

The following article outlines my attempts to fix some issues with my Nexstar 8 GPS slewing roughly.

First of all, I should describe what started this whole journey.

The Accident

One evening, while trying to use my Meade DSI to get better polar alignment with my wedge by drift aligning, I came up with “bright idea” of trying to use barlow to increase the speed at which I could see stars drift away from the crosshairs in PHD. I managed to get something that was semi-decent in terms of drift, so I decided to slew to Polaris to see how close I was. After a few seconds, I realized that scope didn’t seem to be moving anymore, and then I realized that the DSI/barlow combination had hit the base of fork. This is what I shall now refer to as “The Accident”. As soon as I realized this, I stopped the slew, mutter a few choice expletives under my breath, removed the barlow, and started trying to slew a bit to see if anything bad had happened. Unfortunately for me, it had. There were now a couple of positions where the scope’s motion became very rough, and if I looked through the finder at those points, it was very apparent that the scope was sticking, and then jumping. I tried a few gotos, and they were way off. I tried realigning, and some more gotos, and they were way off ☹ I took everything down, and brought the scope back in to the house from my backyard, feeling quite annoyed with myself.

I set my scope up in the living room (luckily I have an understanding wife), as started trying to verify my memory of what I saw after “The Accident”. Slewing the scope around on the declination (I use a wedge), or altitude axis, I could feel some roughness at a two points during the complete rotation around the declination axis.

I immediately started looking to how much it would cost to ship the scope back to Celestron, but I was more than a bit nervous about doing so. I figured the cost of shipping the scope one way from my home to Celestron would be close to \$400, and I’d likely have to pay return shipping since I bought the scope used. There had to be a better option.

A helpful person on the Cloudy Nights forum encouraged me to at least open up the fork arm before sending it to Celestron.

Accident + 1 day

The next day, with some help from my oh so understanding wife, I started trying to clean the brass (or bronze) worm gear. This seemed to help somewhat, as the number of spots where the rough motion occurred seemed to be reduced to a single spot. It was time to wrap up for the night, so I decided to clean the gear again the next day, and get some new lubricant to see if re-greasing the gears would help.

Accident + 2 days

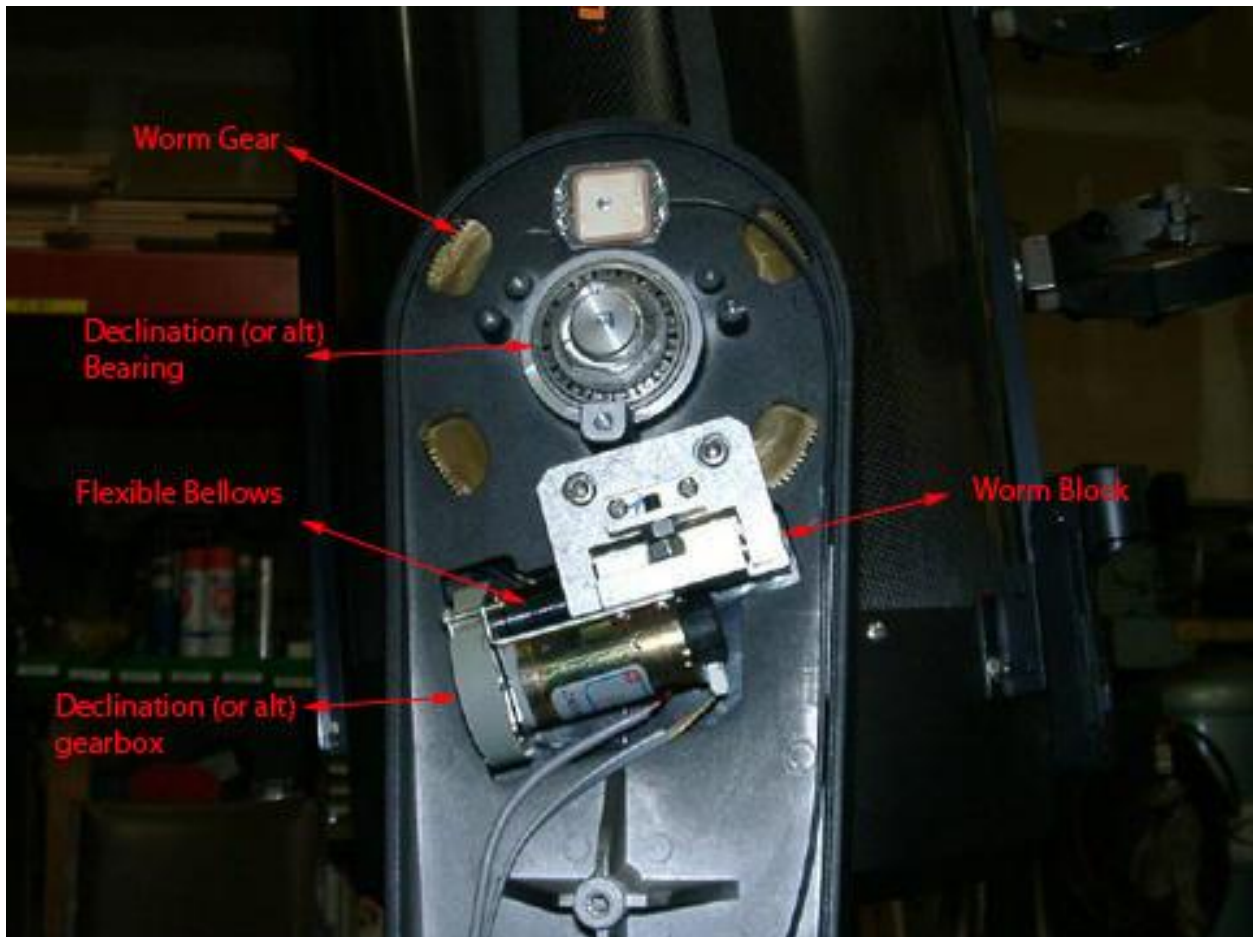
I picked up some white lithium spray grease, carefully cleaned the worm gear and re-greased it. After this, I was back to rough motion in two or more spots. Feeling a bit down, I posted to the Yahoo Nexstar GPS group. I figured the gears must be damaged, and I thought I see if anybody knew where I could get replacements instead of sending the scope to Celestron.

