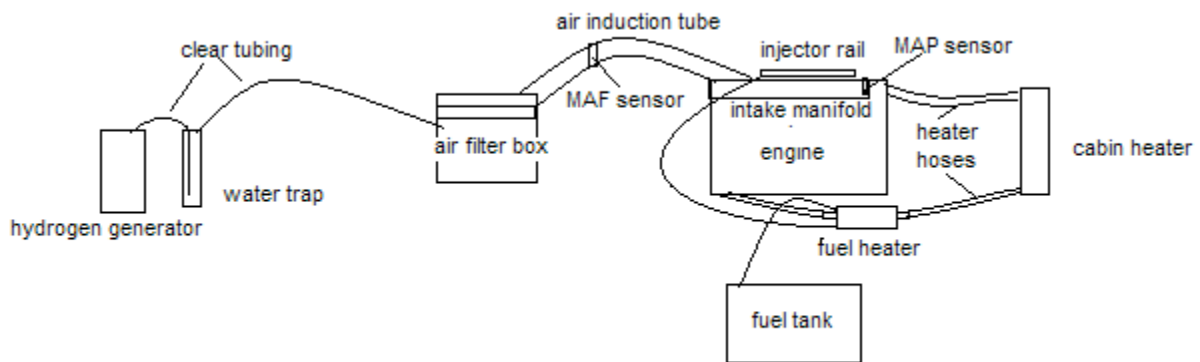


Hydrogen-Boost Fuel Heater Installation Guide

Disclaimer: Any modification to a licensed motor vehicle is at the risk of the operator. Any entanglements with the law and law enforcement officials is the responsibility of the operator. Any licensing, regulation, prohibition, or other entanglements with the governing authorities is the responsibility of the operator.

Modifications to any motor vehicle, licensed or not, come with a risk, and the manufacturer of any device should inform the operator that there is a risk involved. This is the intent of this disclaimer. Modifications of the fuel system may cause hazards that are not ordinarily present with a stock system. Fuel is flammable and any spilling of fuel caused by modifications is dangerous. Heating or aspirating of fuel by means other than by original equipment may also be dangerous. Addition to the fuel, combustion air, or fuel air mix may be dangerous or may cause damage to an engine. Under some rare instances, like extended operation at wide open throttle, running an engine at too lean a fuel/air mixture can burn the valves or cause some other damage to the engine.



Install Fuel Heater. Our fuel heater is self-contained and will be spliced into the heater hose circuit of your vehicle. There are two ways this can be done. If you are sure that your vehicle does not have a shut off valve built into the heater core (I know a few that do) then you can just find a good location to just cut out a section of the heater hose and insert the heater end pipes and clamp the hoses in place. Select a section that is easier for you to get at and install. You will need 2 1" hose clamps, and 2 - 4 smaller hose clamps for the fuel line, 3/8" size. Another way to install the **fuel heater** is to tee into both heater hoses and install the fuel heater into a crossover hose or alternate circuit. This allows for hotter fuel and more efficient combustion. For my experimental vehicle, since I am always changing things I installed a tee with a ball valve on it in both heater hoses leading to the heater core and sent hoses from there to the fuel heater. If there was a valve in the heater core this coolant was not hampered by it because my circuit was an alternative route. One disadvantage to my alternative circuit is that I only get half the coolant flow I could get with a direct splice. My advantage is that when I get a leak in some new component I am testing with, just shut the valves off and I can get home without losing all my coolant. Plus when I want to make a change in the circuit I can shut off the valves and not have to drain the entire coolant system.

Next you will be intercepting the fuel line going to the injector rail from the tank. On some vehicles this is difficult to find so make sure you identify the right fuel line. It

will be the one with a fuel filter between the tank and the engine, as well as a pressure check connection (similar to the valve stem on your tire). On one vehicle it took me two hours to identify the correct fuel line. Hopefully it will be way easier for you. You can always send the fuel heater back, if you find that the installation will be too hard to accomplish.

Carbureted engines or TBI fuel injection carburetor vehicles are the easiest to install. Trucks are the easiest, due to more space under the hood. More modern cars are so tight under the hood, that it makes installation difficult and also hard to find a spot for a hydrogen booster. It is almost like the car manufacturers did that on purpose so you will NOT add any fuel saving devices to your car.

