

How to Convert Cordless Drill Motors for Use in Robot Drives

by Peter Smith

Many robots use small DC motors and a gearbox to reduce the RPM and to increase torque. One popular way of doing this is to use the combined gearbox and motor from a cordless drill. These typically have a 12V-18V motor attached to a 36:1 planetary gearbox.

There are two main sources for suitable drills. Harbor Freight (www.harbor

freight.com) and Homier (www.homier.com). Harbor Freights Model 91396 and Homier 02899 are suitable. Avoid drills that have "hammer" features and remember, the cheaper the better. It should not be necessary to pay more than about \$25 per drill. Various voltages are available but the drills tend to use standard 550-sized motors, so even if the voltage of the one you get is not really suitable, the motor can be replaced by another more suited to your application.

Output speed is usually about 500 RPM at the rated voltage. They are powerful enough for a pair to run a 12 lb combat robot (the robots that took the first three places in the 12 lb class in the 2006 RFL National Championship all used cordless drill parts).

The drill used in this article is the Harbor Freight 91396 (see Photo 1) set which came with an 18V battery, a small flashlight, plus some assorted drill bits and screwdriver bits. The first thing to do is charge the battery per the manufacturers instructions.

You'll need to remove the

chuck from the drill (see Photo 2) before disassembling the rest. The chuck is locked in place by a small, left-hand threaded, screw inside the chuck itself (see Photo 3). If you are really lucky, you can remove this Phillips #2 screw using a screwdriver (remember to turn clockwise to loosen a left-hand thread), but they are usually too tight.

There are two methods which will work to remove it. The first is to use another drill to start drilling out the screw. The heat and torque applied by the drill bit will loosen the screw and it will come out rather than be bored out by the drill. The downside of this approach is that you need a second drill and that the screw itself will be damaged. The second method — and the one that I use — is to get an "impact driver." The driver must be able to loosen or tighten screws (many of the cheaper ones only loosen right-hand thread screws and will only make the left-hand threaded screw on the drill even tighter!) McMaster Carr part 5610A2 (www.mcmaster.com) will do the job. I needed to use a 1/4" socket and an extension piece to get it to be

PHOTO 1



PHOTO 2



PHOTO 3



PHOTO 4

