

“Geared-Up” Pto-Driven Generator

Jeff Kohl, Northfield, Minn., wanted to have a pto-driven generator in case the electric power ever went out. However, he didn't want to run his tractor's engine at full throttle for an extended period of time in order to operate the pto shaft at 540 rpm's. So he built a portable, 3-pt. mounted unit and fitted it with a 540 rpm pto shaft and a series of V-belts. The belts “gear up” a jackshaft that hooks up to the generator to operate it at the proper speed.

“I use a 38 hp. diesel engine and a 540 rpm pto to operate it. The belt-driven unit lets me run the tractor engine at only about two thirds wide open. I'm operating the pto shaft at a slower speed than the generator requires, but this unit boosts the rpm's,” says Kohl.

“I finished building it last summer. I could have bought a commercial gas engine-powered generator, but it would have sat in my garage until I needed it. And I would have had to pull it out a couple times a year to keep it in operating condition. I can park my pto-driven generator in my garage for years until I need it.”

The generator “cage” measures 30 in. wide, 36 in. long and 28 in. high and mounts on 4 caster wheels. Kohl bought a 13,000-watt, pto-driven North Star generator at a sale for \$550. He used big bearings to

mount the pto shaft in place and ran a long 1 1/4-in. dia. shaft to a big pulley on back. The pulley belt-drives 3 other pulleys that drive a jackshaft that hooks up to the generator.

It needed 3,600 rpm's in order to produce 120/240 Vac at 60 Hz. “Since a power unit needs 2 hp. per 1,000-watt generator, I needed a tractor with at least 26 hp.,” says Kohl.

“All commercial pto-driven generators need the pto to run at 540 rpm's, which means I would have to run my tractor's engine at 2,600 rpm's - almost full throttle - in order to produce a pto speed of 540 rpm's. I didn't want my tractor to run at full throttle for a long time, so I selected a tractor speed of 1,800 rpm's as a goal for my generator. This would run my pto at 373.8 rpm's.

“To gear up the generator, I used some old pulleys I collected over the years. I had to do some math to figure out what I needed.

“I spent a total of less than \$1,000. I paid \$100 for the pto shaft, \$86 for the V-belts, and \$60 for the caster wheels. It took me a long time to find all the parts that I needed. I got the angle iron, shafts and bearings free where I work.”

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Jeff Kohl wanted a pto-driven generator on hand in case the electric power went out, but didn't want his tractor's engine to run at full throttle for a long time. So he built a 3-pt. mounted unit and fitted it with a 540 rpm pto shaft and a series of V-belts.

Belts “gear up” a jackshaft that hooks up to generator to operate it at the proper speed.



How To Add Hydraulics To A Garden Tractor

All-around garden tractor handyman Norman Ng says it's easy to turn an old garden tractor into a serious earth moving machine or to convert its manual lift system to hydraulic. Ng says adding hydraulics can multiply a garden tractor's engine power by 1,000 times or more.

“By using hydraulics a person can equip a garden tractor with a front-end loader, a backhoe, a 3-pt. hitch, a dump trailer and more,” Ng says. “All you need to understand is that liquids are incompressible, they transmit pressure in all directions with equal force and liquids under pressure always follow the path of least resistance.

“Engines in garden tractors have enough power to push hydraulic oil up to 2,000 psi or more,” Ng says. “Oil at this pressure going into different size cylinders can handle almost any tool imaginable.”

Ng built a front-end loader and a backhoe for a 1974 Harvester Cub Cadet model 149 in 2015. A reservoir built into one of the loader towers holds the oil. Power came from an 8 gpm pump connected to the engine's

front pto. Hoses from the pump ran into a two-spool directional control valve with a power-beyond port. That supplied oil to a 6-spool control valve. Ng's system was set for a maximum 1,000 psi.

The backhoe uses 6 different cylinders. Two are on the outriggers, one raises and lowers the arm, one moves it side-to-side, another tilts it, and another powers the bucket. Ng says the backhoe works just as good as a commercially-built model. The entire cost for the tractor, loader and backhoe was about \$4,000, considerably less than buying one. He adds that he was able to buy some parts at wholesale through his business and make others. He used plans for the backhoe and loader from P.F.Engineering (www.loaderplans.com).

“Don't think you need big fancy welders to build attachments, because I made the backhoe with a generic brand 140-amp, 120-volt welder that cost me \$400,” Ng says. “I used cheap angle grinders to cut the steel. The hardest part isn't welding or fabrication. It's planning, measuring, layout and cutting. Be



Adding hydraulics to a garden tractor can multiply its engine power by 1,000 times or more, allowing you to do many jobs not possible before, says Norman Ng.

patient and plan, plan, plan before cutting.”

Ng says the same principle he used on the backhoe and loader can be applied to tools such as a forklift, a 3-pt hitch or a snow blade. Instead of using a hydraulic cylinder you'd use a hydraulic motor and add a pto shaft to power the implements. He says you can vary the motor speed by controlling the volume

of oil that feeds it from a reservoir, through valves and the device.

Ng runs an after-market parts business and has basic tech articles on his website.

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Handy Chain Hook-Up Device

“I bolted a chain hook and grab hook together to make a handy device for lifting heavy loads with my chain hoist,” says Melvin Thies, Jacksonville, Ill.

“I attach the chain hook to the hook on the hoist, and attach the grab hook to the chain securing the load. It fits tightly onto the chain. For example, I recently used the device to lift a riding mower deck into the back of my pickup.

“I use the same idea when pulling out brush in the field with my tractor and a log chain. I made two sets of hooks so I can hook up more than one brush puller to the chain at a time. The grab hook keeps the load from shifting on the chain.

“The photos show two different ways I made the hooks.”



Photo shows 2 different ways Thies bolted a chain hook and grab hook together to lift heavy loads with his chain hoist.

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Grab hook keeps load from shifting on chain. Thies uses the hooks for a variety of jobs around the farm.