

Field De-rotator assembly instructions

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8/17/15

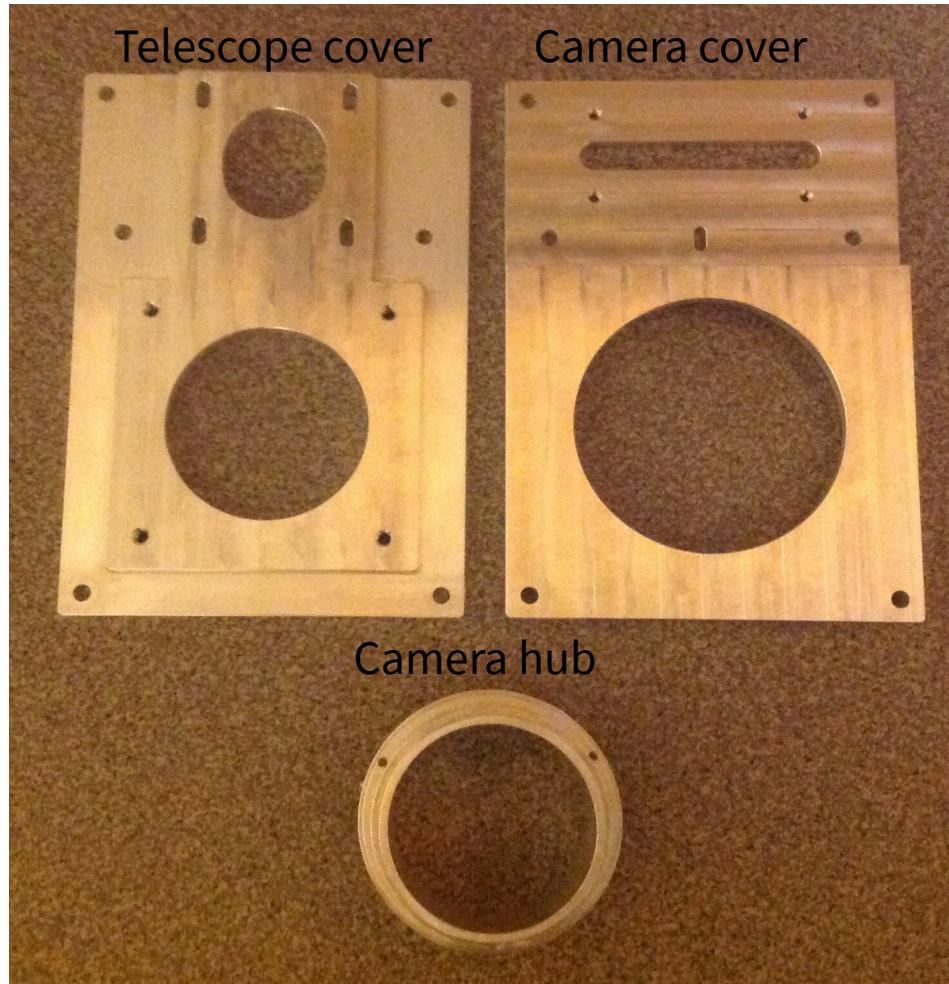
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Machined parts



Inserting the ballbearing

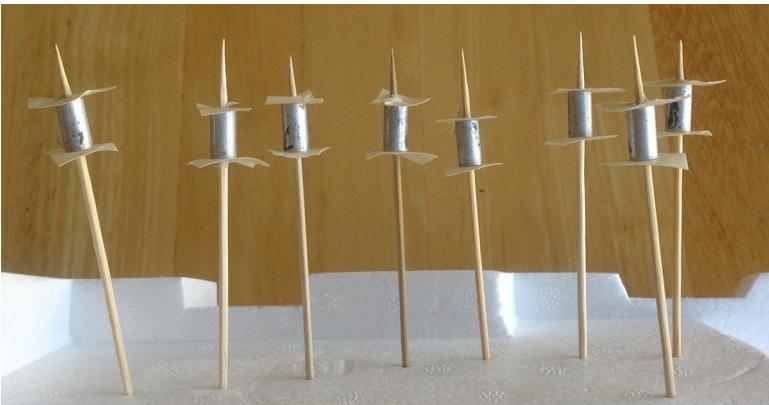


Camera cover was put into an oven set to 375F. It was left in there for 30 minutes to expand the hole for the ballbearing



The ballbearing is dropped into the hole. It is left to cool so that the hole shrinks and grabs onto the ballbearing.

