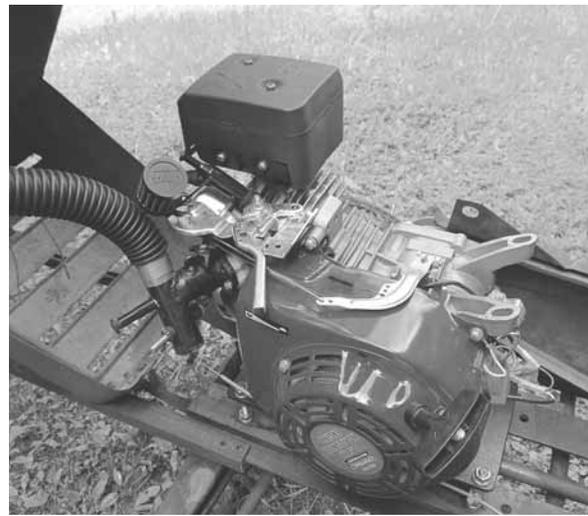




Jeff Davis runs his Wheel Horse garden tractor on charcoal, modifying a 30-lb. propane tank to make the burner unit. Gas runs through two 2-ft. long, 4-in. dia. pvc pipes.



Filtered gas runs through hoses into the tractor's engine, a 6 1/2 hp. Honda clone. Davis fabricated a carburetor to better match the engine to the charcoal gas output.

By Jim Ruen, Contributing Editor

## Garden Tractor Powered By Wood Charcoal

Jeff Davis runs his Wheel Horse garden tractor on charcoal. The burner takes up less space than a wood gas unit and Davis makes the charcoal himself.

"Wood gas can be tricky, but just about anybody can make a charcoal gasifier work," says Davis. "The secret is using clean charcoal to avoid tar. If you do that, it's hard to go wrong."

A charcoal fuel system requires a burner, a cooler, and a way to filter the gas before it enters the engine. Davis modified a 30-lb. propane tank to make the burner unit. He inverted it and cut a hole in the "new" top. This allowed him to hold it of any residue and to mount a tube to clean charcoal.

"The larger the size, the longer the run time," says Davis. "I simply used a tube I had on hand. I made a top for it out of steel plate and used silicone bathroom caulk for the gasket."

In order to turn the tank into a burner, Davis applied a layer of black stove repair sealant and a layer of refractory material for a lining.

A simple gas cooler made from exhaust elbows encircles the filler tube with the first elbow welded to an exhaust port on the side of the tube and near its top. Gas produced as the charcoal burns rises to the top of the tank. When the engine starts, it pulls gas through

the cooler and filter, then into the carburetor.

Initially, Davis used the propane outlet port as an air inlet into the tank through a hole in the refractory material. He has since replaced the outlet port with a grate.

A pan of water is held in place under the tank with a spring. When charcoal is burning and producing gas, air is pulled in through 2 small inlets mounted in the side of the pan. Closing off these air inlets aids in shutting down gas production.

"The grate reduces the temperature of the burn," says Davis. "The water extinguishes any hot embers that fall out of the air intake and even serves as a mirror to view the glowing charcoal above."

The second-generation prototype replaced the frame extension with a short frame for the processor alone, mounted on a standard 2-in. receiver hitch male insert.

"The receiver hitch insert gives me the option of also mounting the gas producer in back of the tractor or on a stand for stationary gas production," says Davis.

Gas runs things through two, 2-ft. long, 4-in. diameter, pvc pipes. They are connected in series and mounted to each side of the tractor. The gas travels first through one with a sock filter in it to trap larger particles. From there the gas continues to the second tube,

which is filled with 1/2-in. thick sponge foam rolled up like a tube. It is designed to filter out finer particles.

To start the tractor, Davis fills the tank and the hopper tube with charcoal. With the pan out of the way, he uses a propane torch and forced air from a battery-powered mattress inflator to ignite the charcoal on the grate. Once sufficient gas is being produced to light with a match, he starts the engine.

