

How to Install a GOTO Star System on Your EQ5 Equatorial Mount

By: *Nightfire Scientific, Ltd.*

We've had a lot of questions about the GOTO Star Automated GOTO system. By far, the most frequently asked question is "How hard is it to install this system on my mount"? This instruction manual will take you through the entire process, step-by-step. But, before we begin, there is a short quiz that you'll need to take, just to see if you're qualified to perform this installation.

Question#1: Can you identify the two tools in the picture on the right?

If you thought to yourself, "I don't know the name for these tools, but I do know how to use them", please proceed to Question#2.

If you know the proper name for these two tools, proceed to Question#2.



Question#2: Can you identify the tool in the picture on the right?

If you thought to yourself, "I don't know the name of this tool, but I do know how to use it", please proceed to Question#3.

If you know the proper name for this tool, proceed to Question#3.

*** Technical hint: If you look at this tool from the pointy end, it looks like a star. It isn't flat like that other similar tool used to open paint cans.**



Question#3: Can you identify what this guy is doing in the picture at the right, AND, do you think you could do this?

If you're thinking, "I'll bet he's stealing a TV", you're reading the wrong manual and are definitely in the wrong place.

If you thought to yourself, "He's either inserting a plug into a wall outlet or removing a plug from a wall outlet", you are correct.

The only acceptable answers to the second part of the question are, "Yes, I know exactly how to do this" or "No, I've never done this before but I believe I can do it".



If you were able to reach this point without too much difficulty, you are skillful enough to install the GOTO Star System. Please proceed to the next page.

Installing the GOTO Star System

The GOTO Star System can be installed on a huge range of equatorial mounts, including the industry standard EQ5, Vixen GP, Vixen SP (but slight housing alterations are required), Orion SkyView Pro, Celestron CG5 and the Meade LXD55 or LXD75. We're using the EQ5 for demonstration purposes. A stock EQ5 equatorial mount is shown below. We're about to turn this humble, but mighty, mount into a precision and sophisticated GOTO system. Humble to sophisticated in 60 minutes or less! (Usually, much less.)



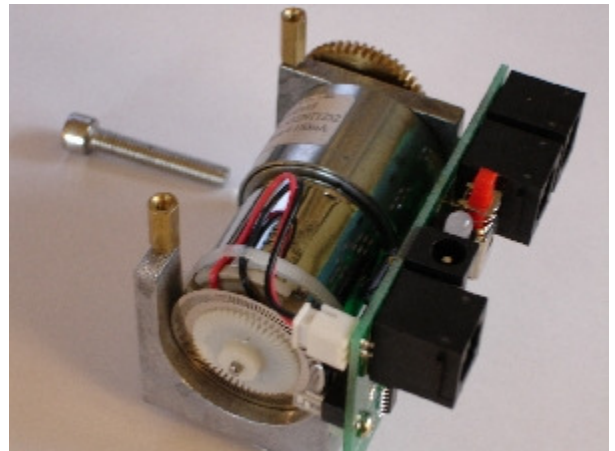
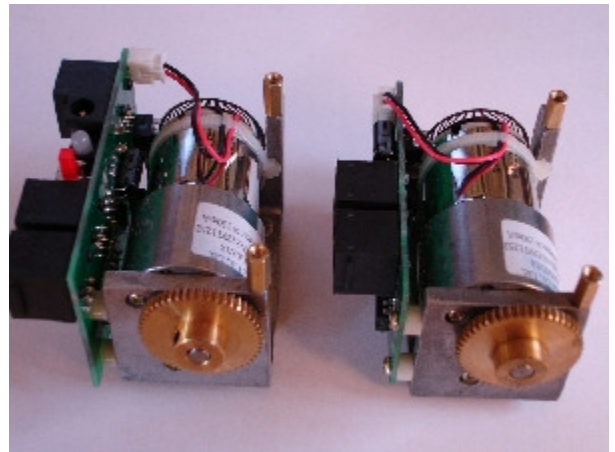
WARNING! Remove your OTA from the mount before performing this installation. You will find the installation much easier if you remove the counterweight and counterweight shaft as well.

STEP 1:

Two of the key components are the right ascension (RA) motor/electronics package and the declination (DEC) motor/electronics package. The RA is the unit on the left and DEC is the unit on the right. They are easy to tell apart in that the RA has three RJ45 jacks while the DEC has only two. The RA drive also has a pushbutton and an LED.

Remove two of the gears from the packaging and place them on the motor shafts as shown in picture. Note that the gear hubs point away from the motor. Push the gears onto the motor shafts so that the gear hubs are flush with the end of the motor shafts. Tighten the setscrews. STEP 1 is complete. Take a break if you need to.

Caution Note: If you look at the back side of the motor assembly, you will see a thin, metal, disk with many slots around the circumference. DO NOT TOUCH OR BEND THIS DISK! This is the optical encoder disk.