Masked for painting



The top and bottom of all the standoffs are masked and mounted with toothpicks. Each standoff is painted separately.

Telescope and camera covers, and hub are masked for painting: All holes, ballbearings have been masked with either masking tape, or filled in with wooden skewers and toothpicks



Parts are painted



Painting sequence:

- 1) A self etching primer spray paint is applied to all unmasked surfaces. The primer is left to dry for about 10 minutes before the next step.
- 2) The camera and telescope covers are spray painted with a ultra-flat beige colour.
- 3) The inside of the hub is spray painted with a ultra flat black colour.
- 4) The masks are left on!

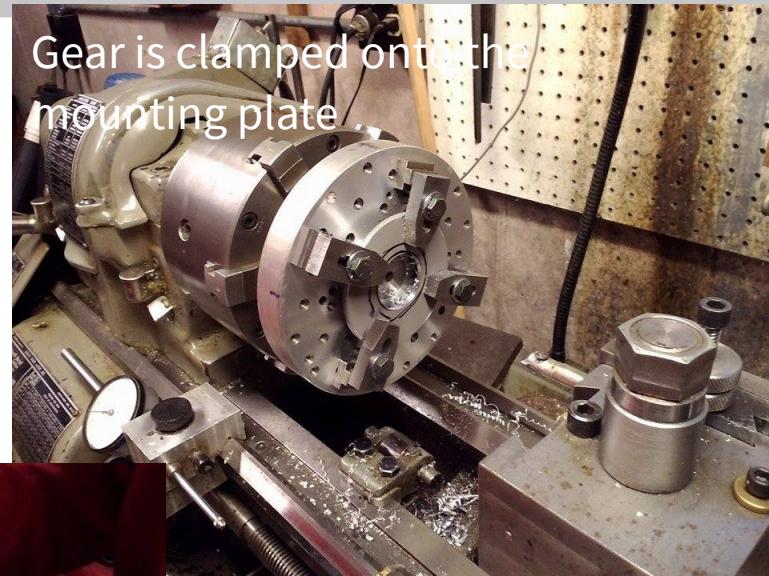
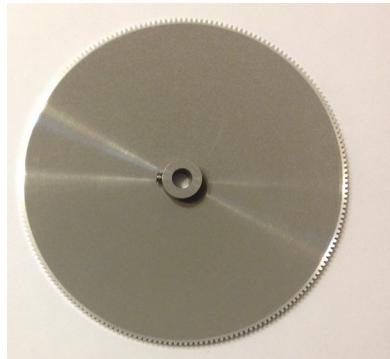
Drying:

- 5) The drying time is 24 hours in a warm 65°F room.

Curing:

- 2) 1 week in warm 65°F room. Parts can be safely handled although paint is still soft! Masks are removed.
- 3) Hot air from space heater is used to completely remove solvents. Takes more than 8 hours! Solvents have completely evaporated when the parts do not smell of paint.
- 4) Cure is complete when the sharp end of a toothpick or fingernail does not leave a mark after it is pressed into the paint. Curing can take 6-8 weeks!

Making the hole in the drive gear



Mounting a ring to offset the gear from the mounting lathe mounting plate

A hole must be made in the drive gear (200 teeth) so that the hub can be inserted.

Machine shop work was done by D. Johnson and J. Larson.



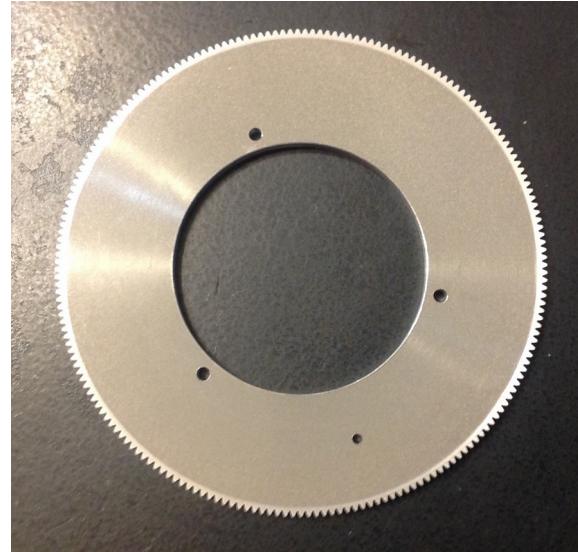
Cutting of the hole requires precision!

