

## Introduction

Let's get a few things out of the way real quick.

- 1) I created this document to illustrate how to easily and safely disassemble the Atlas Pro telescope mount. The mount is great out of the box, but a careful cleaning and re-greasing can work small wonders on guided performance. You can also troubleshoot your own mechanical issues and possibly address them.
- 2) I take no responsibility for any damage done to your mount following these directions. I'm an amateur. I created this document for fun, hoping it would be helpful to other astronomers and astrophotographers.
- 3) The pictures I took weren't always in the best order. I've tried to format the text in the best order to disassemble and reassemble the mount, even if the images aren't always a perfect match.
- 4) You may find it helpful to label any screws that are removed so they are not lost before reinstallation.

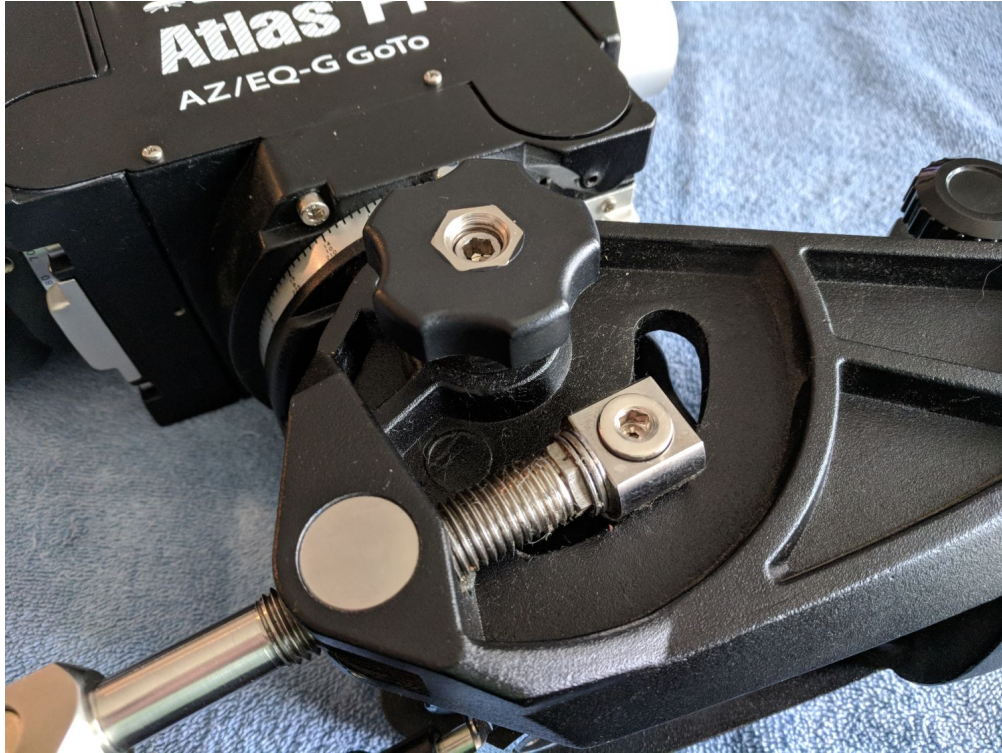
## Tools required



The list of tools required to do this is pretty simple

- Metric allen drivers in sizes 6mm, 4mm, 3mm, 2.5mm, and 2mm
- Phillips screwdriver
- A spanner wrench. I used a pair of needle nose pliers as an alternative
- Tweezers (helpful, but not required)
- Water and dish soap
- Replacement grease
- Rags for cleaning up greasy parts

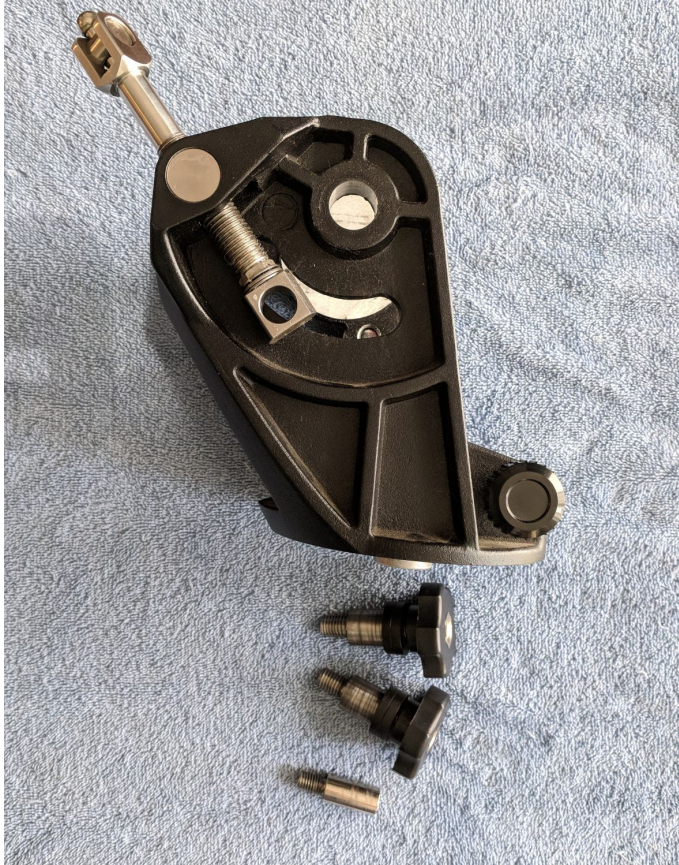
## Removing the mount head casting



Loosen the two plastic knobs on each side of the altitude adjustment axis.

Remove the two pivot pins, and the altitude adjustment screw with a 6mm allen driver.

## Removing the mount head casting



Set aside the two pivot pins and the altitude adjustment pin.

Set aside the mount head casting.

## Belt removal



Remove the four phillips screws holding the motor cover in place.

## Belt removal



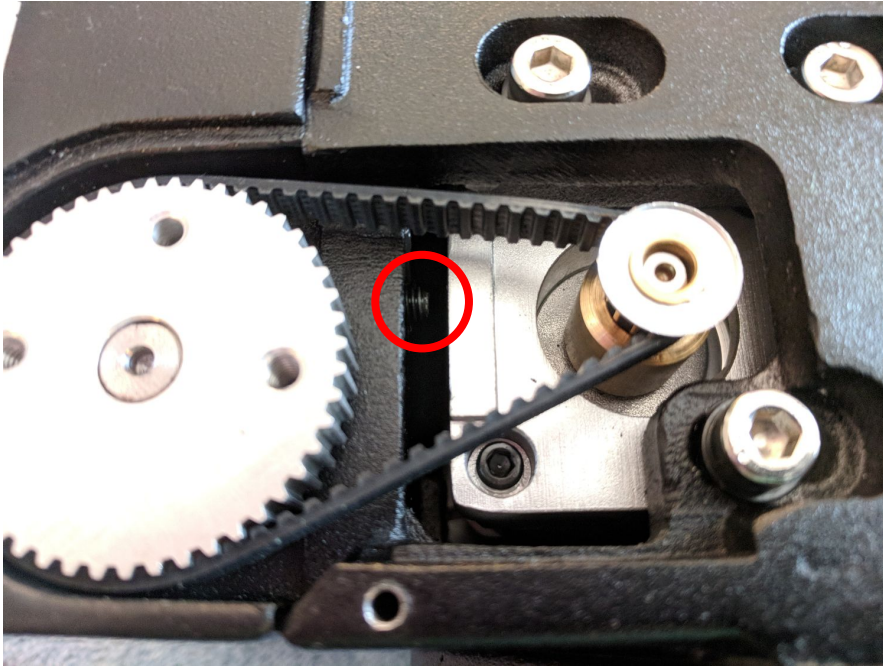
Remove the two motor adjustment access set screws with a 2.5mm allen driver. Set these screws aside.

Insert a 2mm allen driver into the now open hole until it engages with the motor tension set screws.

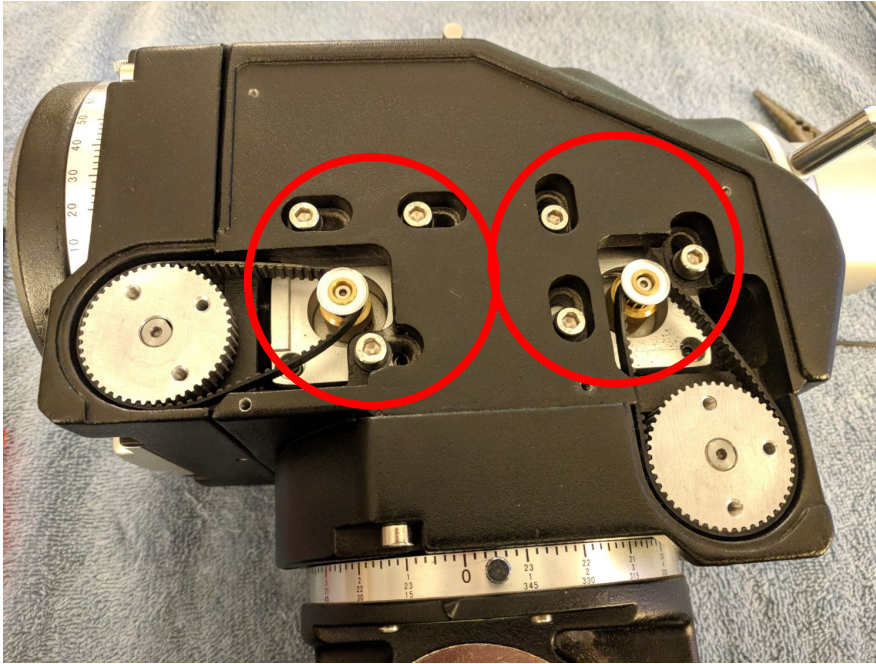


## Belt removal

Loosen the motor tension set screws several turns so that they pull away from the drive motors.