STEP 2:

Remove the RA and DEC control knobs. The DEC knob is the one shown being removed. Can you find the RA knob? *Hint: It looks just like the DEC knob.*

Again, please note that we have removed the OTA and the counterweight shaft.

Are you with us so far?

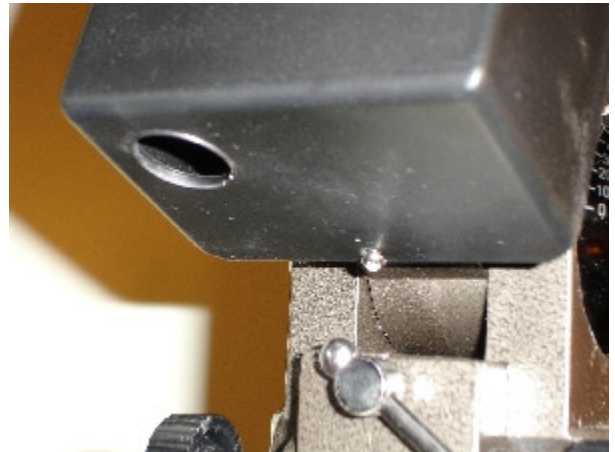


STEP 3:

Ok. Now we need one of those tools you identified in the quiz that you took at the beginning of this manual. No, not big shiny bent one. No, not the small shiny bent one. We'll need the Phillips Screwdriver. (The pointy thing with the black handle shown in the quiz.)

Most, if not all, EQ5 mounts and equivalent, come equipped with a plastic RA motor cover. They are shipped this way even if you don't have an RA drive motor installed. The objective here is to remove this cover. The cover is held in place by a single Phillips screw. Remove it. Go ahead! Be proud of yourself!

With the screw removed, pull the motor cover downward and off of the mount. It might be tight, so a bit of wiggling may be in order. If you break it, don't worry. You won't be needing this cover, ever again.

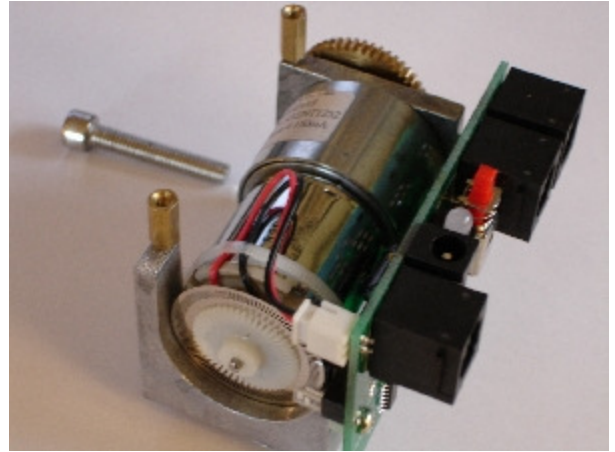


Your mount should now look like this, stripped of its knobs and motor cover. Put the screwdriver down and relax. Step 3 is now complete.



STEP 4: Getting familiar

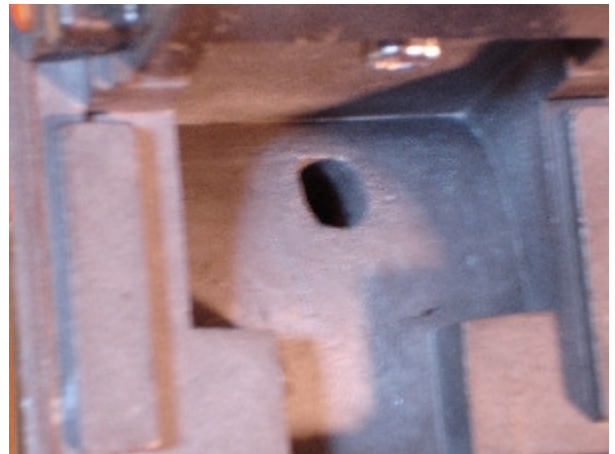
Get ready! We're going to start installing parts very soon. First, let's identify some of the parts and part locations so we don't panic in the heat of battle. The picture at the right shows the RA motor assembly. The picture also shows a long, stainless steel bolt. (The DEC bolt is also stainless steel, but is much shorter.) The motor itself is mounted to a cast metal structure. This casting has a boss (no, not the guy you work for), which is a raised surface. It is underneath the motor in the picture at the right, so you can't see it. There is a threaded hole in the boss. The long bolt will thread into this hole. Don't install the bolt at this point!



Now let's look at the mount. If you face the rear of your mount, and look under the polar finder scope, you will see a rather large hole. You've always wondered why there was a hole in your mount, now you're about to find out. The long stainless steel bolt goes through this hole....