The other gears

The final gear before
a hole is cut into it



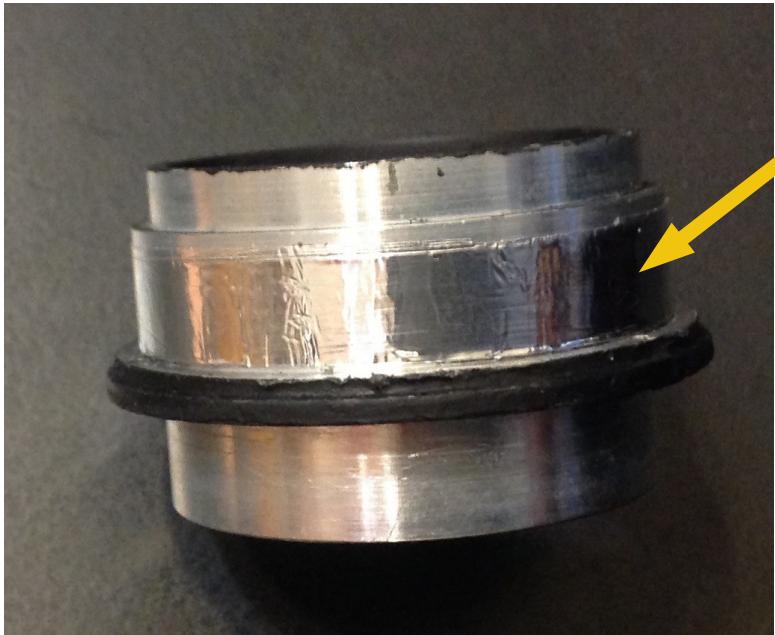
Part of the
compound gear
before the hub is
milled off



Hub of this gear
has been milled
off.

The final drive gear with
the hole for the hub,
screw holes and magnet
hole.

Assembling the hub to the final gear



I had to stick 15 mil thick aluminum tape around the hub that will go into the ballbearing because it was 30 mils smaller in diameter than the ballbearing. This addition gives a nice loose fit between the hub and the ballbearing.

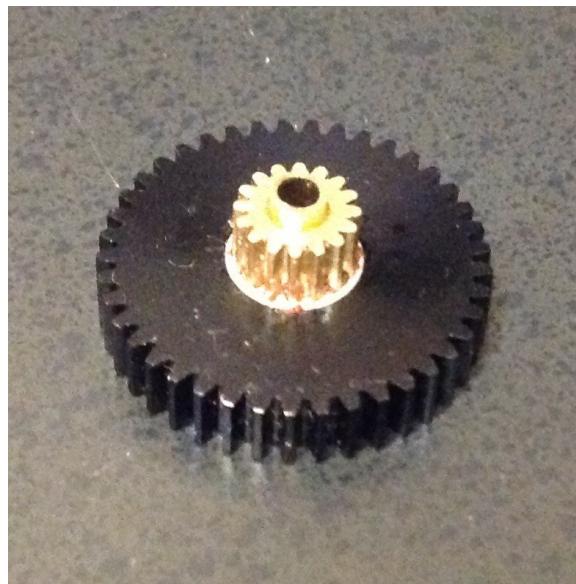


The final gear screwed onto the hub.