## Belt removal



Loosen the three bolts on each drive motor with a 4mm allen driver. Do not remove these screws.

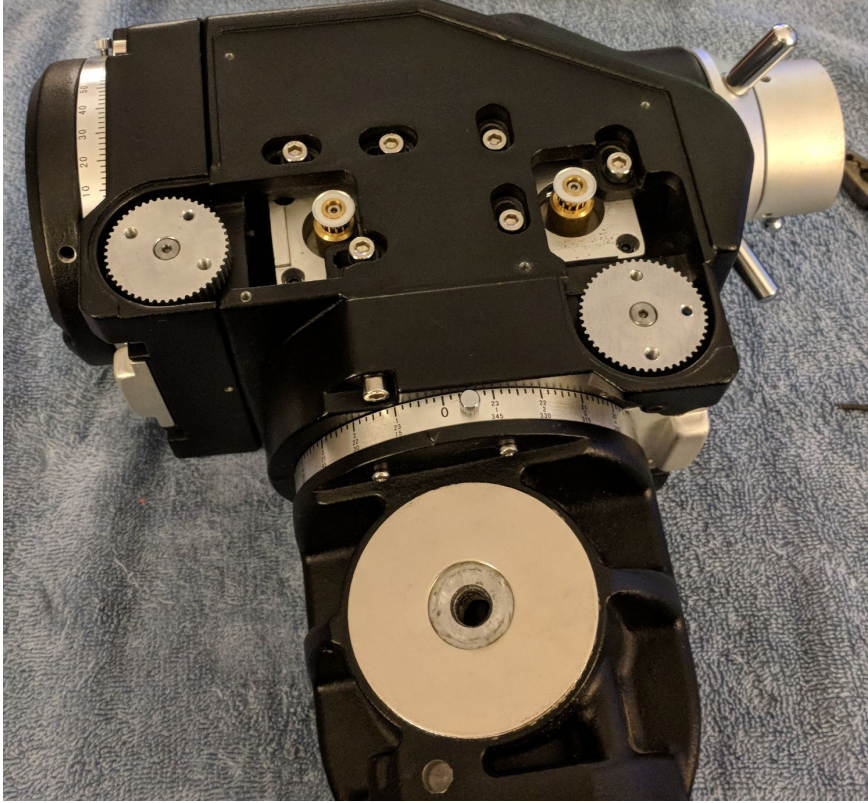
The motors are mounted in slots to allow for tension adjustments on the drive belts.

With the tension set screws loosened, the motors should now slide in the slots, allowing you to release tension on the drive belts.

Carefully remove the drive belts by lifting them up off of the driven gear.



## Belt removal



With the drive motors loose and the drive belts removed, we can now disassemble the RA axis.

## Disassembling the RA axis



Remove the polar scope if installed.

Loosen the RA clutch.

Remove the clutch adjustment knob by hand.

Remove the polar scope alignment reference tab with a phillips screwdriver.

## Disassembling the RA axis



There are three set screws hidden under the RA tension clutch ring. Carefully rotate the clutch ring until you can see a set screw.

Loosen all three set screws with a 2mm allen driver.

If you over-loosen the set screws, it will prevent rotation of the RA clutch ring. If this happens, thread them back in until the RA clutch ring rotates freely.

## Disassembling the RA axis



Now that the three set screws are loose, you can remove the RA end retainer. The proper way is with a pin-style spanner wrench. I don't have one and used a pair of needle nose pliers instead. Your mileage may vary.

Fully unthread the end retainer and set aside.

Underneath the end retainer is one of the RA axis thrust bearings. Take care as grease may cause one of the thrust bearing washers to stick to the bottom of the end retainer.

## Disassembling the RA axis

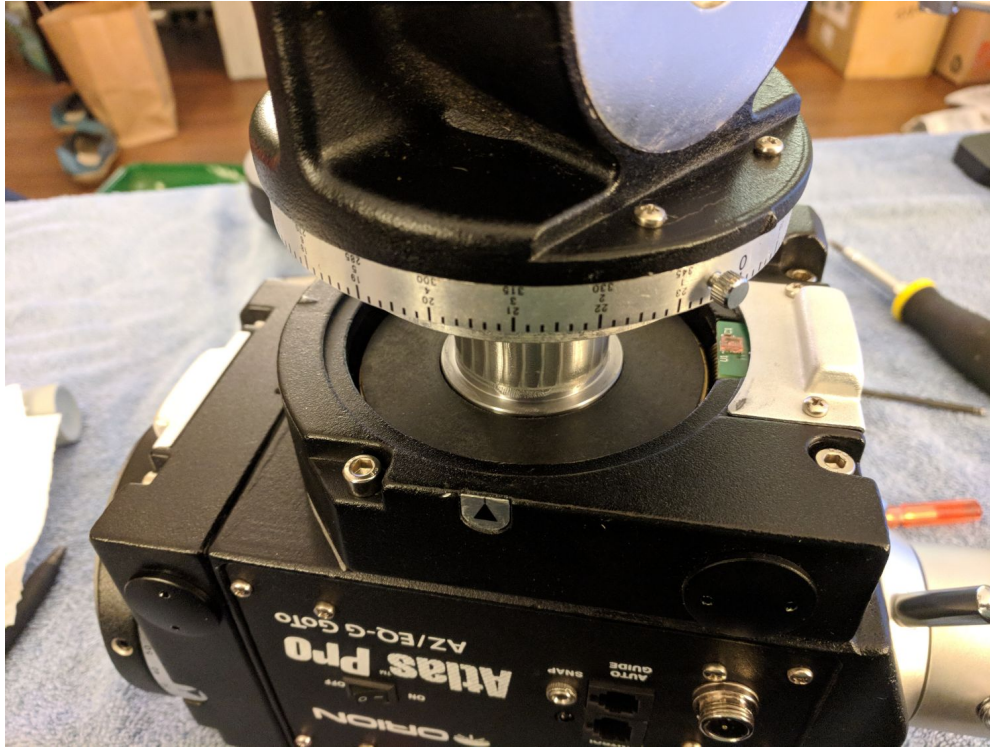


With the end retainer removed, the clutch tension ring can also easily be unthreaded and removed.

The clutch tension ring will come off with the thrust bearing still inside it. This is a safe place to keep it for now.

The mount has four thrust bearings. You will notice that the bearing is composed of three parts: two washer plates and a cage/roller assembly. The cage/roller assembly must always go in the middle of the two washer plates.

## Disassembling the RA axis



Now the RA mount casting can be carefully removed from the RA shaft.

There is a felt washer between the casting and the brass worm wheel. This washer acts as the friction surface for the clutches.

Set the felt washer aside, taking care to keep grease off it for smooth clutch action.

## Disassembling the RA axis

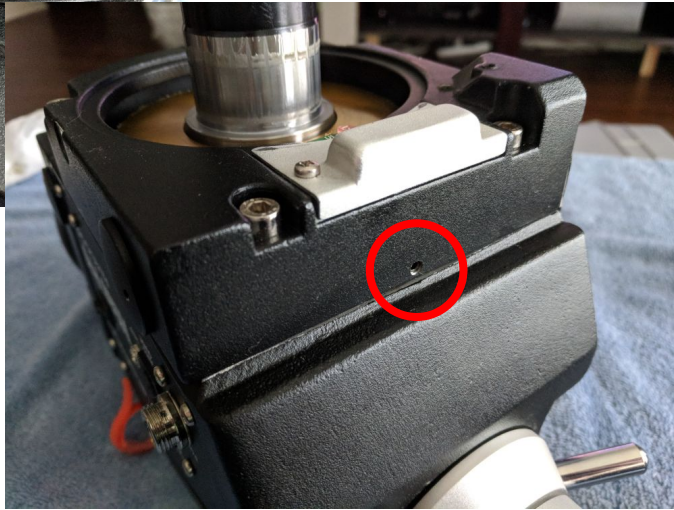


The RA encoder sensor ring is located on the underside of the RA casting. You can see the fine lines in this image that are picked up by the encoder sensor.

Take care not to damage/scratch this area, or the encoder may stop functioning.

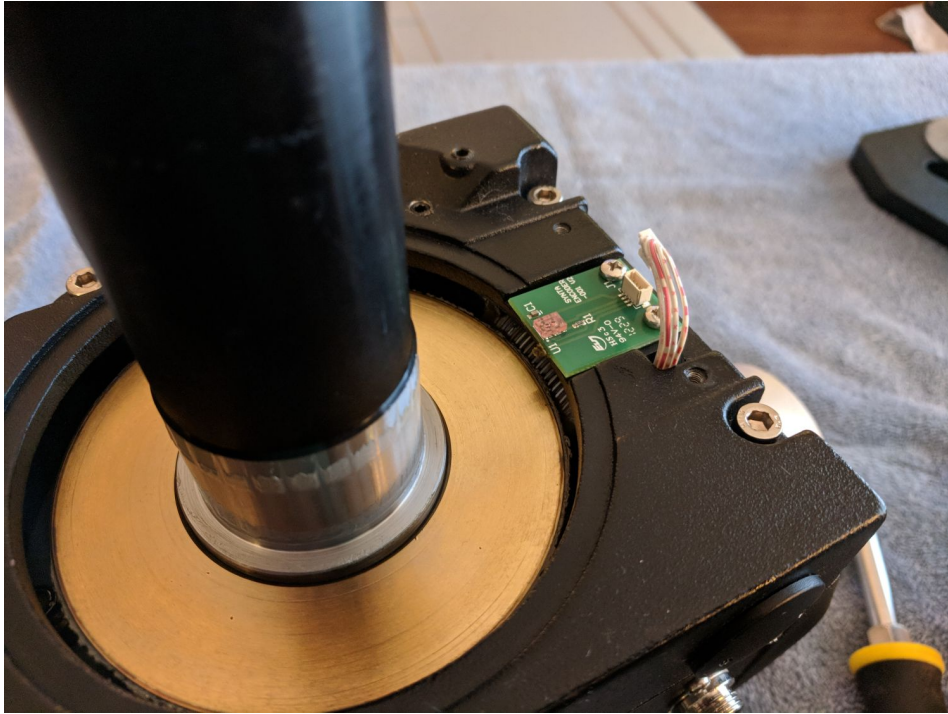
## Disassembling the RA axis

Loosen the worm tension set screws on each side of the RA worm housing a couple turns. These will be carefully adjusted later during reassembly.





