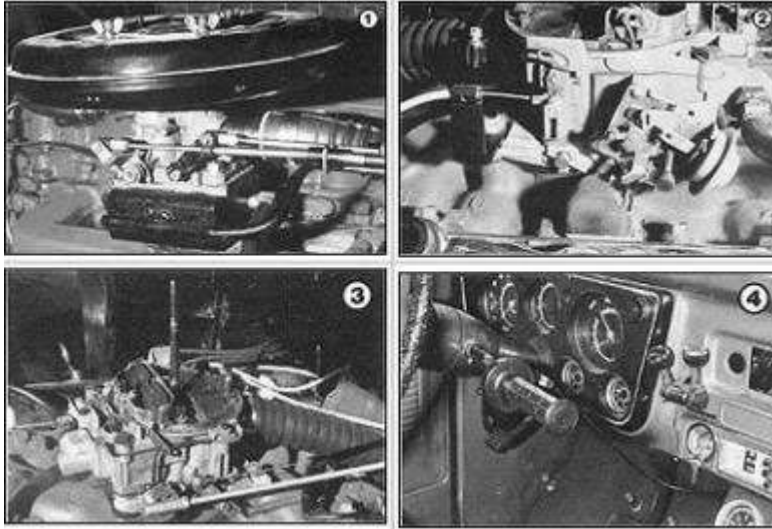


## Woodgas carburetor



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[1] The modified Ford Autolite/Motorcraft 5200 carburetor mounts to our 6-cylinder Chevy sawmill powerplant with a home made adapter box. [2] The air/fuel ratio on our truck's V-8 engine can be regulated, in the wood-gas mode, by a control cable connected to the secondary choke flap. [3] Here's the dual fuel Quadrajets after doing 15,000 miles on our Chevy's V-8. [4] A twist-grip throttle and two bicycle shift levers serve as inside-cab wood-gas controls.

Staff Photos

*The ability to back up your wood-gas power with gasoline can be an inexpensive convenience.*

When we reported on the wood-gas-powered sawmill at MOTHER'S Eco-Village (see issue 78, page 158), we detailed the mechanical aspects of the unit's drive train and described several changes we'd made in the generator, cooler/filter, and circulation systems which — together — produce and prepare the wood-derived fuel.

With this article, then, we'll go on to tell you about the dual-fuel (gasoline or wood-gas) carburetion setup that feeds our six-cylinder sawmill engine, and then explain how we converted our Chevy V-8 truck's fourbarrel Rochester to give *that* vehicle twin-fuel capability.

In both cases, our goal was to simplify our earlier fuel metering designs by eliminating the need for two *individual* carburetors (one for each fuel used) . . . and so, after a bit of preliminary searching to locate common production Garbs that had [1] separate primary and secondary circuits and [2] large enough bores in the latter half to accommodate the necessary flow of wood gas, we went ahead and modified the devices to allow them to handle either liquid *or* gaseous fuel.

Generally, two-stage carburetors — whether they're of the two- or four-barrel type — are designed to operate, under most conditions, on their primary circuits . . . since the small throats, booster venturis, and lean jetting found in these main circuits assure that a minimum of fuel is used.

However, should there be a demand for additional "punch" — as might be required for passing — the large secondary barrels come into play when the accelerator is depressed beyond a certain point, and deliver a

supplemental mixture of fuel and air to the engine's cylinders. This backup system is generally activated by a mechanical linkage that's connected to the primary throttle shaft.

Put very simply, what we did (with *each* carburetor) was to disengage the secondary circuit from the primary and adapt the auxiliary system to enable it to utilize the gaseous wood fuel . . . by doing little more than sealing several orifices with epoxy, modifying the throttle and choke assemblies, and running a large gas inlet port through the carb body's rear wall.

Then, to allow both stages of the device to function independently, we used separate throttle and choke plate controls for each one. This permits the gasoline, or primary, side of the carburetor to deliver liquid fuel to the engine as it's always done . . . but when the throttle plates are closed and airflow through that section is effectively shut down, the secondary — or wood-gas — half takes over and feeds the powerplant instead. In *this* mode, the secondary throttle plates work to control the speed of the engine (as usual), and the choke flap can be adjusted to regulate the air/fuel ratio. (A small tension spring — placed between the choke control cable and the flap lever — allows the pivoting valve to fluctuate slightly and thus seek the ideal position automatically.)

<http://www.motherearthnews.com/Do-It-Yourself/1983-01-01/Build-a-Pair-of-Dual-Fuel-Carburetors.aspx>

The fuel delivery system used on our 250-cubic-inch Chevy-powered sawmill is based on a Ford Autolite/Motorcraft 5200 (used in Pintos with 122- and 140-cubic-inch four-cylinder or 171-cubic-inch V-6 engines), or a Holley 5210 (found in Vegas equipped with 140-cubic-inch fours) two-stage, two-venturi carburetor.

Before making modifications to the Carb body, we fabricated an adapter box to mate the two-barrel fuel mixer to the six-cylinder's single-hole manifold. To do this, we simply cut a 4-1/2" length of 1/8" X 2" X 4" tubular steel, and then trimmed out two 1/8"-thick flat plates to cover the openings at each end of the tube.