Making the compound gear

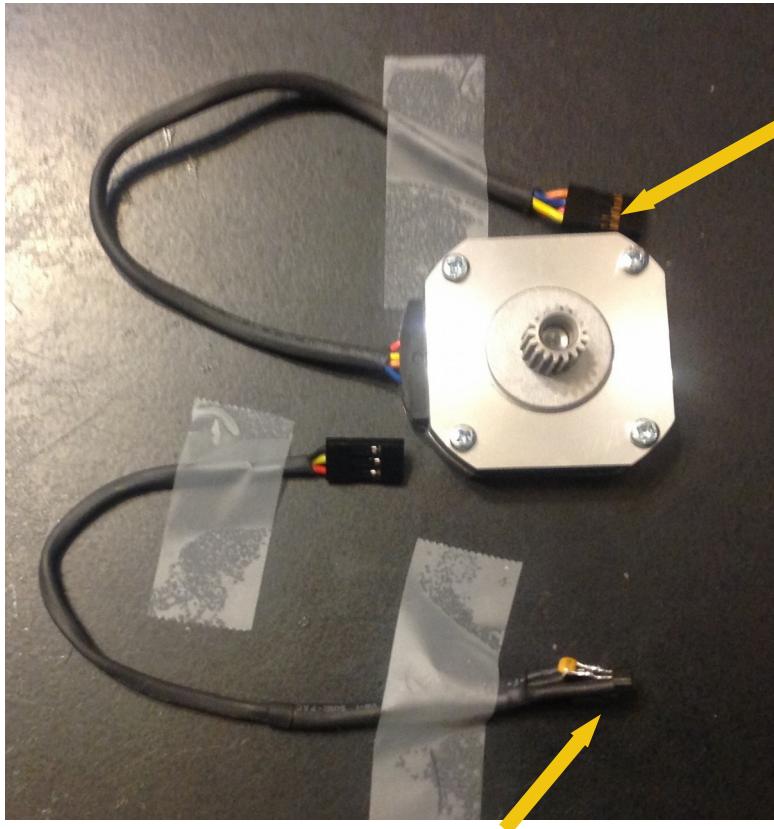


Spindle cut to length:
Thread length: 0.32"
Smooth rod length: 0.39"
Brass tube length is 0.39"



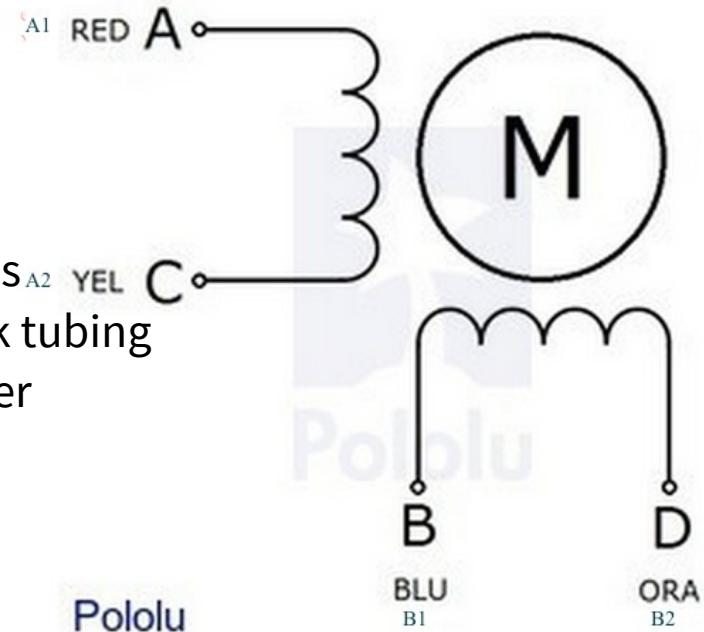
The compound gear after gluing them together with the brass tube. Be careful not to let the threadlocker leak into the brass gear. I had to scrape the excess off between the teeth.

Connecting to stepper



Ordering:
Orange, blue,
red, yellow

Stepper motor with wires
trimmed and heat shrink tubing
to hold the wires together

