

GEARED MOTORS

As is the case with many BEAM parts, you can either buy, salvage, or build the geared motors you'll need for your 'bots. If you just wanted to buy off-the-shelf, geared motors are generally expensive; I generally resort either to salvaging or building mine.

You can buy some nice gear motors; although it's tough to find any motor that's both readily available and affordable. The best deals will generally be from surplus companies that are selling goodies that they have salvaged themselves. Here are some retail "finds":

BG Micro -- These folks sporadically have one, very nice, gearmotor for sale. Currently, it comes as a part of a lens assembly, and is listed as part LEN 1022. \$10 (US) plus shipping; shipping's much cheaper if you order just the motor, rather than the whole assembly. I have details and test results on this particular motor [here](#).

Andy Pang -- just an average guy, but he's got Copal motors (part #020, down at the bottom of the page) for sale.

As for salvage, I've got some preferred salvage sources for gearmotors:

Floppy drives -- One of the most-reliable sources of salvage gear motors is from Macintosh computer floppy drives. The drive mechanism is essentially the same for either internal or external floppy drives; buy whatever's cheaper (you can often buy these at swap meets on eBay for \$3-4). I've got pictures of a representative example floppy drive mechanism here.

In the process of disassembling one of these beasties, you'll find that they are full of interesting and useful hardware. You'll want to hang on to the circuit boards, fasteners, and micro switches for later use in your projects. If you're really careful, you can also drive out the drive's main bearing (a tiny little ball bearing race, press-fit into the drive frame).

Primarily, though, you'll want to pull out the 2 reusable motors -- a gear motor, and a stepper motor. The gear motor is used to eject the floppy, and has many BEAM uses. The stepper motor is used to move the read / write heads in and out.

By the way, while the gear motors from floppy drives are cheap and durable, they won't run at low voltages (see my gearmotor comparison page); most likely you'll want to save these for battery-powered 'bots.

Motorized lenses -- You can occasionally find a projector, camera, or camcorder lens that has built-in focus and / or zoom motors. These are generally small, high-quality, low-current motors, and accordingly are a real treat for BEAMbots. If you have a friend (or make a friend) at a camera store, you can occasionally get one of these from junked equipment.

If you haven't either bought or salvaged the gear motor you need, you'll just have to build your own. I'm aware of just two ways to get there from here:

1. Add a gear train to a small DC motor
2. "Hack" a hobby servo

Adding a gear train to a small DC motor

This can be the cheapest way to go, if you have the patience and mechanical skills (oh, and lay off the coffee for a bit...). You'll also need to find gears. You can get them from a number of places...

- KTUs (Kitchen Timer Units) -- those little, wind-up timers for the kitchen. Generally, this isn't cost-effective (off-the-shelf, these can cost up to \$10; there are cheaper ways to get gears); keep your eyes open, though, for freebies at yard sales, and the like.

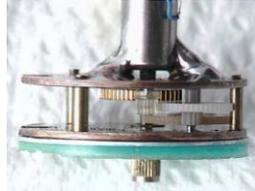
- OTUs (Oven Timer Units) -- you can find these in old ovens, washing machines, dishwashers, even an occasional clock radio 
(the old kind with the mechanical guts -- the source of this shining example in the image to the right).
- Replacement servo gears -- you get these from hobby shops (about \$3 US per set from Tower Hobbies), they're intended as replacement parts for the gears in hobby servos. You will, of course, have to build the "gearbox" that will hold your gears together with respect to each other, and together with your motor. But more on that in a bit...

Once you have your motor and your gears lined up, it's time to put them together. If you salvaged an OTU or KTU, you already have the gearbox and are ready to go. Otherwise, you probably have to build your own gearbox as well.

As for the assembly, I'll just point you to the excellent descriptions and tutorials already out on the web:

If your tastes lean to KTUs, Robert Stein ("Eisbot") has a good tutorial here on building a gear motor from a surplus "Walkman" motor and wind-up kitchen timer.

Solarbotics (your one-stop BEAM shop...) has a neat tutorial on building a gear motor from an OTU here. The end result winds up looking like this:



(image courtesy of Solarbotics)

Meanwhile, if you'd like to look at using servo gears to free-form your own gearbox.

"Hacking" a hobby servo

Good hobby servos can be found for under \$10 (US), but bear in mind that they're designed for a lifetime of just a few hundred hours (pager and "Walkman" motors will, in general, last longer). Hobby servos can easily be modified for use in BEAM robots.

Source: http://www.solarbotics.net/library/pieces/parts_mech_garmotors.html