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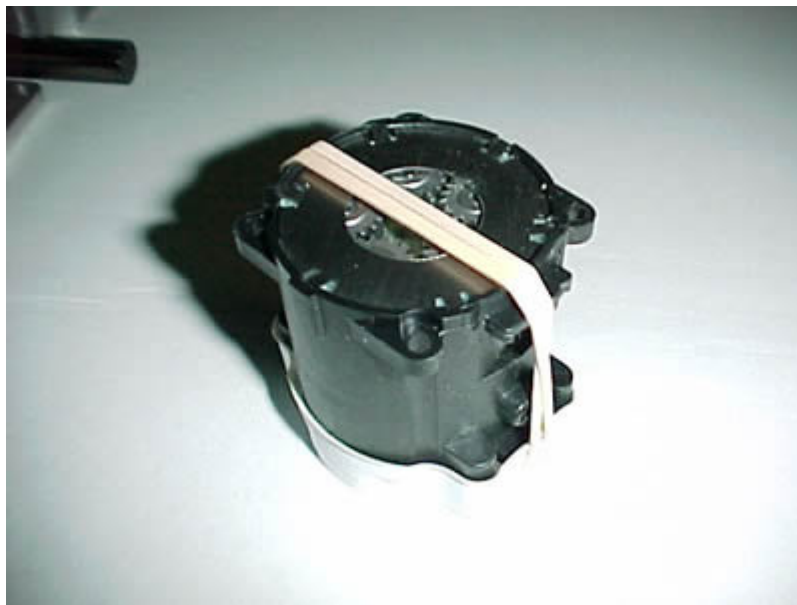
Team ▼

## Building Tips

### Team Delta 18V DeWalt drive motors

By [Brett "Buzz" Dawson](#)  
[Team DaVinci Robotics](#)

A very popular alternative to NPC motors is the venerable DeWalt drill motor. [Team Delta](#) offers a great solution for converting a DeWalt drill motor to work as a drive motor for your robot. This tips section deals with locking the two speed gearbox into either low or high gear and using the motor retainer.



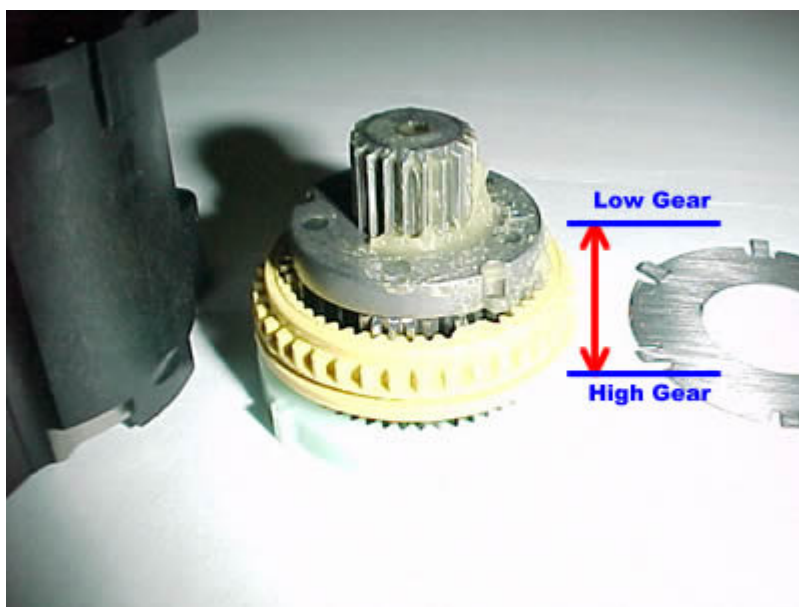
Here is the 18V DeWalt gearbox as it looks fresh out of the box.



The DeWalt gearbox is what is known as a planetary gearbox. There is a ring gear (the light blue and yellow gears are ring gears), planetary gears (the five smaller gears that you see arranged in a radial pattern), and a sun gear (basically a spur gear that interacts with the planetary gears. It is on the bottom of this gear assembly).