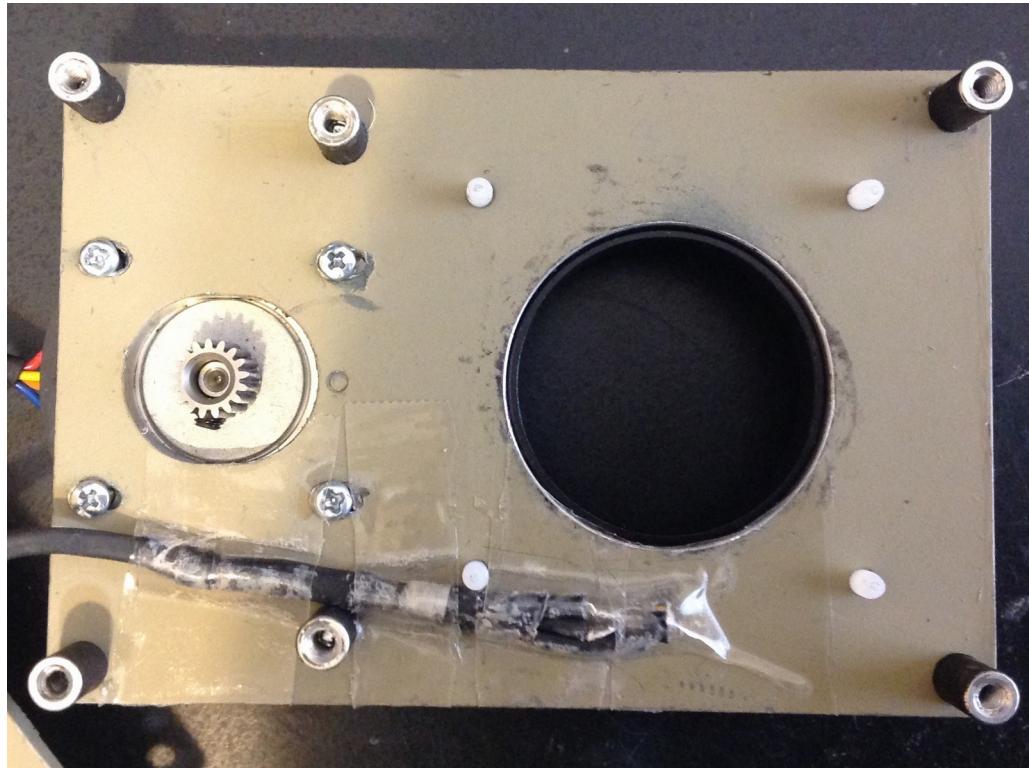


Pololu

**Sanyo bipolar stepper motor
wiring diagram.**

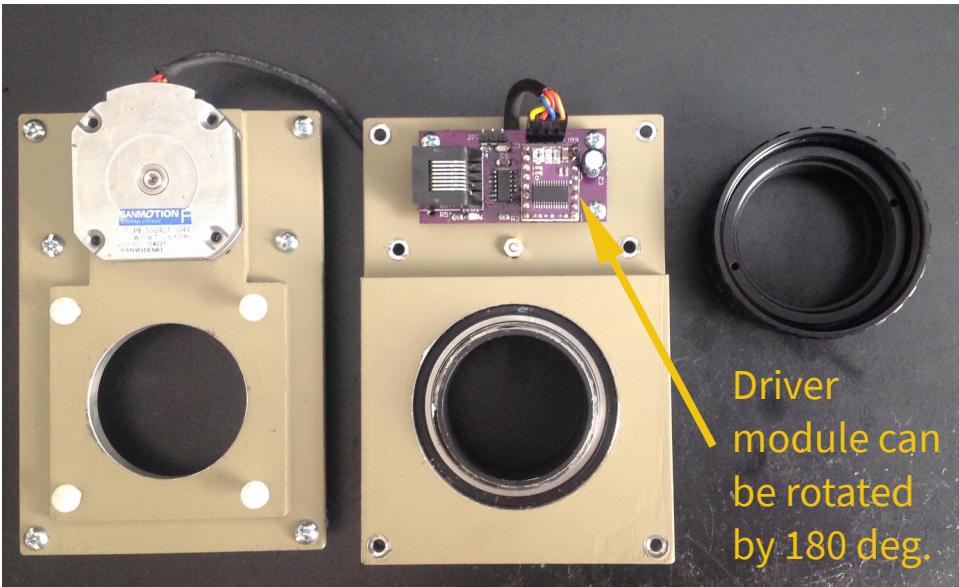
The Hall switch with the capacitor soldered on.
Note the orientation of the capacitor has been
changed so that it acts as a pedestal to prop the
hall switch closer to the magnet

Taping the Hall switch to the shell



Only gorilla clear tape is strong enough to hold the Hall switch and cables in the correct orientation. The picture shows the residue of the other tapes like duct tape. The clear tape helps to place the Hall switch at the correct location that I have marked on the shell.