## Disassembling the RA axis



Remove the encoder wire cover with a phillips screwdriver and set aside.

Carefully disconnect the encoder sensor wire connector.

Remove the four 4mm allen screws that secure the RA worm cover in place.

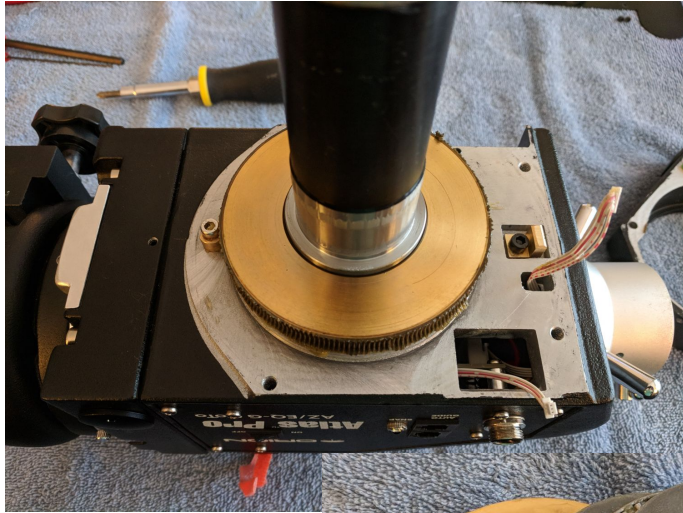
## Disassembling the RA axis



Carefully lift the worm cover, feeding the encoder sensor wire down through the hole it is routed through.

There is a RA worm sensor wire that needs to be disconnected under the cover. Unplug this connector, and then you can sit the RA worm cover aside.

## Disassembling the RA axis



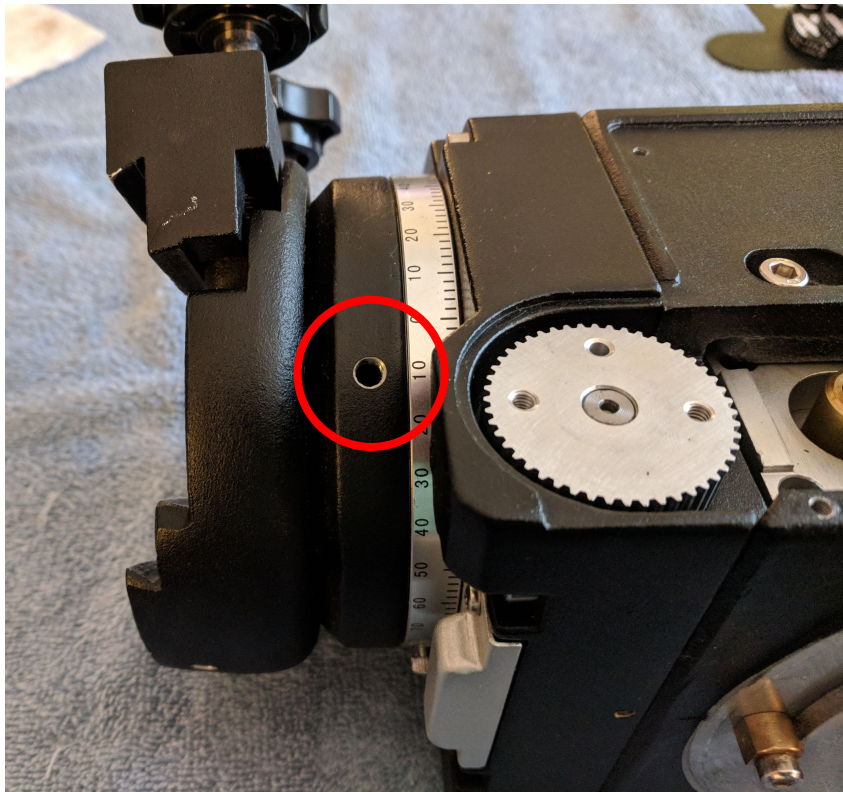
With the worm cover removed, you can remove the worm ring.

Note that the worm ring is a very precise fit on the RA shaft. Remove it slowly and carefully (spinning the ring on the shaft helps). If it is removed roughly it can bind on the RA shaft and cause damage to the ring and shaft.

Underneath the worm ring is the second RA thrust bearing. Once again, keep the bearing cage/rollers sandwiched between the two washers.

Set the worm ring and bearing assembly aside. The RA axis disassembly is now complete.

## Disassembling the DEC axis



Remove the three set screws that secure the saddle in place with a 3mm allen driver

Set the saddle assembly aside

## Disassembling the DEC axis



Remove the counterweight shaft safety stop.

Slide the entire counterweight shaft out the top of the mount and set aside.

## Disassembling the DEC axis

Remove the three set screws that secure the DEC end cap in place with a 2mm allen driver.

Unscrew the DEC end cap and set aside.



## Disassembling the DEC axis

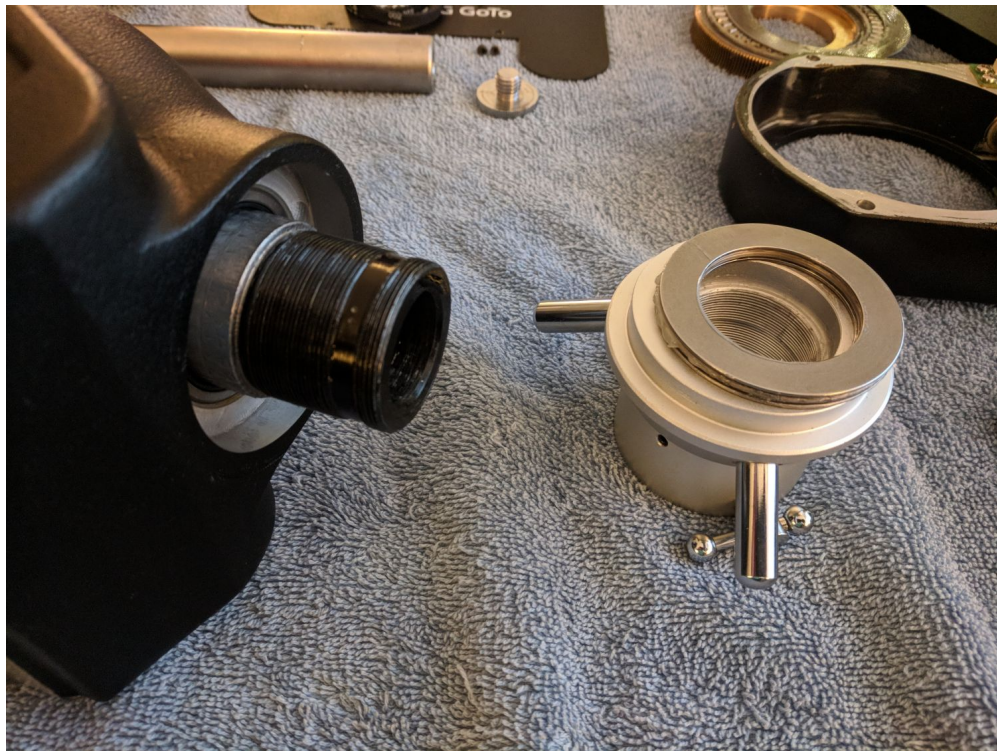


Unscrew the DEC tension clutch ring and set aside.

Under the DEC clutch ring is the first DEC axis thrust bearing. Take care as the near side bearing washer may stick to the bottom of the ring.

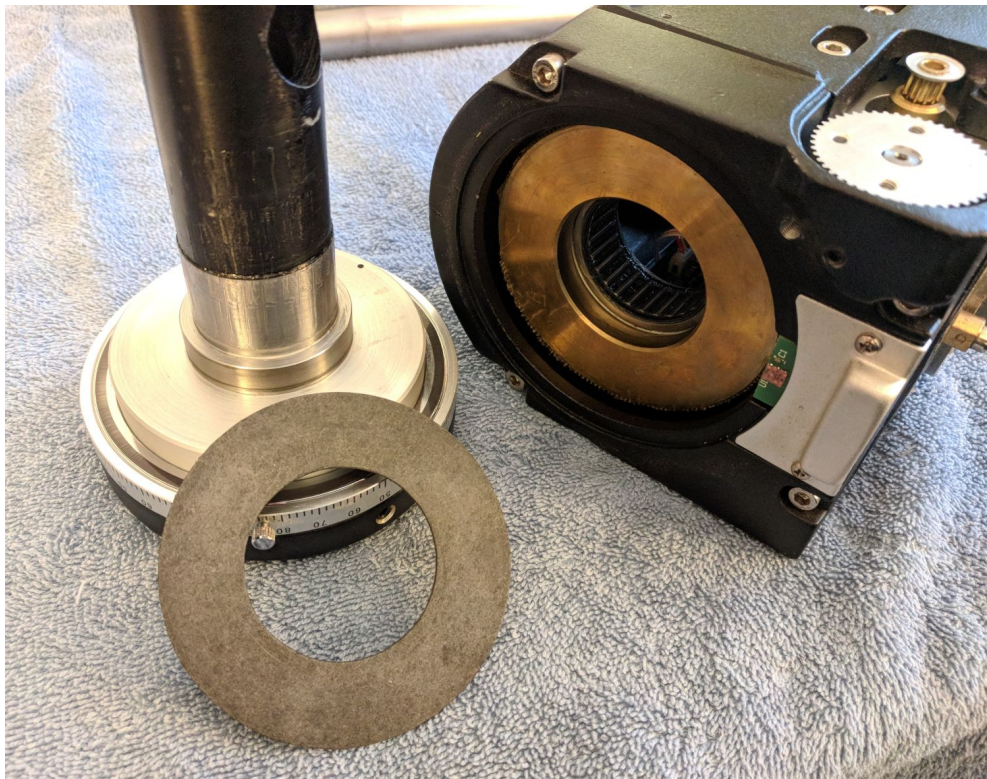
## Disassembling the DEC axis

Remove the thrust bearing and set aside. Be careful to ensure that all three bearing pieces remain together.