Accident + 3 days

A number of very helpful, knowledgeable people in the Nexstar GPS Group pointed out that the worm and worm gear are pretty darn near indestructible on these scopes, and I might find a problem with the declination clutch if I could disassemble the fork arm more completely. Another helpful person on Cloudy Nights shared her similar experience with her Nexstar 11 GPS that ended up being the gearbox between the worm and declination motor. Both of these gave me something else to go on, and I decided that trying it was better than simply shelling out \$800 to ship it to and from Celestron and whatever the repair would actually cost.

I also called Celestron, and they told me to expect an out of warranty repair to take at least 3 months, more likely 4. Taking a closer look at the gearbox and the clutch seemed even more attractive than ever.

I went down the path of trying to get at the Declination clutch first. Somebody pointed me to Matthias Bopp's very helpful article on disassembling a Nexstar 11 GPS to replace the declination (or alt) clutch here: http://www.dd1us.de/Downloads/replace%20or%20adjust%20altitude%20clutch%201_3.pdf Using this as I guide, I started to work.



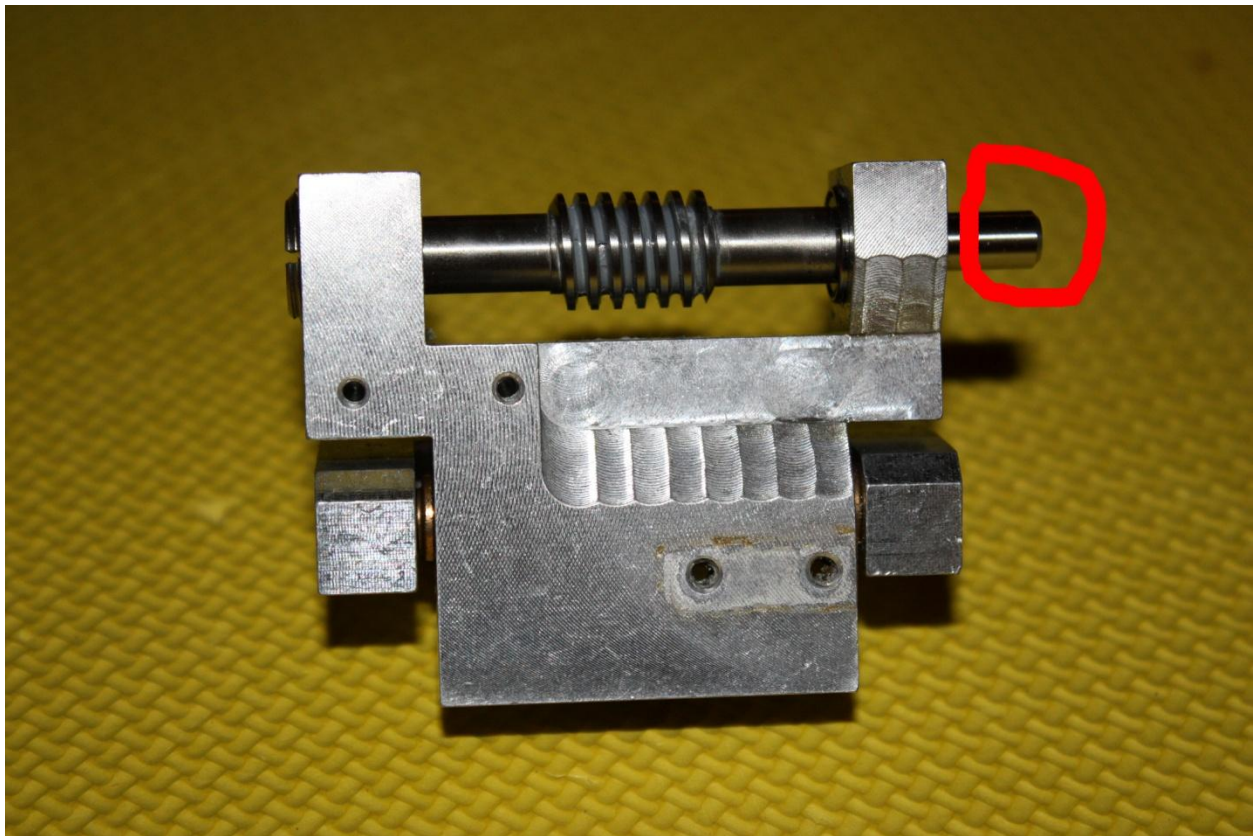
(photo courtesy of Frank Dilatush)

