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TECH

# 'WHEELING WITH GAS

## [PROPANE GAS, THAT IS]

### Here's a do-it-yourself propane conversion for your 4x4

By Robin Stover

Photography: Robin Stover

**W**hether you're a mudbugger or a rockcrawler, the same set of problems exists when it comes to fuel delivery. Either you stick to your easy-to-work-on carburetor, or you integrate a complex fuel-injection system to keep your engine fed when the going gets tough and the angles get weird. Both systems have their drawbacks. But

there's a third option. What very well may be the best of both worlds for enthusiasts who want the simplicity of a carburetor and the run-at-any-angle attributes of fuel injection just might involve a conversion to propane.

A carburetor is designed to mix air and fuel. We like carbs because they are simple, easy to understand and easy to work on. But when it comes to off-camber situations or steep angles, the carburetor quickly shows its weaknesses. They surface when those angles begin to confuse the fuel levels in the carburetor float bowls. Then there's fuel injection, which can be a nightmare to troubleshoot on the trail, not to mention the high cost of the parts needed for a typical aftermarket EFI setup. To solve both of these annoying problems we decided to convert our carbureted '77 Chevy 4x4 tow truck to run on propane.

Like most 'wheelers, we knew very little about this type of

conversion. Even after intensive research, the process seemed baffling and time-consuming. We remained more or less bewildered until we discovered a company called Technocarb, which specializes in LPG conversions on late-model cars and trucks. One phone call to Technocarb and it became obvious to us that propane technology has come a long way, and that the four-wheeling community is next to benefit from years of propane innovation.

Our donor truck was dynoed before and after the conversion process. The results surprised us. In addition to the benefits we were looking for, conversion to propane boosted the rear-wheel horsepower developed by the stock 350 from 119 to 137. That's good enough to convince us.

**PROPANE POWER!**



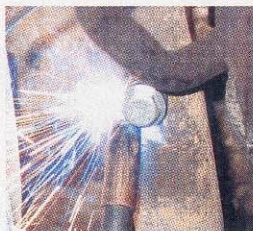


**1** The components from Technocarb were shipped to our door in one small box. Each item was labeled and wrapped individually to make things easy. Detailed instructions and a wiring schematic were also included. Other essentials, however, we had to obtain separately.



**2** In addition to the Technocarb components, we also needed a TB9-8 Holley throttle body and gasket. We purchased one from Meeder Equipment Company in Fresno, California. We also needed 17 feet of LPG hose and two LPG fittings. We contacted a local forklift parts supplier for those. You'll need to round up similar parts for your rig to accomplish this conversion, as they are not available from Technocarb.

**3** The first step of the conversion required a stop at Cal State Muffler in Milpitas, California to have a bung welded into the exhaust pipe. This is necessary to install the oxygen sensor provided in the parts from Technocarb.



**4** The next step was mounting a DOT-approved tank. Rockstar Trux in San Jose mounted our 60-gallon tank under the wrecking boom on the back of the flatbed. We decided on this mammoth vessel for two reasons. First off, it was cheap—we found it for sale in a local newspaper, and second, it provided a large enough reserve of propane for a whole weekend of 'wheeling. Forklift tanks are a good option for those with limited space in which to mount a tank.



**5** Next was the removal of the stock Quadrajet carburetor in favor of a Holley throttle plate. A standard carburetor adapter was used to adapt the Holley throttle plate to the Q-jet intake manifold. Then, the Technocarb mixer was bolted to the Holley throttle plate. A fuel block-off plate was mounted in place of the stock mechanical fuel pump.

## What, Exactly, Is Propane?

**P**ropane is liquefied petroleum gas (LPG). Like natural gas and unlike gasoline, it's a simple mixture of hydrocarbons, mainly propane/propylene and butane/butylene. Propane is a by-product of two modern-day sources: natural-gas processing and crude-oil refining. Currently more than 350,000 vehicles travel the nation's highways using propane for fuel. Propane powers everything from school buses to police cars in dozens of fleets all over the nation. Propane is growing in popularity, particularly among rockcrawlers because of the benefits that come from a clean-burning, pressurized fuel source.

The propane-conversion process can be done either by a DOT-certified shop, or by an individual in his own garage. A converted vehicle must adhere to strict guidelines set by the National Fire Protection Agency and local emissions regulation boards. Regulations vary from state to state, so be sure to check out your state's regulations first.

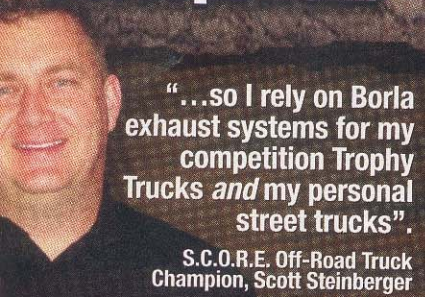


**6** Next, a step critical to the driveability of the vehicle: The fuel regulator/converter (arrow) must be mounted as shown above for the diaphragm inside to function properly. We made a support bracket from scrap metal we had lying around the garage. The fuel lock-off solenoid is visible below the converter. Notice the blue heater hose we used to tie the converter into the vehicle's cooling system. The heat from the coolant is necessary for the liquid propane to change into a gas.