## Disassembling the DEC axis



With the clutch tension ring and end cap removed, the DEC axis shaft can be carefully removed from the mount housing.

As with the RA shaft, there is a felt friction washer between the shaft and the worm ring. Take care not to get grease on the washer.

There is also an encoder sensor ring on the flange side of the DEC axis shaft. Take care not to scratch or damage the encoder ring.

## Disassembling the DEC axis



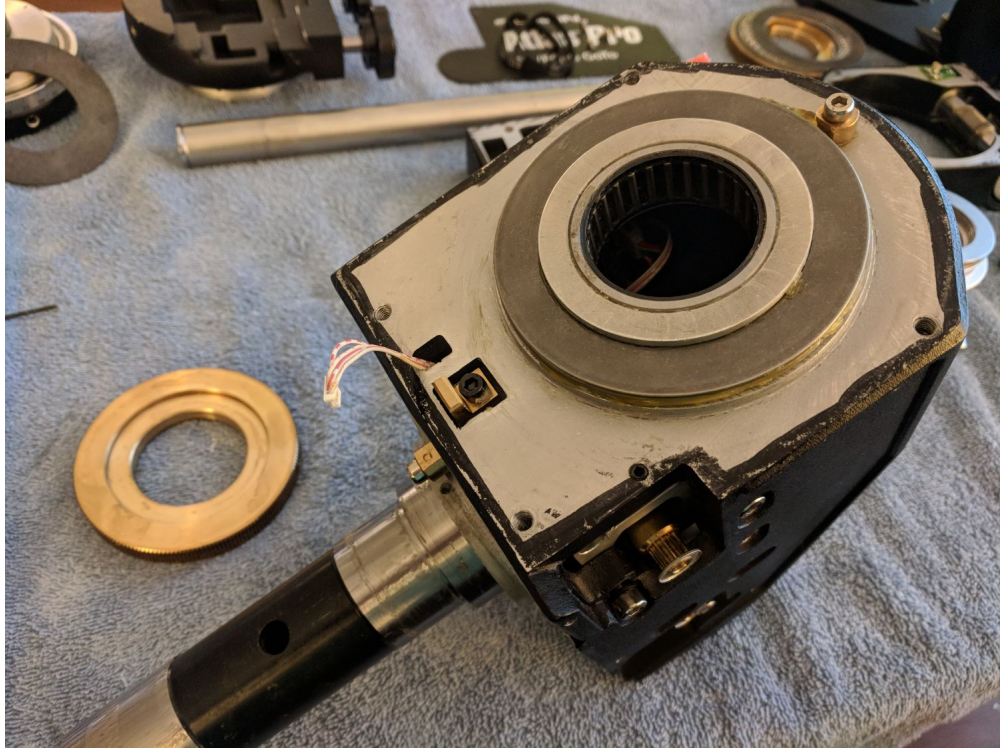
Like with the RA worm housing, remove the encoder sensor wiring cover and set aside.

Loosen both worm adjustment set screws a couple turns.

Remove the four worm housing screws and set aside.

Carefully remove the DEC worm housing, feeding the encoder sensor wire down through the hole it is routed through.

## Disassembling the DEC axis



The DEC worm ring can now be removed.

Under the DEC worm ring is the second DEC thrust bearing. Remove the bearing, taking care to keep all three pieces together.



## Prepping the mount for re-assembly

Now is when you want to thoroughly clean and dry all moving components.

The worm rings and thrust bearings can be immersed in water and dish soap or washed with a degreaser. Use a rag or old toothbrush to remove all existing grease. The shafts, worm gears (left in their housings), and radial roller bearings can all be wiped clean with a rag.

Inspect the mount for any metal shavings or other debris. Inspect all critical areas for burrs, knicks, or other damage.

Lay the pieces all out and let them thoroughly dry. You don't want any moisture trapped in the mount when you put it back together.

## Grease Choice



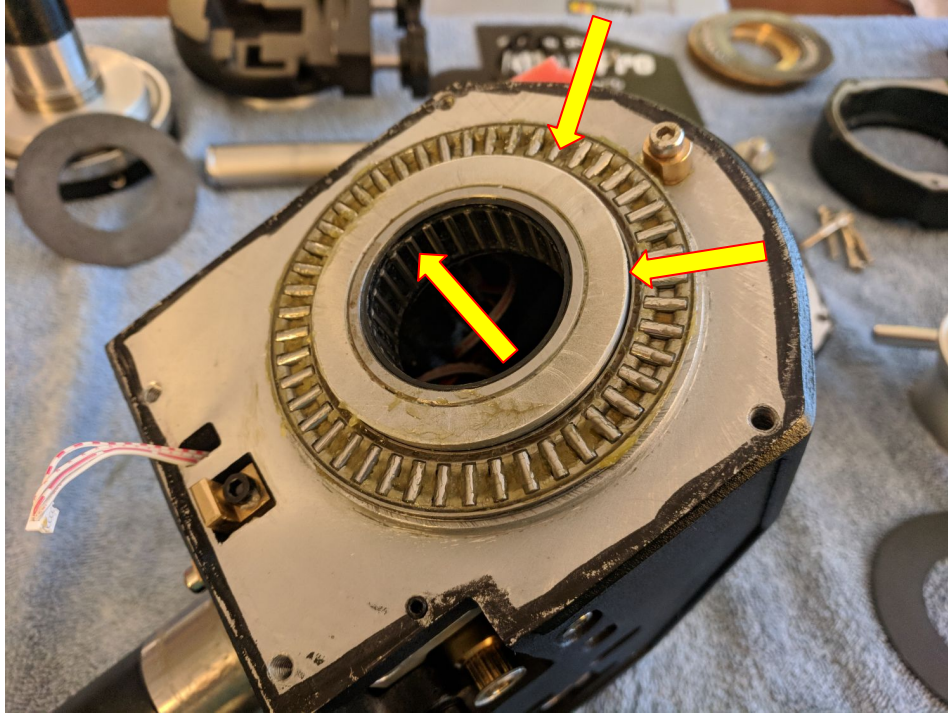
During re-assembly, you will want to use a premium grease.

Stick to a grease with the consistency of peanut butter (NLGI 2). This will provide proper lubrication of the sliding surfaces on the worm gears.

Many people recommend Super Lube, which is what I used on my mount and it has worked very well.

When applying grease, more is not always better. You want to sufficiently cover the surfaces that need it, but you do not want to over-apply.

## Re-assembling the DEC axis

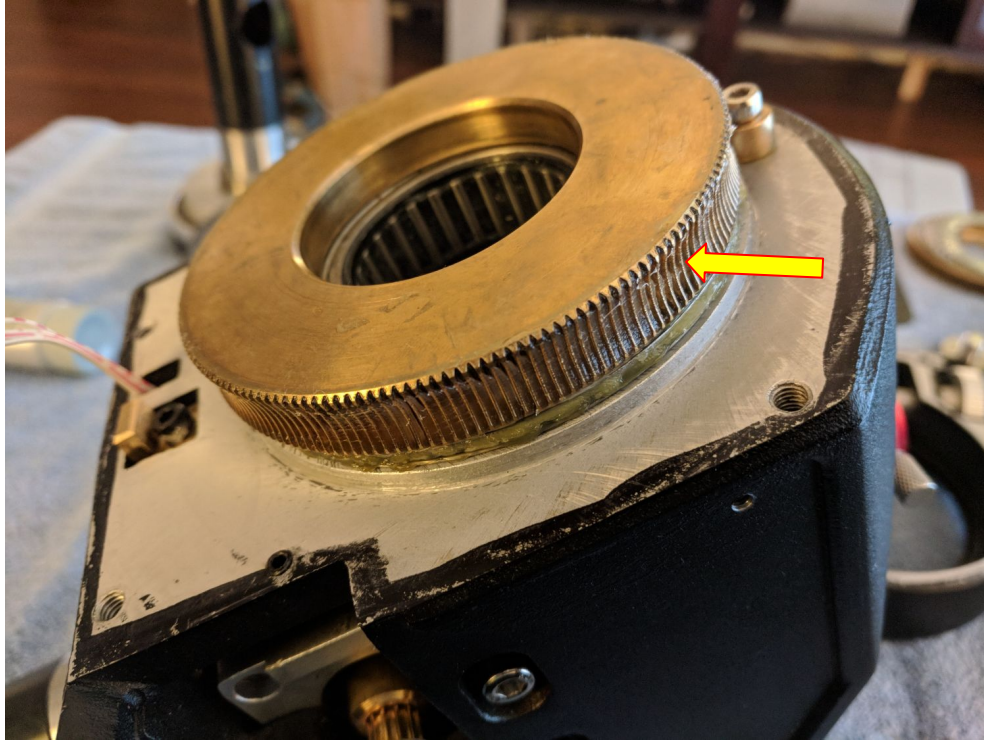


Apply fresh grease to the two DEC radial roller bearings. Work the grease into the bearings with your finger.

Re-assemble the large DEC thrust bearing. Ensure that the assembly order is washer, roller cage, washer. Work grease into the roller cage with your fingers.

Apply a thin layer of grease to the DEC worm ring pilot.