After a surprisingly simple disassembly process, I was looking at the declination bearing, and I couldn't remove the bearing at all. Perhaps there is a difference between the Nexstar 8 GPS and the Nexstar 11 declination assembly, but I couldn't get that thing to come out no matter what I tried.

I now tried to go in the direction of looking at gearbox. I removed the whole declination motor assembly, and tried running it without any load. It seems to be fairly noisy when I ran it out of the scope, but it didn't seem to be particularly noisier at any one spot than any other. I called it a night after that.

Accident + 4 days

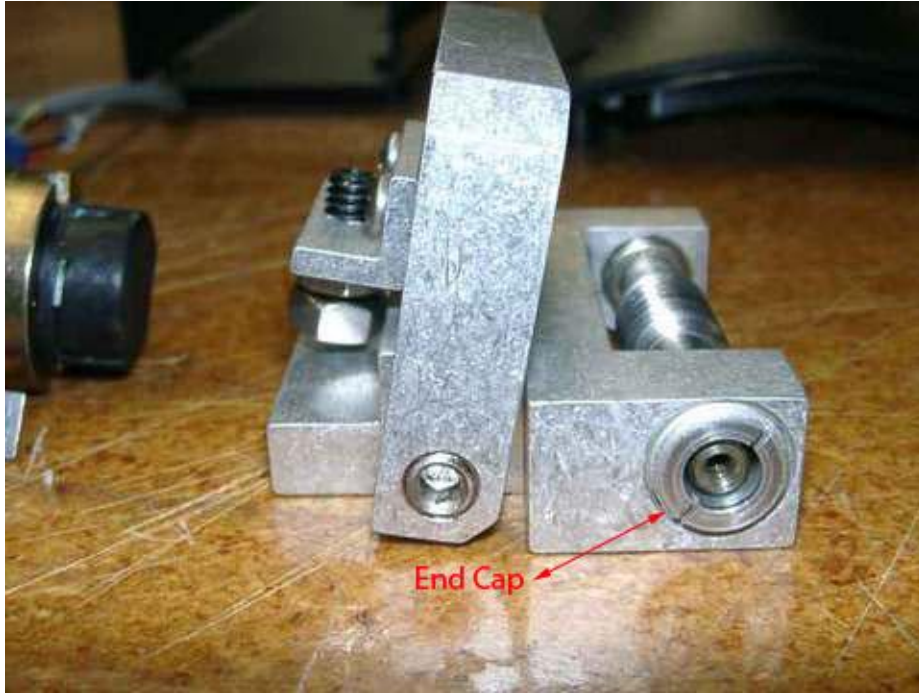
At the suggestion of somebody on Yahoo group, I bought a mechanic's stethoscope to try and narrow down where the roughness was coming from. I checked the motor, the gearbox, and the brass worm gear. None of them seemed to be where the roughness was coming from. I removed the motor from the worm block so that I could see if any the gears in the gearbox were visibly damaged. I couldn't see anything obvious, but the worm itself seemed very difficult to turn by hand from the circled portion in the following picture, which is where the flexible bellows from the gear box attaches:



I gave the worm bearings a spray with WD 40, but it didn't seem to make much difference. It was, however, the first thing I found that didn't seem to be working as it should. Unfortunately, the need to work for a living put an end to my efforts for the day.

