AndyMark Toughbox Assembly Instructions

July 2011

Parts needed to make one (1) Toughbox

| Component	Qty.	Part #
Mount Plate	1	am-0155
Shaft Plate	1	am-0261
Output Shaft	1	am-0153
Extrusion Cover	1	am-0260
Large Cluster Gear ($\frac{3}{8}$ hex bore)	1	am-0149
Large Output Gear ($\frac{1}{2}$ hex bore)	1	am-0150
Small Hex Shaft	1	am-0152
Small Cluster Gear ($\frac{3}{8}$ hex bore)	1	am-0151
CIM Gear	2	am-0034
FR6ZZ bearing	3	am-0028
FR8ZZ bearing	1	am-0030
¼ - 20 x 2 shcs	4	am-1012
¼ - 20 nylock nut	4	am-1015
¼" washer	1	am-1027
¼ - 20 x ½ bhcs	1	am-1029
#10-32 x $\frac{5}{8}$" shcs w/ nylock	4	am-1120
#10-32 x ½ shcs	2	am-1002
2x2x10mm key	2	am-1121
$\frac{1}{8}$" machine key	1	am-1043
$\frac{5}{16}$ washer	4	am-1009
½" e-Klip	1	am-0206
8mm Retainer Clip	2	am-0033
Grease Pack	1	am-0448
Encoder Mount	1	am-0208

Tools needed:

$\frac{5}{16}$" Allen Wrench
$\frac{3}{16}$" Allen Wrench
$\frac{7}{16}$" Wrench (or Socket Driver)
Small Hammer

Step 1: Ensure you have all listed parts.

Step 2: Insert two of the $\frac{5}{16}$" washers, the 2x2x10mm machine key, CIM Gear, and $\frac{5}{16}$" clip onto CIM Motor shaft.

Step 3: Press two of the FR6ZZ bearings into the Mount Plate. Press a FR6ZZ and FR8ZZ bearing into the shaft plate. Use an arbor press, a strong push with a thumb, or light taps with a small hammer. Check that flanges are on the same side.
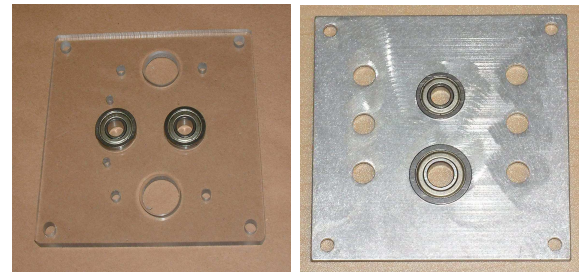

Step 4   Step 5

Step 4: Mount motor to Mount Plate using #10-32 screws. <u>DO NOT ADD Loctite or other thread locking material</u>. This has already been applied to the screws (excess Loctite or other thread locking material will eat away the polycarbonate). Make sure that the bearing flanges are not on the same side as the motor.

Step 5: Attach the ½" e-Klip into the groove on the Output Shaft.
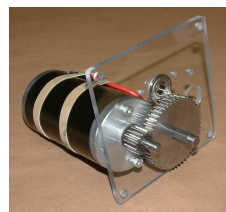
Step 6   Step 7

Step 6: Place the Small Hex Shaft into the bearing closest to the motor pinion. Place the Large Cluster Gear (with the smaller hex hole) onto the Small Hex Shaft. Make sure the teeth of this gear mesh well with the CIM Gear. Also, be sure to place the gear so that the small boss (raised surface) around the hex hole is facing the bearing on the Mount Plate.

Step 7: Place the Output shaft into the second bearing.

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Step 8: Place Small Cluster Gear (small gear with $\frac{3}{8}$" hex hole) onto the Small Hex Shaft. Place Large Output Gear onto Output Shaft. Establish that the bosses on these gears are facing out. The purpose of these small bosses is to contact the inner races of the adjacent bearings.

Step 9: Place the Extrusion Cover over the assembly. Apply grease to gear and meshes, using grease pack. It is OK to use additional heavy grease.

Step 10: Place the Shaft Plate onto the Output Shaft so the bearing flanges are on the inside of the gearbox. The Shaft Plate should slide all of the way so that the Extrusion Cover is sandwiched between the Mount Plate and Shaft Plate. There should be no gaps. Insert all ¼-20 x 2" Screws (4) into the holes on the Shaft Plate and through the 4 holes on the Mount Plate. Assemble the ¼-20 Nylock Nuts and tighten all with a $\frac{3}{16}$" allen wrench and $\frac{7}{16}$" wrench or socket.
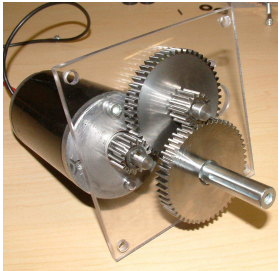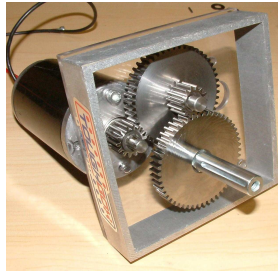
Step 8	Step 9	Step 10

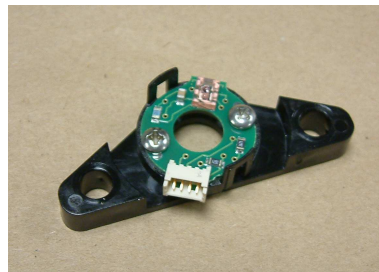## Assembly of Encoder Package onto Toughbox

Step 1: Two holes (0.170 diameter) are located on the polycarbonate Mount Plate, near the output shaft bearing. Tap these two holes with a #10-32 thread cutting tap.

Step 2: Assemble the circular encoder circuit board and the circular encoder plastic base (black plastic piece with 2 clips sticking up) to the Mount Pad (black plastic trapezoidal piece) with the two small screws (#3-48). The screws will cut threads into the Mount Pad. The circuit board connector should be sticking out the long flat side of the Mount Pad.

Step 1	Step 2

Step 3: Mount the assembly created in Step 2 to the Toughbox Mount plate, with the 2 - #10-32 screws supplied in the Package.

Step 4: Place the encoder wheel on to the $\frac{1}{4}$ inch output shaft protrusion so that the encoder lines are facing the circuit board. The outside face of the encoder wheel should be flush with the tips of the clip tips of the encoder plastic base.

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