... and comes out here, on the front of the mount. Go ahead and try it out. Put the bolt into the hole in the rear of the mount (threaded end first, of course), push it into the hole with a pencil, allen wrench or screwdriver, and look at the front of the mount. There it is! Just as we told you it would be! Take the bolt out and let's gather the parts we were going to install and two tools.



STEP 5: RA Control Shaft Gear Installation

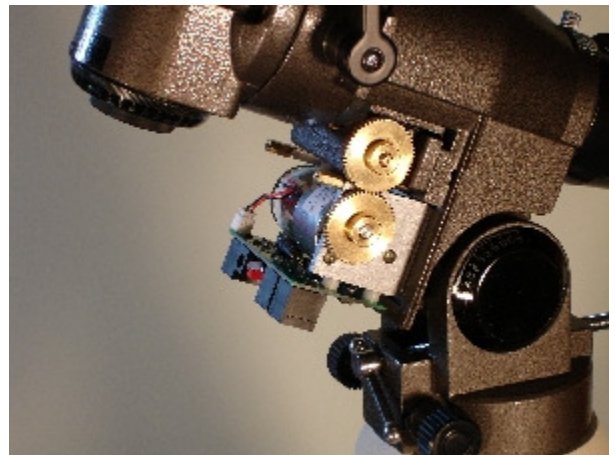
We're going to need one of the two remaining brass gears, and the small allen wrench for this step. (You should have already installed two of the brass gears on the motors in Step 1.) If you skipped Step 1, please go back and do it now.

Take the brass gear and place in on the RA control shaft as shown in the photo. The gear hub should be facing away from the mount. Align the allen screw (which is threaded into the gear hub) with the flat surface on the RA shaft. Use the small allen wrench to lightly tighten the setscrew. We're going to adjust the position of this gear later so don't tighten it down fully at this point.



STEP 6: RA Axis Installation

You will need the RA drive motor, the large allen wrench and the long stainless steel bolt for this step. ***Remember to be careful when handling the motor assembly so you don't damage the encoder!** First place the bolt on the long end of the allen wrench and insert the bolt into the hole at the rear of the mount. Be sure that it is protruding all the way through. Carefully hold the motor against the mount. The boss with the threaded hole needs to face the mount. Align the threaded hole with the bolt and begin to tighten the bolt. Check to be sure that the motor gear and the RA control shaft gear are in good mesh. Tighten the bolt to secure the RA motor to the mount. Check the alignment of the gears. You may need to move the RA control shaft gear toward or away from the mount. Tighten the gear using the small allen wrench. Done! Stand back and look at your mount. Hey, it's beginning to look like something!



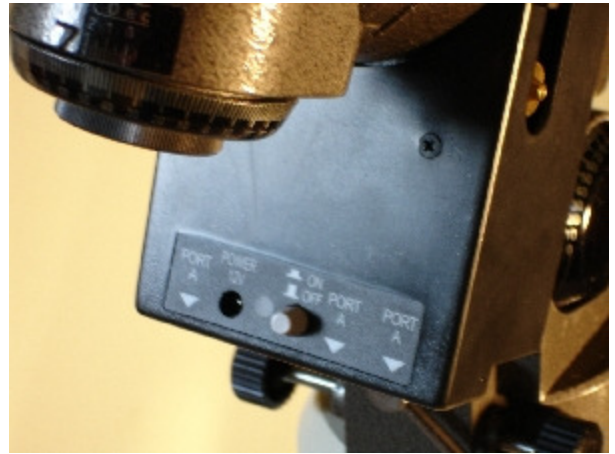
STEP 7: RA Motor Cover Installation

Two covers were included with your GOTO Star system. One for the RA, and one for the DEC. You'll need the RA cover for this step. The RA cover is shown at the right. You'll also need two of the small Phillips head screws and a Phillips screwdriver. Slide the cover onto the RA axis, from the bottom and pushing upwards. Make sure that the RJ12 jacks are aligned and flush with the cover. Insert and tighten the two Phillips head screws to secure the cover.



Packaged with the screws, you'll find a gray plastic bullet-shaped part. This is the on/off button. Simply press it onto the red on/off switch. You can see the switch by looking through the hole in the cover.

Done! Again, stand back and look at your mount. Looks professional, doesn't it!