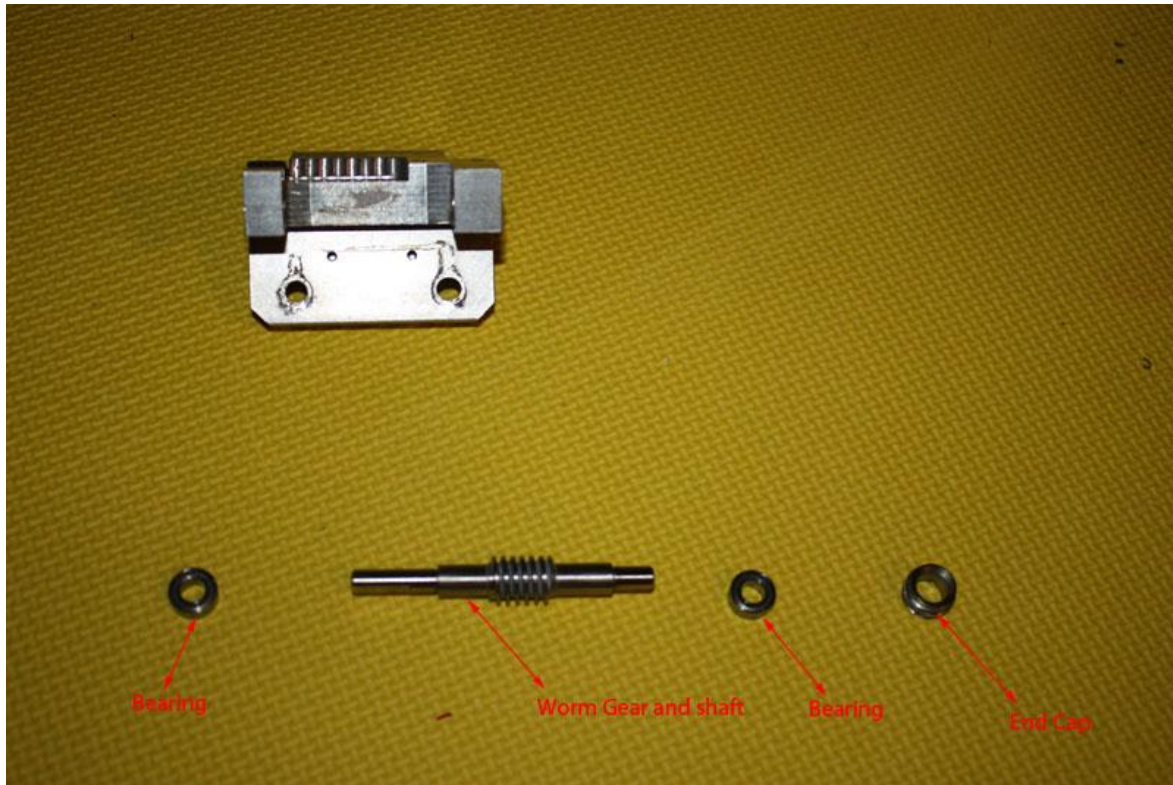
Accident + 5 days

I picked where I left off on Day 5, with the idea the worm should be rotating smoothly, I went about trying to get at the bearing to see if they were worn, dirty or damaged. As I started loosening the end cap, shown here:



(picture courtesy of Frank Dilatush)

the rotation of the worm suddenly became silky smooth. I removed the end cap anyways and got the worm and bearings out. Here are the pieces of the worm block assembly:



The bearings seemed to be fine, so I cleaned the worm/worm shaft, and put everything back to together, tightening it until the worm rotated roughly, and then backing it off until it was smooth again. I reassembled everything except the fork arm cover, and tried a few complete declination rotations with the hand controller. No roughness anywhere!

Conclusion

As I write this, I still have yet to get the scope back out under the stars to test if this has actually fixed the problem.

My working theory is that when the DSI/barlow combination hit the base, some of the torque from the declination motor ended up getting transferred into the end cap, tightening it to the point where the worm rotation was no longer smooth. I have no idea if this is actually what happened, but would explain the problem.

I'd like to thank Ian, Lenny, Frank, Ralph and John from the Yahoo Nexstar GPS group, and Don, Carol and Mark from Cloudy Nights for their great advice and encouragement along the way. I never would have been able to do this without their help. Thank you all!

I hope somebody finds the information in this article useful. If anybody wants to get in touch with me, they can either email me using tjhayko@rogers.com, or post the Yahoo Nexstar Users Group, or to Cloudy Nights (www.cloudynights.com, id: tjay).

Special thanks to Frank Dilatush for letting me use some of his pictures in this article