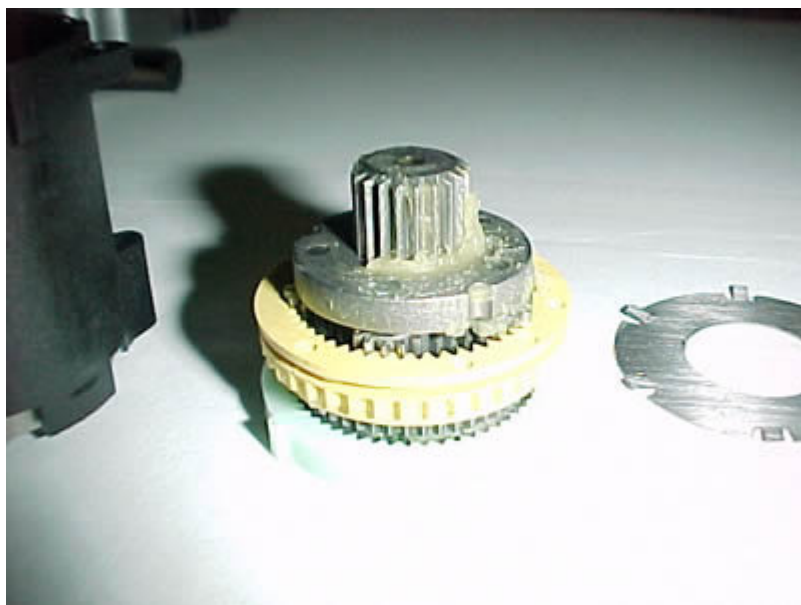
In this picture you can see the retainer clip on the right, the bulk of the gearbox assembly (there is another set of planetary gears still in the housing), and the plastic gearbox housing.

Be careful when turning the gearbox upside down to take the gear assembly out as it can fall apart and spill the little gears all over the table and/or floor.



Here is that assembly turned upside down so that you can see the sun gear that will interact with the other planetary gear that are still in the housing. The yellow ring gear is the one that it used to change the synchronization of the gears which changes the gearbox from high to low gear. The yellow ring gear can slide up and down.

There is a shim that comes with the RCM500 motor mount (RCM500 sold separately but used on this page) can be used to lock the gearbox in either low or high gear. To lock the gearbox into low gear remove the yellow ring gear and put the shim where the ring gear sits. Then put the ring gear back on and it will be sitting higher (with respect to the picture on the left) which puts it into low gear.



Here you can see that the yellow ring gear has been flipped upside down. The lip of the ring gear now acts as a stop to keep the gear from sliding up (forward) and thus shifting into low gear by accident. You can put the shim on top of this if you want but it really doesn't do much for you.

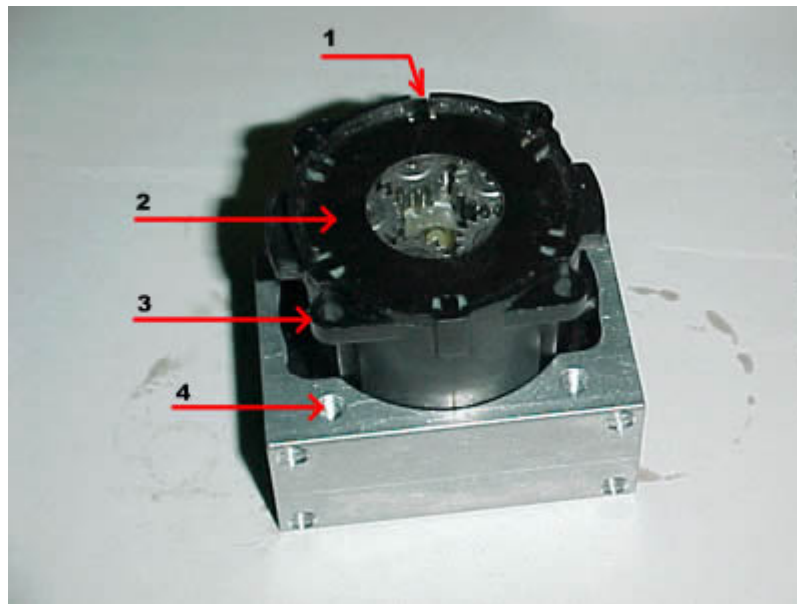
Once you have made the necessary adjustments reassemble the gearbox reassemble it and press the retainer ring back into place with your fingers.



Now that we have put the gearbox back together we can get it ready to be mated to the motor mount.



But, before we put them together you need to make sure that the teeth on the torque clutch line up with the notches in the motor mount otherwise the gearbox will not fit all the way in and the torque clutch would be capable of slipping.