Then, prior to welding these caps in place, we used the base gaskets from the original *and* the new carburetor as templates to determine the position of the mounting and venturi holes in the upper and lower surfaces of the chamber. (Note that the bottom opening will be directly below the port for the secondary venturi, since this powerplant is run almost exclusively on wood gas.)

Once the 1-3/8" and 1-1/2" holes had been drilled in the top of the chamber, and a 1-3/4" opening in its bottom, we went on to drill a pair of 13/32" bores to use when securing the box to the Chevy manifold, and four 11/32" holes to accommodate the 5/16" X 1-1/4" carburetor mounting bolts . . . which were inserted from the *inside* and welded in place.

Finally, we drilled and tapped a 27/64" hole in *one* of the end plates, to accept a 1/4" pipe to 3/8" hose elbow fitting (for the engine's PCV line, since these wasn't an appropriate fitting on the manifold) . . . then welded those caps in place to complete the chamber.

With the adapter box finished, it was a simple matter to make up some hardware to support the carburetor's air cleaner and to hold the control cables in place. The latter piece of equipment is nothing more than a 12" length of 1/2" steel rod with 3 inches at one end hammered flat (to a thickness of about 3/16") under heat. The support was then bent into an offset so approximately 5 inches — opposite the flattened end — was left straight.

Because we used an outboard motor throttle control on the sawmill, we fabricated two slotted collars — from 1" sections of 1/4" pipe — to accommodate the grooved cable housings which came with that piece of hardware. By tacking the collars to the support arm, then welding the arm to the side of the adapter box (after first positioning the carburetor on top of the chamber to assure proper alignment with the throttle shafts), we were able to provide a sturdy mount for both gasoline *and* wood-gas control cables. (Of course, if you should choose to use a different kind of throttle arrangement, it'd be a simple matter to weld whatever hardware was required to that support arm instead.)

The air cleaner housing and filter assembly (Fram Kit No. FA189PL2) was purchased as a replacement unit for the standard Vega air box. To fasten it to the carburetor, we simply slipped the assembly over four posts that we'd made by brazing 10-32 nuts to one end of 1-1/2"-long sections of 3/8" brake line, and 5/16" X 1" studs to the other. Wing nuts hold the filter/cleaner unit tightly in place, and a piece of duct tape — spread over the round opening within the center chamber — prevents dirty air from bypassing the element.

The photographs accompanying this article illustrate the modifications that must be made to the carburetor body itself in order to complete the conversion. These, together with their captions, should be all you'll need to build your own dual-fuel carburetor based on our design . . . which can be adapted to any gasoline-powered engine of 300 cubic inches or less.

#### **A FOUR-BARREL CONVERSION FOR BIG-BLOCK ENGINES**

Those of you who are working with larger powerplants will be interested to know that the dual-fuel system on our Chevy truck's 454-cubic-inch V-8 was fabricated from a two-stage, four-barrel Rochester Quadrajete carburetor. Since this piece of equipment was, at one time or another, installed on almost every big-block GM engine, it should be no problem to find one in good condition at an auto salvage yard. (Be aware that the series designation on our unit is 4MV, which simply means that it's a four-venturi design with a manifold-mounted thermostatic choke coil. Other Quadrajete series Garbs may work as well, but we'd suggest finding a pre-1973 model, as pictured.)

Since the Quadrajete is such a popular carburetor, there's no need to make an adapter box to fit it to a non-GM engine, because most auto parts stores *sell* adapter plates — for about \$10 — which will allow you to do just that.

In our conversion, the primary — or gasoline — throttle linkage remained stock . . . and the secondary, or wood-gas, setup demanded little more than the addition of a 1/8" X 3/4" X 3" arm to the throttle shaft, which we connected to the throttle cable of a motorcycle twist-grip equipped with a manual cruise control (refer to Photo 26).

The secondary choke flap position, which determines the amount of air entering the wood-gas section of the carburetor, can be adjusted with a bicycle gearshift lever and cable. (This setup, like that on the smoke throttle, is secured to the controlled component by way of a crimped eyelet at the cable's tip.) A second bike shifter — this one connected to the center rivet of the distributor's vacuum advance diaphragm — governs the engine's ignition timing under load.

Finally — in order to allow the stock air cleaner housing to clear the wood-gas feed tube — we made up a 2"-high, 5"-diameter sheet-metal collar to fit between the carburetor and its lid, then simply threaded in a replacement mounting that was 2" longer than stock.

The step-by-step four-barrel carburetor conversion is detailed in the accompanying photos and captions, and the modified fuel mixer should be compatible with any V-8 engine having a displacement greater than 300 cubic inches.

*EDITOR'S NOTE: Those interested in seeing a detailed illustration (in "exploded" form) of the carburetors described above can get further pictorial information from any popular auto repair manual, likely available in most local libraries. For information on how to get detailed plans for a complete wood-gas system, turn to page 45.*