Davis replaced the Wheel Horse engine with a 6 1/2 hp. Honda clone. The belt drive connects to the transaxle. He fabricated a carburetor to better match the engine to the charcoal gas output. He also advanced the timing.

"You could use the engine as is with charcoal gas, but there is some restriction," says Davis.

Without the restriction, the little engine produces plenty of power. He is even able to pull small logs out of the woods.

Davis has developed several sets of directions for modifying the engine and building the carburetor, as well as fabricating the gas processor. He shared them under the Creative Commons process that allows others to use the information and share it if attributed, but not for commercial purposes or to be altered.



Pvc "filter" pipes are connected in series, mounted on each side of the tractor.

He is also in the process of fabricating a rocket-style furnace to make his charcoal.

"I will be able to use the heat produced making charcoal for space heating and then use the charcoal to fuel vehicles," says Davis. Check out a video of Davis' charcoal-fired garden tractor at [www.farmshow.com](http://www.farmshow.com).

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## Giant Store Repairs And Sells Farm Toys

The Le Mars Toy Store is a mega toy tractor dealership with more than 10,000 toy tractors, trucks and farm equipment, not to mention pedal tractors and equipment. Some are brand new, while others may have been kept in original boxes for decades. Still others were played with for years before being sold. Many have been repaired, restored and customized. Like any tractor dealership, there is a service department, a parts department and even a welding department.

"We're known for our loader tractors, but we also make our own wheel weights, laser cut and machine parts, tools, rims and tires. We do unique painting that brings toy tractors to life," says Albert Schulz, store owner.

In addition to loaders and wheel weights, Schulz and his 6-man crew can add working 3-pt. hitches, moving clutches and levers, chrome pipes, cultivators and more. Combines get customized heads and platform extensions.

"I've got a man who can weld cast iron. That's not something a lot of people can do," says Schulz. "We've learned from scratch here and gotten very good at it."

Schulz, a farmer/rancher and accountant, got into his toy tractor dealership accidentally.

When he moved his farm accounting business into an old department store in Le Mars, a secretary suggested he put some of his toy tractor collection in the windows. When people asked about buying them, he decided to set up a store for the Christmas season. Over the past 19 years, it evolved into a year-round enterprise that has attracted customers from 47 states and 12 other countries.

Customization started when people asked if he could fix a broken toy tractor or they wanted a tire or muffler. Sometimes they would indicate they wished a new toy had an attachment of some kind. Schulz started to meet the demand.

"We get lots of requests for old equipment and have restored toys going back to the 1920's," he says. "You buy a customized tractor from us, and you'll catch the fever. I have a guy from Canada and another from California who come each year to pick up a customized toy and order another. I'll have a woman bring in a toy her husband had as a boy and ask that it be restored by Christmas."

Schulz is also proud of the work they do on pedal tractors. He warns that full restoration isn't cheap to do, but it's worth it.

"They look better than they did coming



Toy tractor dealer Albert Schulz with one of his toy loader tractors.

from the factory," he says. "We put a clear coat over the paint that is like glass."

Schulz buys collections of toys from estates or collectors. His advice to anyone is the same. "Before selling granddad's collection, set aside a piece for each of the children," he says. "Also, sell the rest in one group. If you try to sell individually, you'll be left with the dogs."

Like the "not cheap" pedal tractor restorations, customization can get pricey. He has sold a \$6,000 toy combine and others for \$4,000 to \$5,000. Tractors can run into the hundreds of dollars and more.

"When a customer calls or stops in with a toy, we ask what they want done, tell them

what we will do, and provide an estimate before we start," says Schulz. "We tell them up front and can show them the work we do. If a mistake is made, we fix it for nothing."

Schulz loves the people who come to his store and only indicates one regret. "I wish I could find someone to buy into the store and learn the trade," he says. "The people we work with are astounding!"

Check out the Le Mars Toy Store and Albert Schulz on video at [www.farmshow.com](http://www.farmshow.com).

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