**7** This is the digital power-control stepping motor, which controls flow of propane between the converter and the mixer. Think of this as a precision gate valve that controls the vapor.

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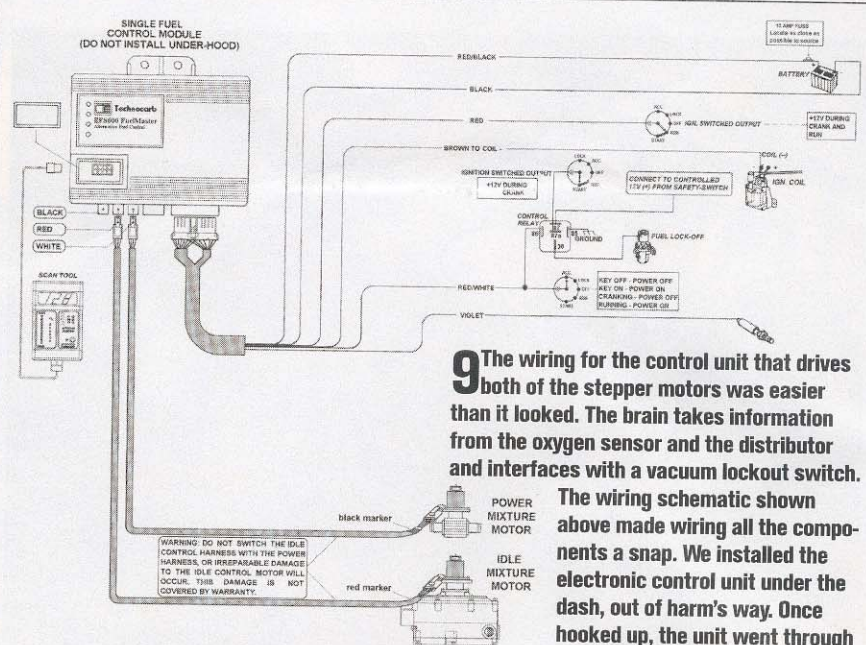
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**9** The wiring for the control unit that drives both of the stepper motors was easier than it looked. The brain takes information from the oxygen sensor and the distributor and interfaces with a vacuum lockout switch.

The wiring schematic shown above made wiring all the components a snap. We installed the electronic control unit under the dash, out of harm's way. Once hooked up, the unit went through a series of data-acquisition

**8** Once all the mechanical components were installed, a hose was needed to transfer propane from the tank to the converter. Special LPG hose must be used to comply with DOT laws, and LPG hose fittings were installed once the proper hose length was determined.



modes until it figured out how to make the engine run smoothly on LPG. Immediately we noticed improved performance, and a distinct exhaust odor which confirmed that our conversion was a complete success. The truck was able to climb and sidehill like never before, and we looked forward to much less frequent oil changes. Thanks to the self-compensating electronic fuel-management controller, this engine won't know the difference between sea level and a high mountain pass, and has much less to go wrong than a typical multipoint fuel-injection system.

**Pros and Cons of Propane Power**

**A** propane-powered vehicle will run at any angle as long as the fuel is available in the tank.

Propane-powered vehicles typically experience less carbon buildup, compared to gasoline- and diesel-powered vehicles. Carbon is what causes your motor oil to change from golden brown to black.

A propane system requires no fuel pump because the propane is stored under high pressure. That pressure pushes it through your rig's fuel system.

Virtually pollution-free, a well-tuned

propane system produces only one by-product—carbon dioxide. That's what you and I emit when we exhale.

Propane has an octane rating of 110, great for high-compression engines.

Fuel availability can be scarce, compared to gasoline or diesel. Fuel refills must be planned in advance.

Tuning a propane-powered vehicle can be a chore if you don't have experience with them. Luckily the folks at Technocarb have resolved this issue by implementing a plug-and-play controller for the tuning process. **FW**

**SOURCES**

- Dyno provided by:**  
**Apex Motorsports**  
Dept. FW, 2555 Lafayette St., No. 101, Santa Clara, CA 95050-2644, 408/562-1000, www.apexmotorsports.com
- Cal-State Muffler**  
Dept. FW, 312 S. Main St., No. 3, Milpitas, CA 95035, 408/946-4341

- Meeder Equipment Company**  
Dept. FW, P.O. Box 12446, Fresno, CA 93777, 559/485-0979
- Rock Star Trux**  
Dept. FW, 45 Wilson Ave., San Jose, CA 95126, 408/295-5055, www.rockstartrux.com
- Technocarb Equipment Ltd.**  
Dept. FW, 30488 Great Northern Ave., Abbotsford, British Columbia, Canada V2T 6H4, 604/854-6264, www.technocarb.com