Assembling the the shell



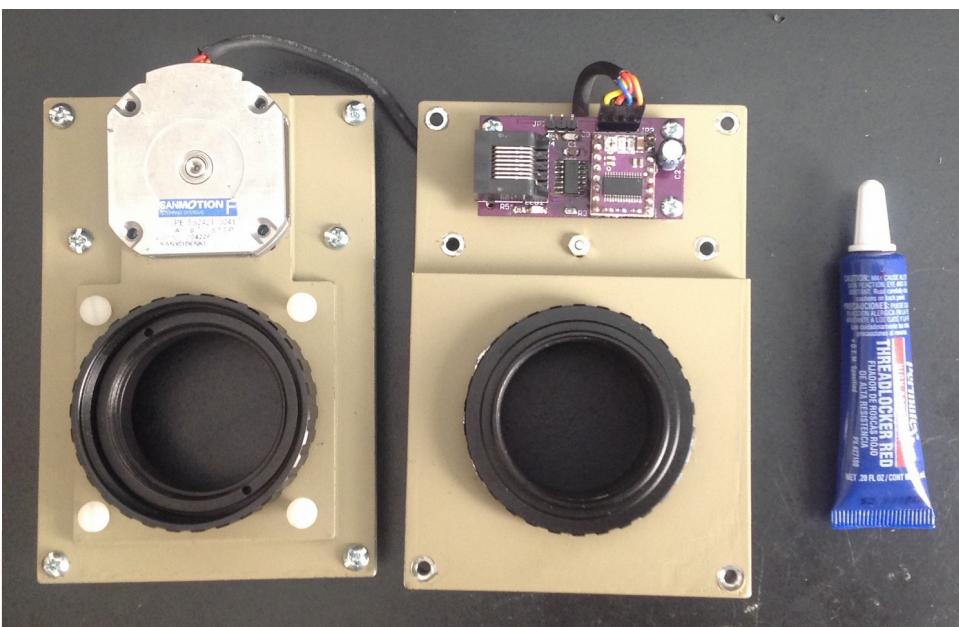
Install the stepper motor, nylon screws, and driver board to the shells. The driver board can be mounted in the direction pictured here or 180 deg from this picture. Later pictures show that the driver is 180 deg w.r.t. what is shown here.

Insert the hub into the ballbearing.

Glue on the SCT and T-thread adapters with the threadlocker.

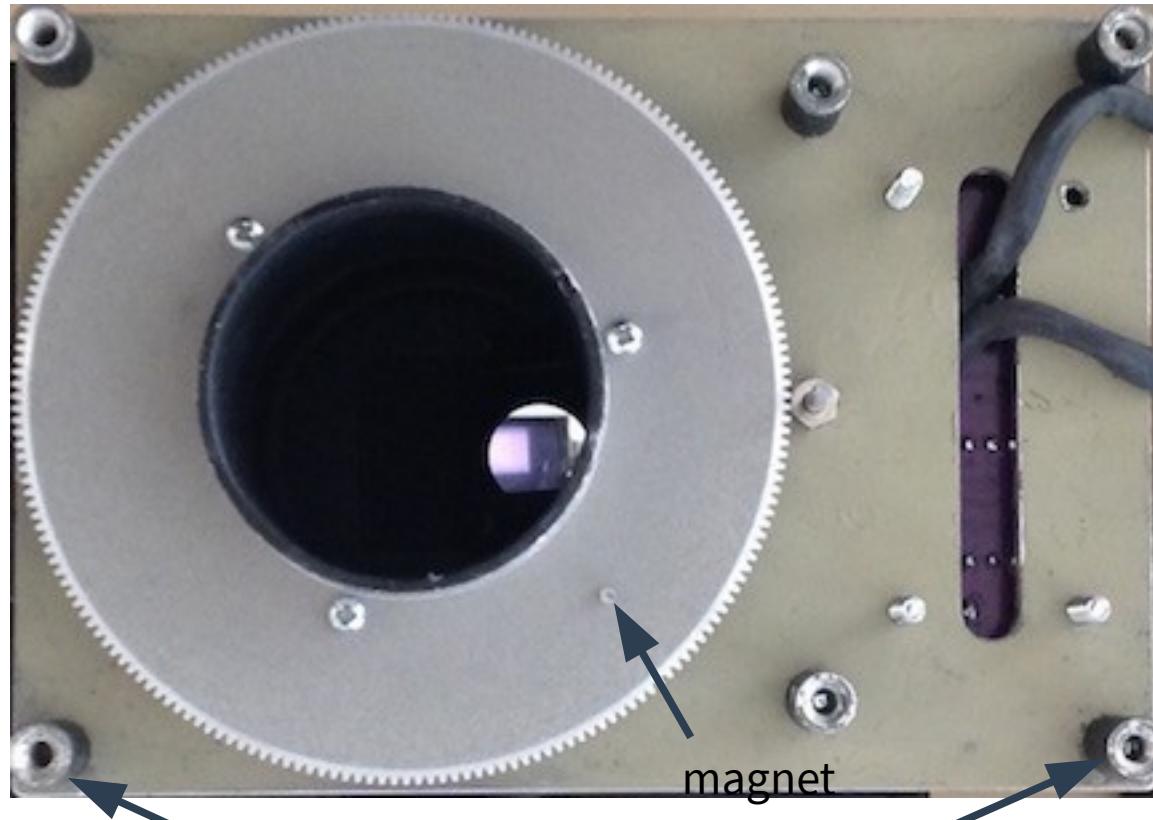
Be careful not to use so much glue that it flows out! The glue is very strong and if it cures, these parts can be stuck in the wrong position!