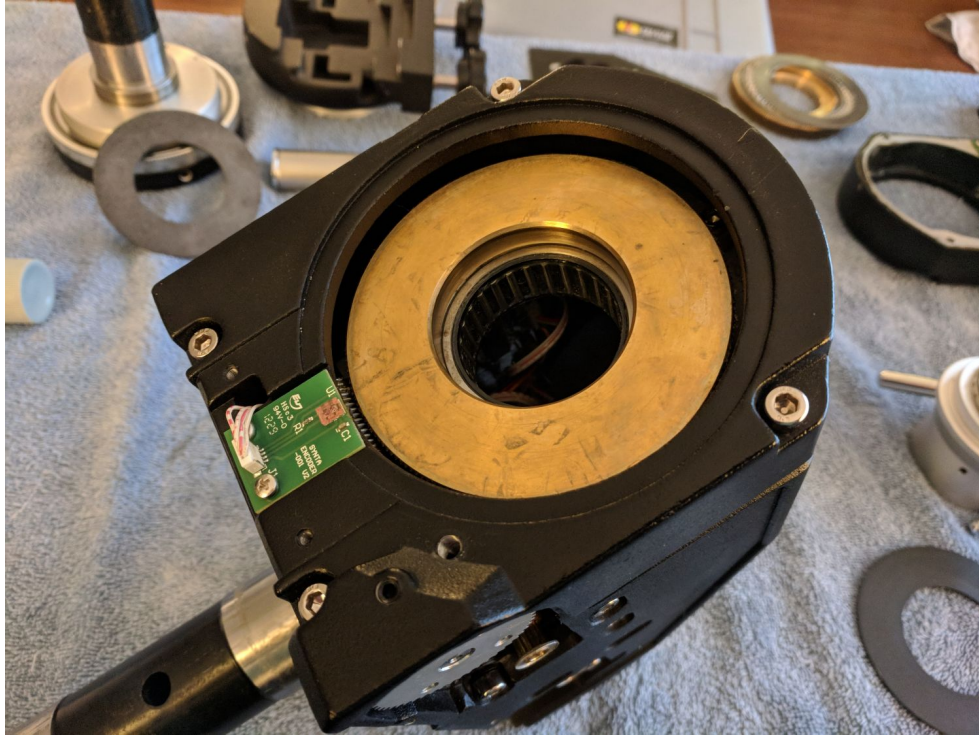
## Re-assembling the DEC axis



Install the DEC worm ring on top of the thrust bearing. Use your finger to spread a small amount of grease into the worm ring teeth. Put the grease all the way around the worm ring.



## Re-assembling the DEC axis



Loosely install the worm gear housing.

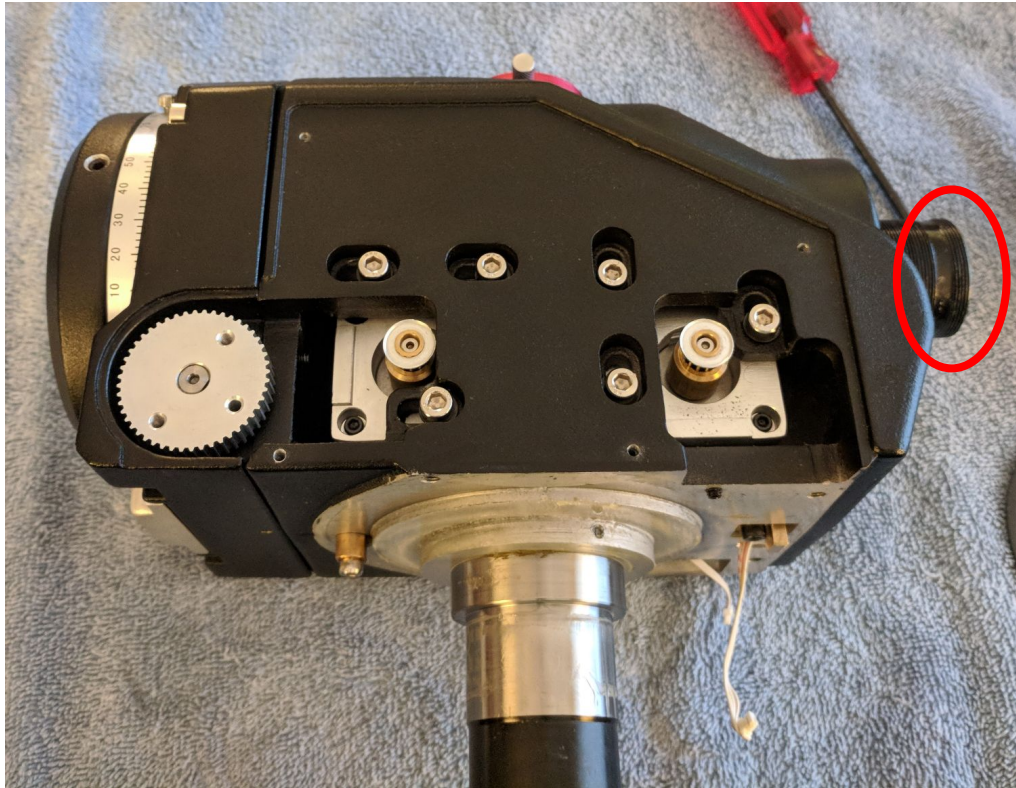
You do not need to apply grease to the worm gear, the grease has already been applied to the worm ring.

Carefully route the encoder sensor wire up through the access hole and plug it into the encoder sensor.

Do not fully tighten the worm gear housing, this will be done at a later step.

Install the encoder sensor cover.

## Re-assembling the DEC axis



Carefully install the felt friction washer and DEC shaft.

Wipe any extra grease off of the threads on the end of the DEC shaft.

## Re-assembling the DEC axis



Install the small thrust bearing on the end of the DEC shaft. Ensure that the assembly order is washer, roller cage, washer. Work grease into the roller cage with your fingers.

## Re-assembling the DEC axis



Install the DEC tension clutch ring, threading it tight until the DEC clutch locks up.

Install the DEC end cap. Thread it all the way onto the DEC shaft, and then tighten the three set screws to secure it.

## Adjusting DEC worm engagement

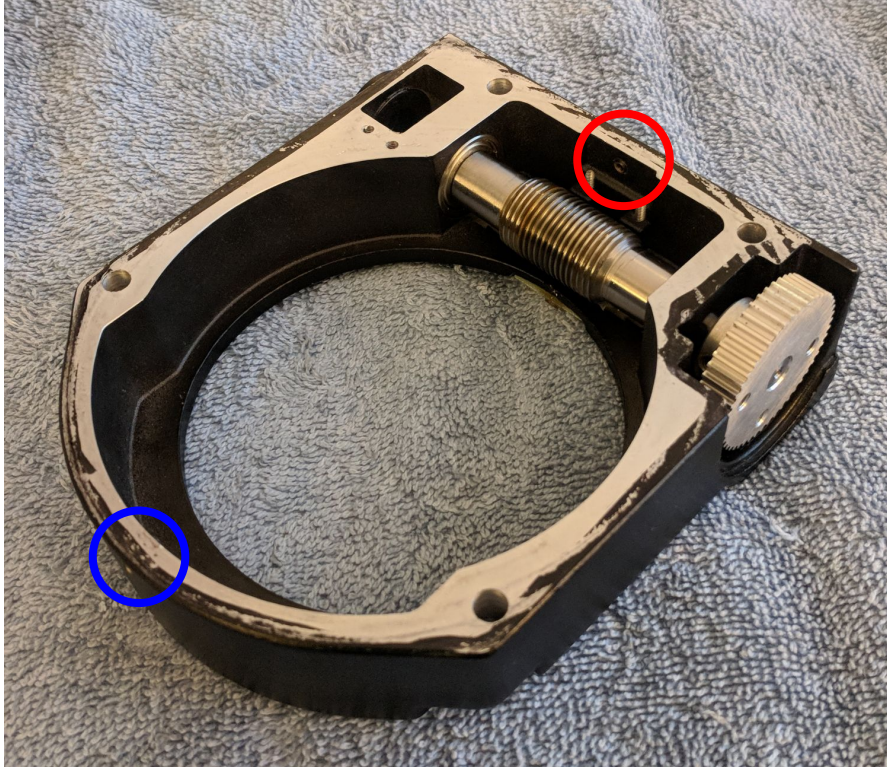


The worm engagement adjustment is critical. It is a balance between low backlash, and gear binding. The goal is to adjust for minimum backlash without introducing binding in the worm gears.

The adjustment is made by using two set screws in a pull-pull arrangement.

The set screw circled in red (worm side) pulls the worm gear away from the worm ring. This increases the gear interface spacing. Larger spacing results in a larger amount of backlash (bad), but less gear binding (good).

