

## Electric Power Steering Added To Kawasaki Mule



**Kokur replaced the factory steering column assembly on his Kawasaki Mule with one off a Toyota Prius. He also attached the Toyota's steering computer module under the dash and wired it to the battery.**

John Kokur, Carlisle, Iowa, updated his 1993 Kawasaki Mule with electric power steering, spending a total of only \$160.

"I got the Mule from my father-in-law when he bought a newer Polaris Ranger equipped with power steering," says Kokur. "The Ranger was much easier to steer, especially when backing up to a trailer or

maneuvering in tight areas.

"I investigated power steering kits for my Mule, but at \$600 to \$700 they cost more than I wanted to spend. I remembered an article in FARM SHOW (Vol. 41, No. 5) about someone who added electric power steering out of a car to a smaller tractor. So I went to a salvage yard and found a 2006 Toyota Prius. I removed the steering column assembly and steering computer module, and cut the power and the car control harness to use as pigtail connections to the module."

He removed the factory Mule steering column, as well as the roll cage and front plastic for access to the back of the dash. After he cut off all the factory Prius mounts, he made brackets to attach the Prius column to the frame and dash, and also made the Prius column more vertical and tilted it slightly to the right of the Mule's original location. "This lessened the angles of the steering shaft U-joints, and also gave me more room to enter and exit the Mule," says Kokur.

With the steering column in place, he started working on the steering shaft. "The Prius used a small shaft between the column and the rack and pinion, which was a splined two-piece slip shaft. I separated the two pieces, and luckily, the half that hooked up to the Prius' column was the female half. I measured and cut the factory Mule's shaft, and, to my amazement, it fit nicely into the female shaft from the Prius. I had to marry the two shafts together because none of the splines were the same size from the Toyota to the Mule. After attaching the shafts to the column and to the Mule's rack and pinion, I welded them together."



**He cut the Toyota power and car control harness to make pigtail connections for the steering module.**

Next, he attached the steering module to an out-of-the-way spot under the dash and then wired it to the battery.

"I wanted to retain the Mule's steering wheel to keep the vehicle looking original. I found a round steering shaft adapter on eBay for \$15 and it almost fit right out of the box," says Kokur. "I ended up grinding out the splines of the adapter with a carbide burr and slipping it on the Prius column where the steering wheel would normally fit. I then cut the Mule steering shaft about an inch and a quarter below the splines of the steering wheel, and ground it down to fit inside the large side of the adapter. After tapping it all together, I welded both sides. A piece of 1

1/2-in. heavy-duty radiator hose clamped to the Prius' steering column camouflages the shaft and adapters."

The conversion worked perfectly. "It used to take both hands to turn the steering from lock to lock with the Mule sitting still, but now I can steer with one finger," says Kokur. "You can hardly tell the steering column has been replaced from just looking at the machine."

Kokur says he spent a total of \$160, saving a fair amount of money over a pre-made kit and a whole boatload over a new Ranger.

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## Handy Portable Power Units Run On Cordless Batteries

Whether you want to start a vehicle's dead battery or you just need a portable AC power unit, you'll be interested in these 2 new products from KC Innovations, Loogootee, Ind. Both make use of commonly available DeWalt, Milwaukee or Makita cordless tool batteries.



**EZ Start eliminates the need for jumper cables. You just install a cordless tool battery, hook up the cables, and flip a switch.**

### EZ Start

The EZ Start comes with a 60-amp circuit breaker/switch, and heavy-duty jumper cables. To operate the unit just hook up the cables, install a tool battery, and flip a switch.

"EZ Start eliminates the need for jumper cables and a second vehicle, or having to drag around a heavy 12-volt battery," says Doug Knepp. "You just install a tool battery and hook up the cables. It's small enough to fit in your car's trunk.

"There are portable power packs on the market, but as far as I know they're limited to one battery brand. Jumper cable kits equipped

with a built-in battery are also available, but you can't use the battery for anything else. Also, a jumper kit with its own battery has to be charged periodically or else it won't have power when you need it. And if left in a discharged state for too long, the battery will be ruined. Cordless tool batteries recharge in only about a half hour."

The EZ Start sells for \$119.95 plus S&H.



**Han-D-Power II operates off one or two 18 or 20-volt batteries to provide portable electric power.**

### Han-D-Power II

The Han-D-Power II operates off one or two 18 or 20-volt batteries (not supplied), and contains an inverter that supplies portable AC power. It consists of a compact 10 by 9 by 6-in. metal box equipped with slide-in brackets for batteries. The unit has 3 ports - two 110-volt AC outlets and a USB port.

"It provides electric power anywhere you want it, whether you're in the field or camping in the wilderness. There's no need

## Wall-Mounted "Waterless Urinal" For Shops

Tired of leaving your shop to go out in the cold, rain or snow to relieve yourself? Shop Relief may be your answer, says Brian Laine, Arlington, Wash.

ShopRelief is a waterless fold-out urinal for your shop. Installed between studs, it appears as a flush stainless steel panel against the wall. To use it, pull out the chute. When done, just push it closed.

The unit drains through a hose that goes inside your wall space and then to the outside. It doesn't require any plumbing or use any floor space. You just cut a rectangular opening in your drywall between studs, drill a hole on the outside bottom of the wall, run the discharge hose out into a holding container or buried hole filled with some rock. The urinal attaches to the wall with 4 screws.

"The urinal can be installed into walls with standard 16 in. on-center 2 by 4 construction, or any spaces that are larger than this," says Laine.

Sells for \$295 plus \$18 shipping.

A package of 10 deodorizer blocks sells



**Waterless fold-out urinal installs between wall studs and drains through a hose to the outside.**

for \$19.99 including free priority mail domestic shipping.

Contact: FARM SHOW Followup, TechnoVersions LLC, 7921 Wade Road, Arlington, Wash. 98223 (ph 425 879-2890; tachmatch@aol.com; www.technoverions.com).

to drag a heavy generator around or start a gas engine," says Knepp. "Works great to operate any electric-operated tool under 600 watts including heavy-duty, high-wattage tools such as a hammer drill. Also, it has a pure sinewave power source so you can safely use it to charge your laptop computers and iPhones, or even cell phones."

How long the batteries last will depend on the application, says Knepp. "If you want to

charge a cell phone the batteries will last for several days. To provide power to a big tool that operates on 600 watts, the batteries will probably last only for 1 to 2 hrs."

The Han-D-Power II sells for \$249 plus S&H. The company is looking for dealers.

Contact: FARM SHOW Followup, KC Innovations, 6699 North 1200 East, Loogootee, Ind. 47553 (ph 812 636-3684; sales@kc-innovation.com).