Suggestion: Use a toothpick to scrape off extra glue when it flows out. Also the threadlocker dissolves paint so scrape off the paint when it comes off. Takes 24 hours to cure.



August 17, 2015

Insert magnet into drive gear

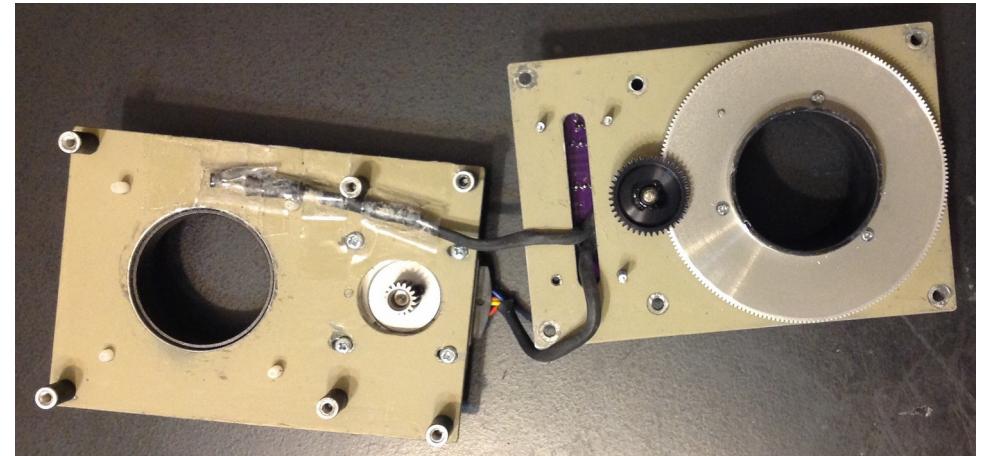
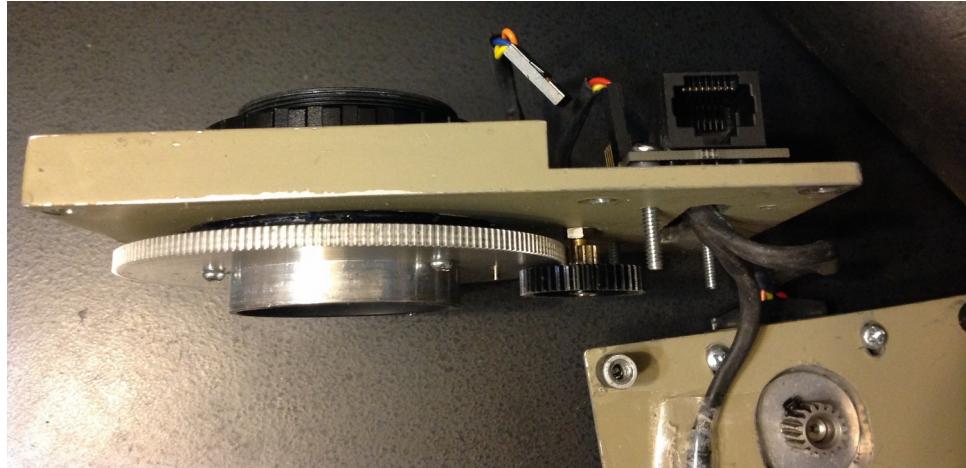


Standoffs

Insert the magnet into the hole. Make sure that it is the South pole that is sticking out.