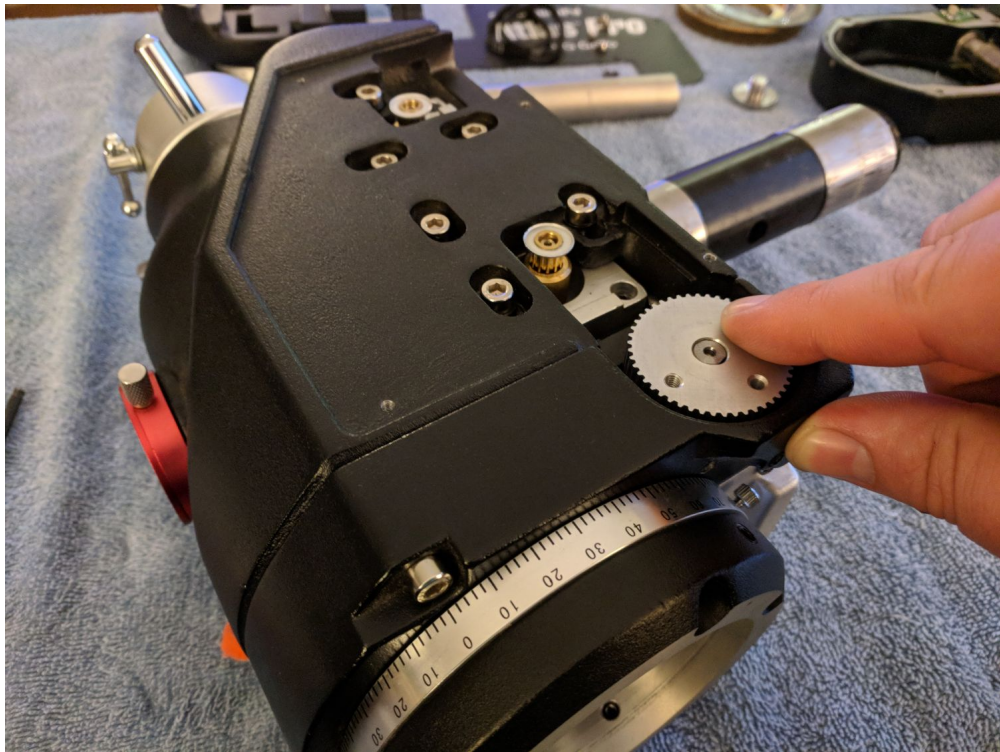
## Adjusting DEC worm engagement



The set screw circled in blue (ring side) pulls the worm gear into the worm ring. This decreases the gear interface spacing. Lower spacing results in a smaller amount of backlash (good), but increases the chance of gear binding (bad).

The trick is to play with the spacing until it is JUST large enough to prevent any binding in a full worm ring rotation.

## Adjusting DEC worm engagement

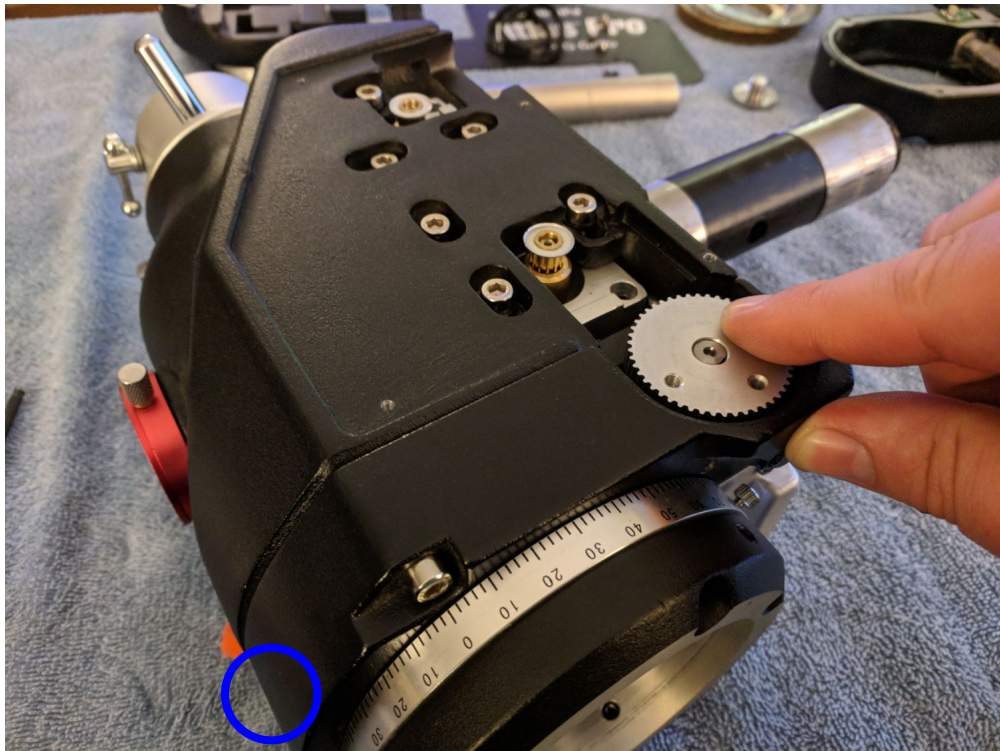


Both binding and backlash can be felt by spinning the DEC worm drive gear with your finger.

You should be able to easily spin this gear through a full worm ring revolution. You can see a full revolution by locking the DEC clutch and watching the DEC shaft as it rotates around.

If the gear gets hard to spin during the revolution, you have binding and need to loosen the ring side set screw and tighten the worm side set screw.

## Adjusting DEC worm engagement



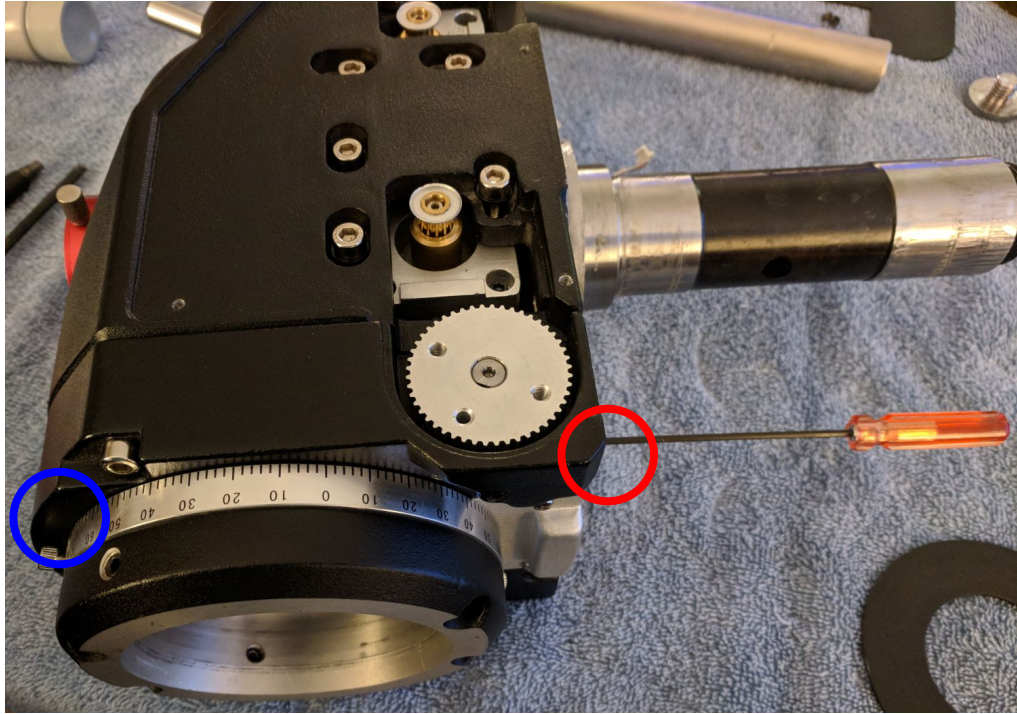
If you can rock the gear back and forth several degrees without any motion on the DEC shaft, you have excessive backlash and need to tighten the ring side set screw and loosen the worm side set screw

I find it best to start with a tight gear engagement and then loosen until there is no binding. Here is my process:

1. Tighten the four housing screws until they are just snug. The housing must be free to slide based on the tension in the adjustment screws.
2. Snug the **ring side** set screw until the gear cannot be easily rotated with your finger.

