Electric-Powered Hydraulic Log Splitter

Matt Armstrong

Above: Matt Armstrong's converted electric / hydraulic log splitter ready to...split.

We bought a 5 hp gasoline engine powered hydraulic log splitter (1150-C086) at Northern Hydraulics' store in Marietta, Georgia. It is a horizontal only splitter, the cheapest one they had.

We split Georgia red oak for firewood to sell. As you can imagine, the noise of the engine was about to drive us bonkers. Even with high quality ear protectors, the noise was bad due to its low frequency content, which ear protectors don't attenuate.

After considering welding a car muffler onto the 5 hp engine, we thought it would be more fun to convert it to electric.

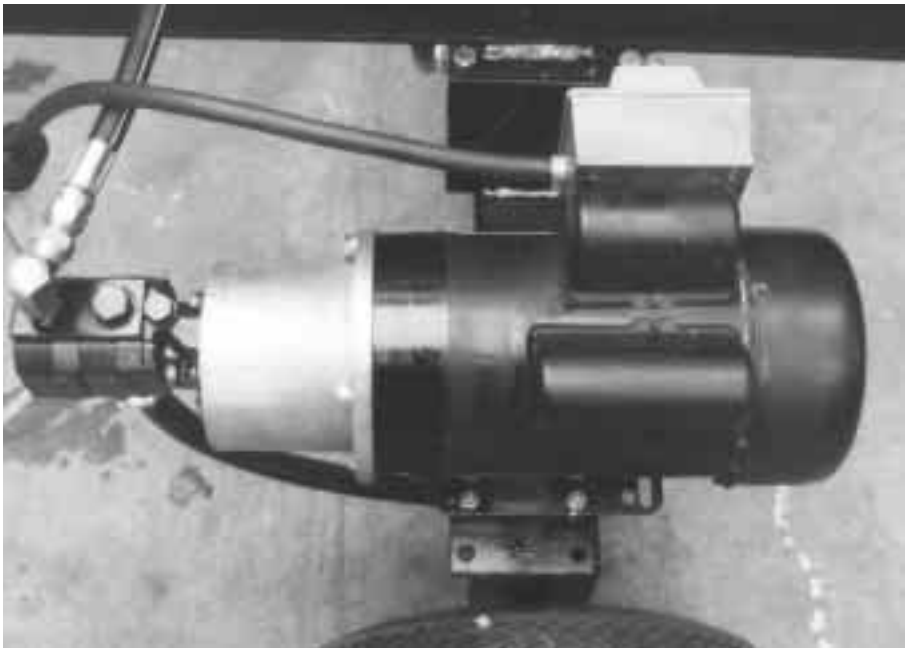
Looking at Northern Hydraulics' catalog, we found the following two equations: 1 hp electric motor = 1.5 hp hydraulic motor and 1 hp hydraulic motor = 1 2/3 hp gasoline engine.

Above: Quieter, cleaner, more powerful, less smelly, all-in-all a better tool.

To equate an electric motor to a gasoline engine, we multiplied 1.5 X 1 2/3 and got 2.5.

So a 1 hp electric motor = a 2.5 hp gasoline engine. Since the engine being replaced was a 5 hp gasoline engine, we needed a 2 hp electric motor.

A reasonably priced C-Face (56C frame) 2 hp, 230 volt motor (22109-C086) was found at Northern Hydraulics for $139.99. C-Face motors have a smooth machined ring on one end. Adapters fit onto this ring and are held on by bolts into tapped holes in the motor.



Above: The 2 hp, 240 vac motor more than does the job.

We found an adapter (6Z070) in the W.W. Grainger catalog for $28.15. This aluminum adapter matches up to the C-Face motor on one end. The other end matches up to the 4 bolt (4F17-4 bolt pattern) hydraulic pump. The motor and pump shafts project inside the adapter. There's a coupler on each shaft. Between the couplers is a star-shaped piece of rubber. This compensates for any slight misalignment.