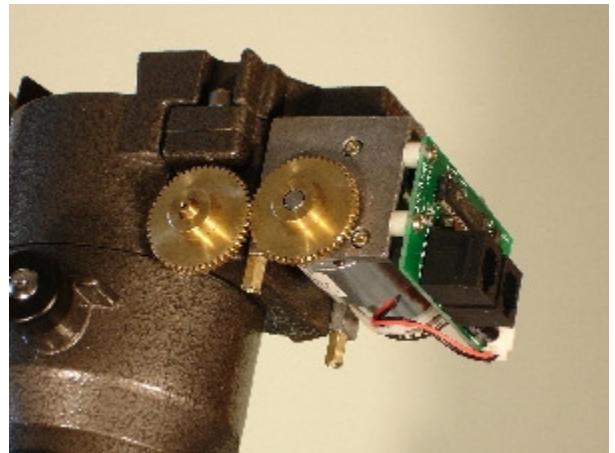
STEP 8: DEC Axis Installation

Locate your last remaining brass gear. Put this gear on the DEC control shaft as shown in the picture, with the gear hub facing outward. Slightly tighten the gear setscrew. We'll need to adjust this later, just as we did with the RA axis.



Place the DEC motor against the DEC flange as shown in the picture. The motor housing boss will fit nicely inside the mount's recess. * **Again, use caution in handling the motor assembly so that you don't damage the encoder.** With the motor in position, and the motor gear meshed with the DEC control axis gear, insert the short stainless steel bolt (from the top) into the motor boss and tighten securely.

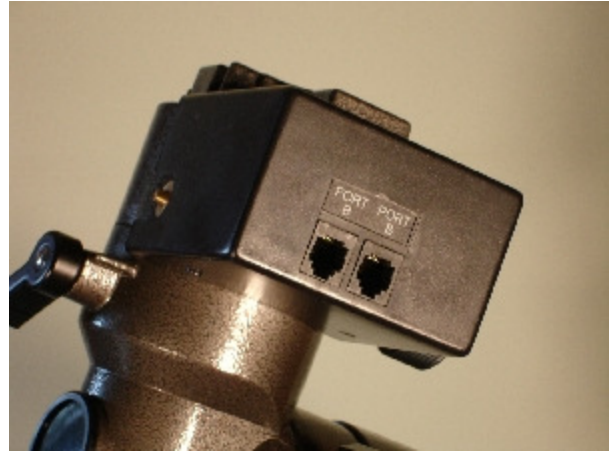
Great job! Looks high tech, doesn't it!



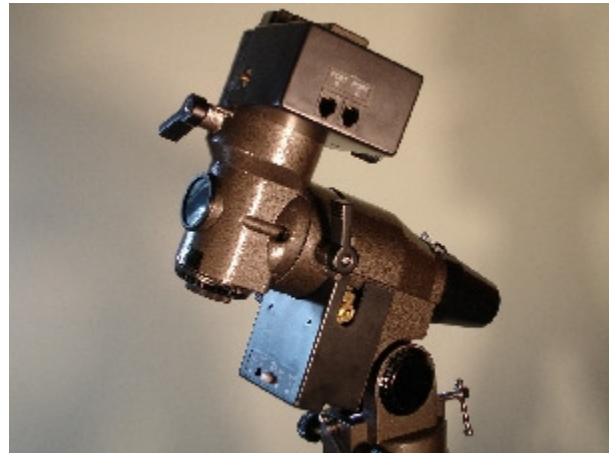
STEP 9: DEC Motor Cover Installation

Slip the DEC motor cover over the motor assembly and securely fasten it to the motor frame using the last two remaining Phillips head screws. (The screw holes are on the bottom of the housing.) Be sure that the two RJ45 jacks are centered and flush with the housing surface before tightening the screws.

Nicely done!



Let's take a breather! Your mount should now look like this. Oh, yeah! You can now put all your tools away.



STEP 10: Cable, Pendant and Power Cabling

Ok. Let's start the wiring! (Well, plugging in the cables to be more exact.) Your kit contains two coil cords that are exactly the same length and they are wired exactly the same way, so there's nothing tricky here. Take one of the cords and plug it into Port A on the RA control panel. **WAIT A MINUTE!!! ALL OF THE PORTS ARE LABELED `A`. WHICH PORT `A` SHOULD I USE???** Answer... it doesn't matter. We typically use one of the two right hand ports. Why? We simply think it looks better. Now, take the free end of the cord and plug it into Port B on the DEC axis. There are two ports labeled `B` and you can use either one. When you're finished, your mount should look like the picture.



Take the pendant and flip it over to the back side. Oh no! There are two ports here! Grab the second coil cord and plug it into the right-hand port of the pendant. "Why can't I plug it into the left-hand port?", you may ask. It won't fit, we relied. Just so you know, the left-hand port is a communications port and this can be connected to your computer using the supplied interface cable. More on this in our "Using the GOTO Star System" manual.



Plug the free end of the pendant coil cord into Port A on the RA control panel.



Guess what! You are almost done!



A power adapter was included with your kit and you may now plug it into the RA control panel port labeled "Power 12V". Plug the adapter into a wall outlet and you will notice that the RA control panel LED is lighted in red. Press the ON button, the LED turns green and the GOTO Star Pendant springs to life!

Congratulations! You've completed the installation!