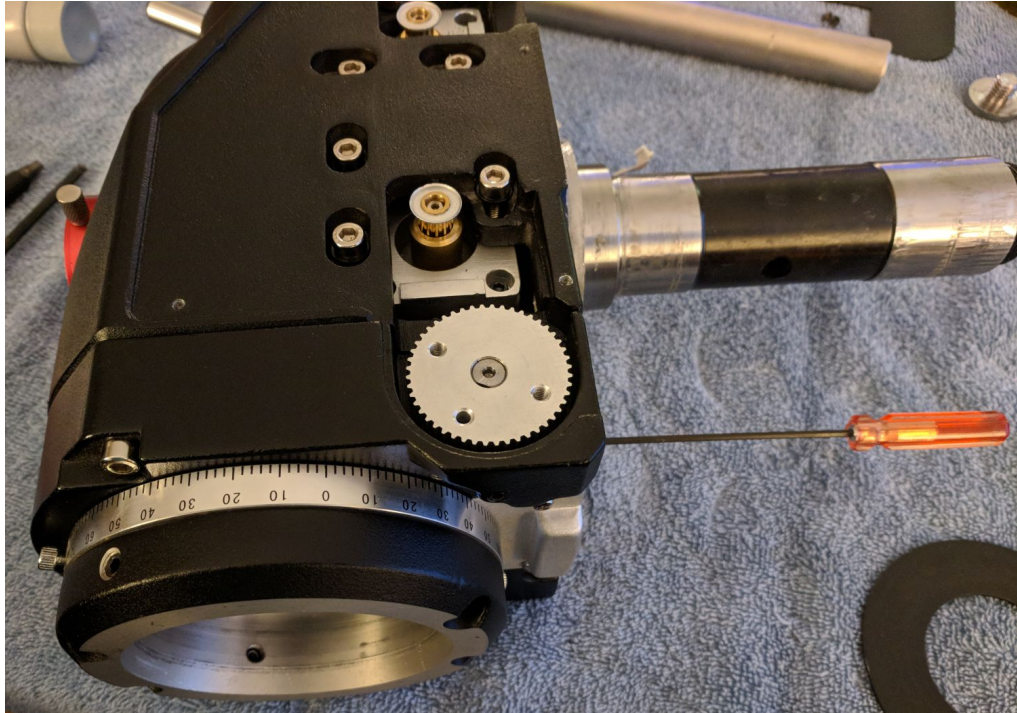


## Adjusting DEC worm engagement



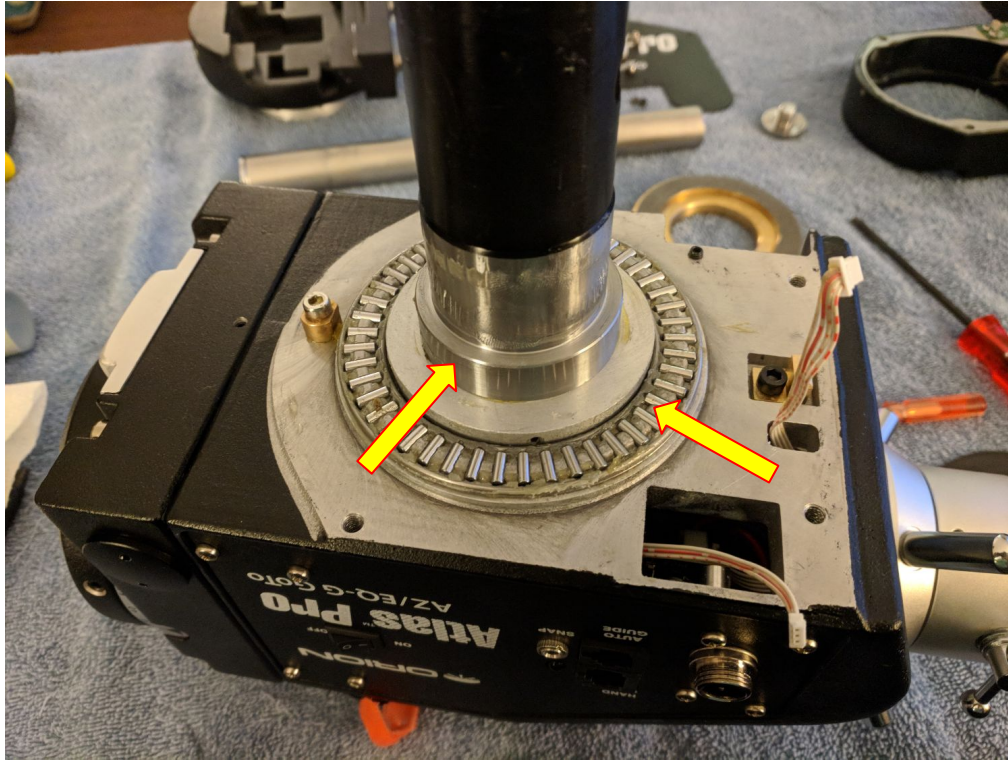
3. Snug the **worm side** set screw until it stops tightening.
4. Now iteratively increase the gear engagement by loosening the **ring side** set screw  $\frac{1}{8}$  turn and tightening the **worm side** set screw  $\frac{1}{8}$  turn. Do this just until you can freely rotate the worm driving gear.
5. Fine-tune the engagement with very small turns of the set screws. Some backlash is acceptable, but no binding is acceptable. Ensure that you can easily spin this gear through a full worm ring revolution after adjustment.

## Adjusting DEC worm engagement



6. When the adjustment seems perfect, fully tighten the four worm housing screws. If this throws off the adjustment, slightly loosen them, make a fine adjustment, and then re-tighten.
7. If you are happy with the backlash amount and have no binding in the worm engagement, the adjustment is complete.

## Re-assembling the RA axis



Re-assemble the large RA thrust bearing. Ensure that the assembly order is washer, roller cage, washer. Work grease into the roller cage with your fingers.

Apply a thin layer of grease to the RA worm ring pilot.

## Re-assembling the RA axis



Install the RA worm ring on top of the thrust bearing. Use your finger to spread a small amount of grease into the worm ring teeth. Put the grease all the way around the worm ring.

## Re-assembling the RA axis



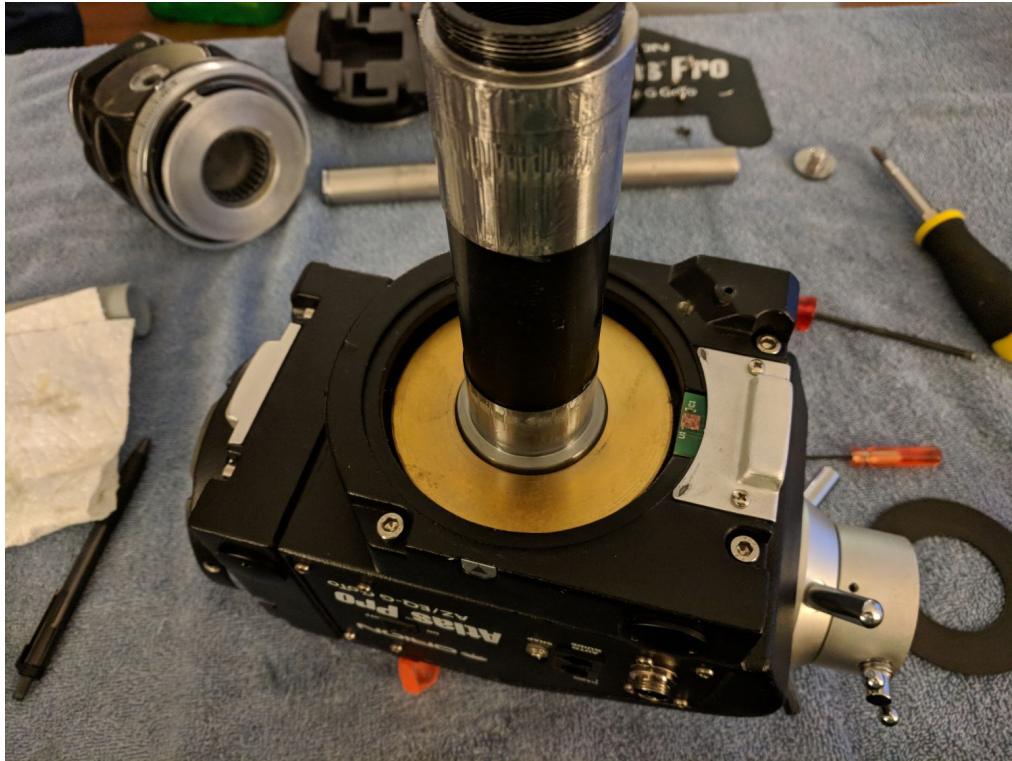
Just like on the DEC axis, loosely install the worm gear housing.

You do not need to apply grease to the worm gear, the grease has already been applied to the worm ring.

Carefully route the encoder sensor wire up through the access hole and plug it into the encoder sensor.

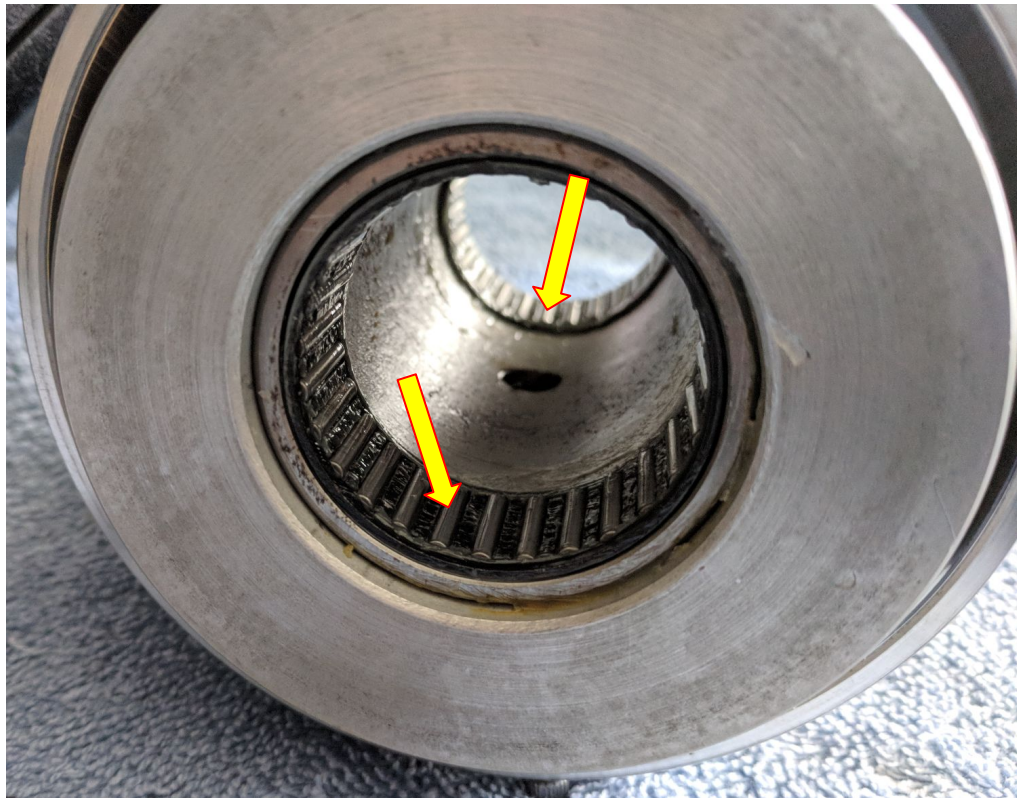
Connect the worm sensor wiring before fully lowering the worm gear housing.