The gasoline engine had a 3/4 inch shaft. The new electric motor had a 5/8 inch shaft. We had to buy half of a 5/8 inch coupler (3004-C086) from Northern Hydraulics for $6.59. The old rubber insert still worked OK since the only difference was the shaft diameter on one of the two couplers.

The motor is rated to draw 8.4 amps at full load at 230 volts. Wanting about 100 feet of wire on the splitter we bought a 12 gauge, 3 conductor extension cord from Home Depot. 12 gauge wire is rated for 20 amperes. There was plenty of excess capacity in the wire. However, the real question at 100 feet is voltage drop. Our calculations show an insignificant voltage drop.

We mounted a heavy duty 20 ampere switch from Home Depot on the splitter and attached the other end of the 100 foot extension cord to an electric clothes dryer plug. Clothes dryers are on a 30 ampere circuit, so there was plenty of capacity. Also, clothes dryer outlets are installed on every house around here. We knew we could take the splitter within 100 feet of any home and use it.

The electric motor operates at 3450 rpm. This is about the same speed as the gasoline engine at 3600 rpm. No changes were necessary here.

No hydraulic hoses needed to be changed. We didn't even remove them. We did raise the splitter up about six inches using several pieces of two inch box tubing. This is so we wouldn't have to lean down over the splitter. The electric motor was mounted onto the old gasoline engine mounting plate with four bolts.

Then we turned it on. Quite a bit of wood had been split before changing the engine to an electric motor so we were quite familiar with how the splitter felt and sounded when hitting knots. It was suprising to find that the electric motor seemed to have more power than the gasoline engine. Based on this, we probably could have gotten away with a 1.5 hp electric motor.

One thing we were not prepared for was the sound of the hydraulic pump. The noise of the gasoline engine had previously masked the hydraulic pump sound. A conversation can easily be carried on while splitting wood with the electric motor, however the hydraulic pump sound is somewhat irritating. We ended up wearing push-in foam ear plugs to attenuate the high frequency pump noise. These don't affect conversation at all.

We used to split wood well into the evening in our subdivision and frequently heard about it from the neighbors. After switching to electric, several neighbors asked us if we got rid of the log splitter.

As an acid test, we jammed the splitter ram into a sideways log to get the pump to max out. Then measured the voltage at the breaker panel and at the motor terminals. The loss was only about 3 volts. This

tiny voltage drop is well within motor design guidelines. When maxing out the pump, no audible speed drop in the motor was detected. We were amazed!

Since the splitter now feels like it has more power, we went one step further. Previously a horizontal wedge that slips over the top of the vertical wedge had been fabricated. This gives us four pieces of wood output instead of two and dramatically reduces splitting time. When this was used with the 5 hp gasoline engine, the engine's governor would really kick in to try and keep the engine speed up. We were worried that this might overload the electric motor. Not so. In fact, no difference in motor speed is noticeable at all. However, if we're splitting a 3 foot diameter log, we'll remove the 4-way splitter for the initial split.

Overall we much prefer the electric motor over the gasoline engine. The gasoline engine was sold for $100 recovering about half our cost. And we no longer have to fool with gasoline, oil, and cleaning the air filter.

Could a DC motor be used? Probably. I'd use a 24 VDC, 1 hp permanent magnet motor and just avoid logs with large knots.

Next project: A 24 VDC powered homemade go-cart.

Access

Matt Armstrong, Matt Armstrong, Inc., dba Matt the Mechanic, 7 Fairview St., Cartersville, GA 30120 • Shop 770-382-8402 • Home 770-514-7223 • Fax 770-382-7637 • Email: FixPorsche@aol.com

Northern Hydraulics, PO Box 1499, Burnsville, MN 55337-0499 • 800-533-5545 • Fax 612-894-0083

W.W. Grainger Offices throughout the country and overseas. Call 800 directory assistance for the office nearest you.