I had to follow the fuel line under the vehicle from the fuel filter to the firewall, where it disappeared from view but I could feel it with my finger. As I reach up from under the car with my finger of the fuel line, my helper reached down behind the engine until he could feel my finger and continued following the fuel line up to the engine, where it disappeared again under the intake manifold. We did find one spot between the firewall and the engine, where we could cut a rubber section of the fuel line and slide in a couple pieces of pipe and install clamps on the rubber fuel line. All this was done by feel since we could not see back there behind the engine. The ends of the attached pipe (3/8" soft copper) were up on top of the engine where we could get at them easily to finish the installation.

An option to cutting the fuel line is to disconnect the fuel line from the injector rail. Then rig a connection that is detachable in emergencies so that if you get a leak in your circuit you can easily detach the fuel heater lines and reattach the stock fuel line. My Saturn had a slide on connector for the fuel line to attach to the injector rail. I simply unclipped the fuel line and slid it off. This exposed the end of the fuel rail that was a short piece of 3/8" diameter pipe. The fuel line had an o-ring inside that sealed onto the pipe and a plastic clip that held it all in place. My set-up rigged a short piece of 3/8" OD pipe onto the end of a hose that I attached to the fuel heater. I slid this pipe into the end of the fuel line and zip tied the two together so the pipe could not slid out. Then on the injector rail I simply clamped a hose onto the short pipe where the fuel line used to attach. Then if I ever had a fuel leak I could cut the zip tie, loosen the clamp, pull off the fuel heater and reattach the fuel line in its stock position. 2 minutes to stop the leak until I get home and fix it right so I can reinstall the fuel heater.

If you have a General Motors product you will need a special tool to disconnect the fuel line connectors. It is best to go buy the tool and ask how to use it. They are very inexpensive (\$3-\$5) and are easy to use if you are instructed by the auto parts salesman.

Increased Engine Coolant Temperature:

The warmer the engine runs, the more efficient it is, up to a point. NASCAR race cars run in excess of 250 degrees Fahrenheit. Most vehicles on the road has an engine coolant thermostat setting of 185 degrees, but more and more newer vehicles are coming out with 195-205 degrees thermostat settings. I prefer to raise the thermostat setting to 205-215 degrees, which is still below the high temperature warning light activation temperature on most vehicles. Getting too close to 250 degrees is not safe for your

engine. Increasing the temperature setting of your engine coolant thermostat is not always easy. Sometimes you can purchase a higher temperature thermostat for the auto parts store but usually not. Sometimes a modification can be made to your present thermostat by increasing the spring tension by securing a spacer behind the thermostat spring. I did this on my Saturn by cutting a slot on one side of a thick washer and spreading the slot until it was big enough to slide over the shaft of the thermostat. Then I pulled the spring down and slide the slotted washer onto the shaft, then I squeezed the slot closed and released the spring. The thickness of the washer will determine the amount on increase in temperature.

Of course if you increase the coolant temperature to close to boiling temperatures this will increase the pressure in your cooling system, which will likely cause leaks in the hoses or heater core. I solve this problem by changing the engine coolant antifreeze to propylene glycol instead of the toxic ethylene glycol. Propylene glycol has a much higher boiling point and is non-toxic. It is used in RVs for protecting the water pipes in the winter when the RV is not in use. Propylene glycol solution is available in auto parts stores and RV centers. Full strength Propylene glycol is available in plumbing supply stores and boat repair shops. I use full strength propylene glycol is I can find it but I have used the solution when I was in a bind. If you use the watered down stuff (solution usually pink) be sure to leave your radiator cap loose so the water can boil out without building up pressure, and be sure to check the level often. Within a few top-offs you will lose enough water from the solution to concentrate it to the point that it will not boil any more water off. I still leave the radiator cap loose because you don't need pressure in the system with propylene glycol and I don't like the pressure causing my hoses and clamps to come loose and leak.

On most vehicles with a fuel return line to the tank and an evaporative emissions control system the fuel heater acts as a vaporizing system as well. Heated fuel returning to the tank creates more vapors than usual and these vapors are routed to the intake manifold via the evaporative emissions control system. Even this vaporizing system is not adequate to get extreme mileage gains.

The combination of a fuel heater and hydrogen boost cell work well together in increasing a vehicle's MPG gains.