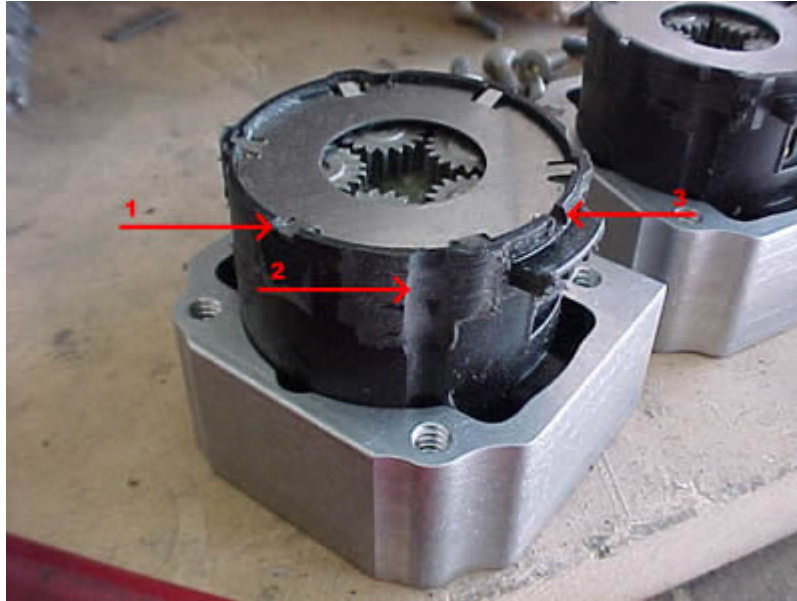
It will take some doing to get the gearbox into the motor mount because it is designed to be a snug fit.

#1 This is the notch in the gearbox that the tab on the motor lines up with. The notch makes sure that the bolt holes (see #3) line up.

#2 This is the gearbox retainer that keeps the gears from spilling out the back of the gearbox.

#3 This is one of the bolt hole mounting points that will line up with the ones on the motor. This is important to know because if you buy an RCM505 motor retainer (also sold separately) you will need to grind all of these off of both the gearbox and the motor.

#4 This is where the threaded rod of the RCM505 will go. There are three more tapped holes around the mount.

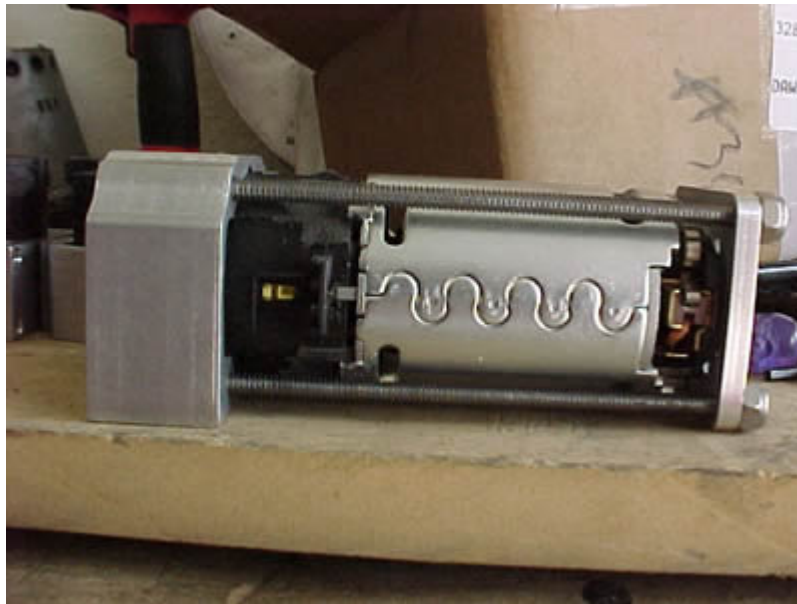


#1 The original notch in the gearbox to mate with the motor tab.

#2 This is where the mounting holes used to be. A couple of minutes with a Dremel tool will take the plastic away in a hurry. The mounting points on the motor take a little more work. You can grind them off with a grinding wheel but make sure that you use an aluminum grinding wheel as the face of the DeWalt motor is made of aluminum whereas the casing is steel.

#3 This is a new notch that I cut into each of the gearboxes to allow me to rotate the motor 90 degrees. By doing this it makes the terminals on the brushes easier to get to. And, the main reason that I did it was to turn the brushes so that I could put a fan by the brush housing and blow air through the brushes.

One of the two main reasons for 18V DeWalt motor failure is the brush housings melting from the constant high currents. If you can keep them cool you can stave off the possibility of failure.



After you have ground off the bolt holes you put the retainer on, making sure that the rubber pads on the retainer are positioned directly over the brushes to keep them from accidentally shorting out on the retainer. Run the threaded rod through the retainer and into the pre-drilled and tapped holes in the motor mount.

And voila! There you have it, a completely assembled ready to go 18V DeWalt drive motor. Total weight: 32 oz.

# Linear Machine

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Netscape is kinda fickle