Do not glue yet! The magnet needs to be quite close to the Hall switch to activate it.

Assembling the gears

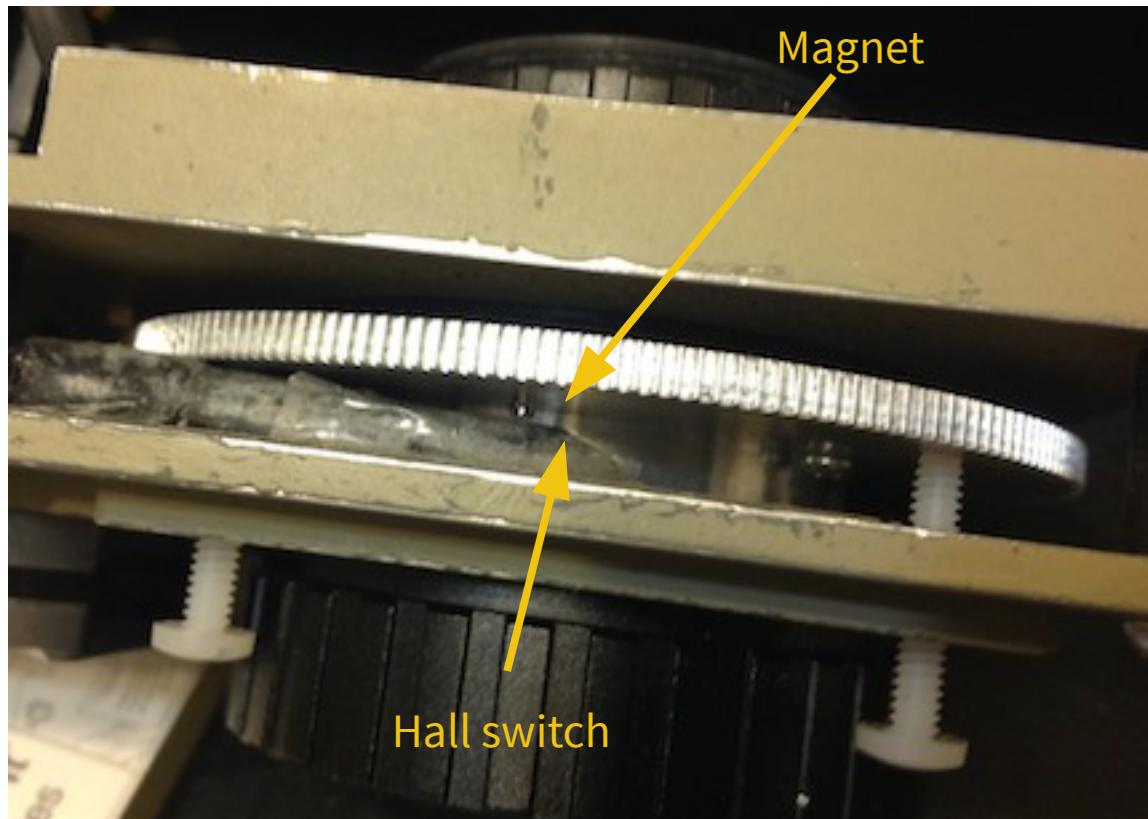


Install the compound gear with the spindle screwed to the shell. Use a piece of tissue to adjust the position of the compound here. The tissue should slide in and out easily between the drive gear and the compound gear. See <https://www.youtube.com/watch?v=qUzdhLj3tdw>

Attach the stepper gear and adjust the position of the stepper motor so that contact between the stepper motor gear and the compound gear is not too tight.

The tightness, or looseness of the gears can be tested by turning the drive gear. Everything should rotate smoothly. Grease is not recommended because it might contaminate the optics.

Complete assembly and test that Hall switch works



The magnet needs to have its south pole pointing towards the Hall switch. The magnet has to be very close to the Hall switch to activate it.

Done!

- The derotator needs to be connected to the telescope and the controller. See
 - Installing the Field DeRotator
 - Field DeRotator Controller User's Guide