## Re-assembling the RA axis



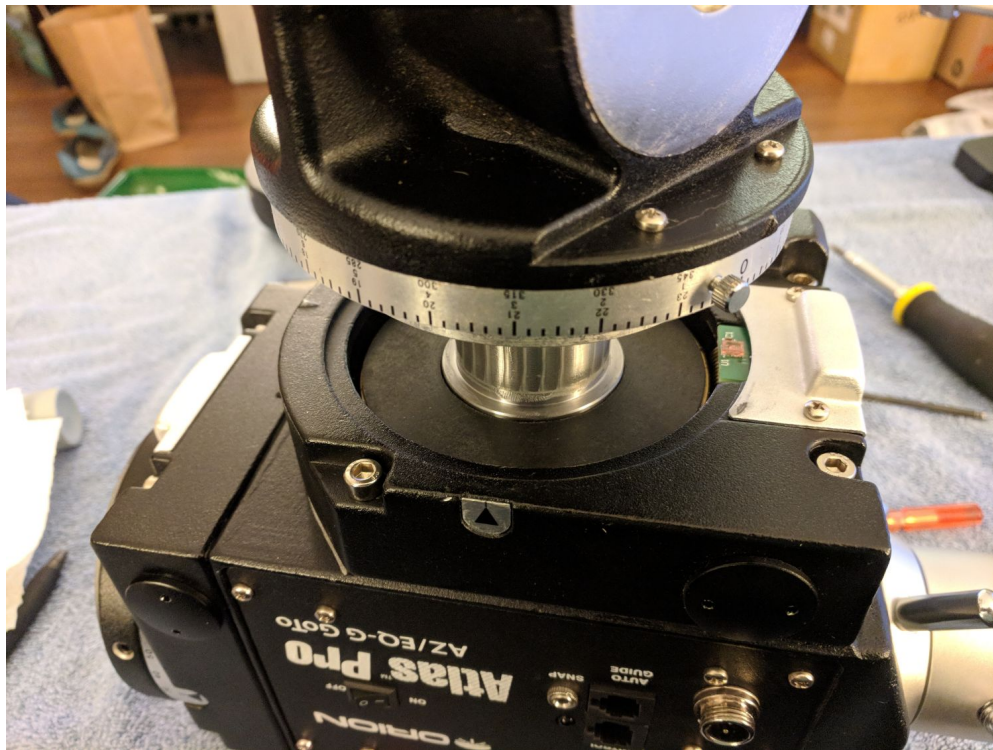
Install the encoder sensor cover.

## Re-assembling the RA axis



Grease both RA axis radial roller bearings.  
Work the grease into the bearings with  
your finger.

## Re-assembling the RA axis



Install the felt friction washer.

Carefully lower the RA casting over the RA shaft.



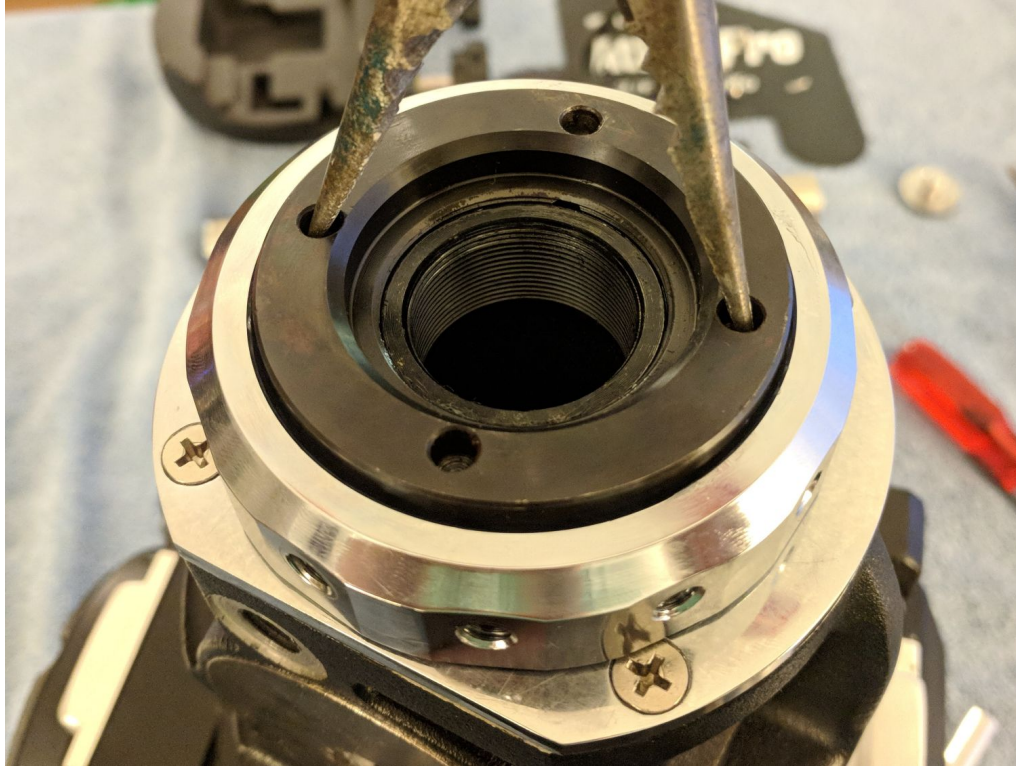
## Re-assembling the RA axis



Install the RA clutch tension ring, threading it nearly tight against the mount body.

Re-assemble the small RA thrust bearing. Ensure that the assembly order is washer, roller cage, washer. Work grease into the roller cage with your fingers.

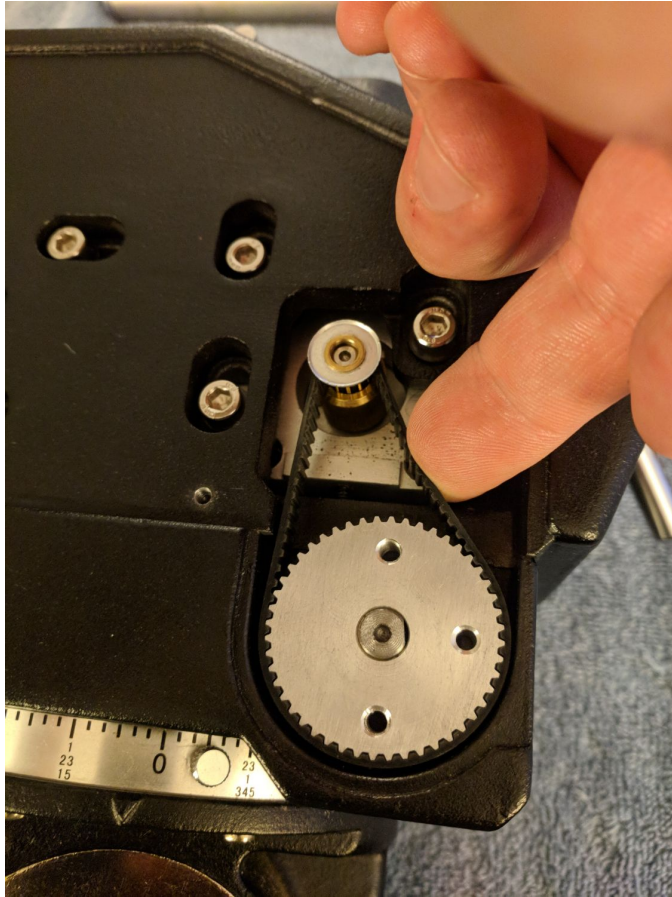
## Re-assembling the RA axis



Install the RA end retainer using your spanner wrench (needle nose pliers).

Tighten the three end retainer set screws by lining them up with the holes in the RA clutch tension ring.

## Final Steps

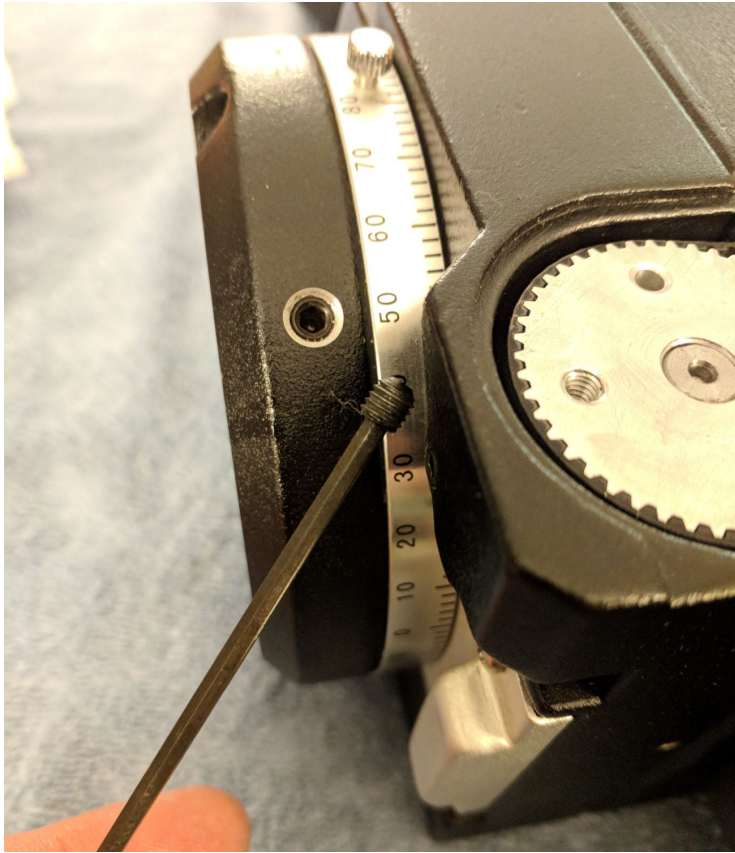


Loosely install the drive belts.

Tighten the belt tension screws to take up the belt slop.

The belts should be tight enough to appear straight, but still be loose enough to easily flex in the center span with a little pressure.

## Final Steps



Install the belt tension access cover set screws.

DO NOT tighten these. Just thread them in until the head is flush. If you overtighten, they will fall out the back side of the tapped hole and you will have to take the mount back apart to get them out.

## Final Steps

Install the belt cover panel.

Install the counterweight shaft and the saddle, tightening the three set screws that secure the saddle in place.

Apply a thin layer of grease to the mount head mating surface on each side of the RA casting.



## Final Steps



Install the mount head casting. Secure with the two pivot shaft pins and fully tighten them.

Install the altitude adjustment pin and fully tighten.

Install the clutch adjustment knob.

Install the polar scope alignment reference tab with a phillips screwdriver.

Install the polar scope.