

SiTech Controlled Meade LX200 16" Converter



My Conversion project:

LX200 16" classic Meade to a Sitech controller

Our Local astronomy club built a Public outreach observatory in conjunction with a state Park and the local university. The Park took our design and after making some modifications Built a roll off roof observatory to house our outreach equipment which included a nonfunctional 16" LX200 Classic that the local university loaned us (permanently) to use for public outreach. We found one of the motors had disintegrated which after an extensive search we found a used replacement motor. The scope seemed functional but was stored for a couple years till the observatory was finally built. Then we installed it only to find out it wouldn't accurately go to any targets and when we on rare occasions got it through the alignment process and the tracking was terrible. We were disappointed to say the least. We spent several months trying to get it working and trying to find parts. We replaced several components without much success. Then one day while online a suggestion was made to try the Sitech controller. After doing much research and getting approval from the university we decided to make the attempt to convert the old Classic to a new Sitech controlled scope.

Ok let's get down to the actual conversion process.

First we ordered the controller, motors, and wireless hand pad.

<http://www.siderealtechnology.com/page10.html>

1 ea. Dual Servo Telescope Controller

2 ea. New Servo Motors, 19.1 volt, 10:1 gear ratio, 500 count encoder

1 ea. Cable Set

1ea Radio Hand pad, (Transmitter and Receiver)

Retail price for the full set is about \$1050.00

Later after a learning experience I ordered the Pulleys and Belts

<https://sdp-si.com/eStore/Catalog>

I ordered 2 sets one set 3:1 gear reduction and 1one set 2:1 gear reduction

There is a great calculator to help you get the correct parts

<https://sdp-si.com/eStore/CenterDistanceDesigner>

Pay close attention to the part numbers

Here are the parts I would have ordered if I were to do it again

[A 6T16-024DF2506](#) 24 Tooth Dual Flange .25 wide with a 0.188 bore size with Aluminum Insert

[A 6Z16-048DF2508](#) 48 Tooth Dual Flange .25 wide with a 0.25 bore size with Brass Insert

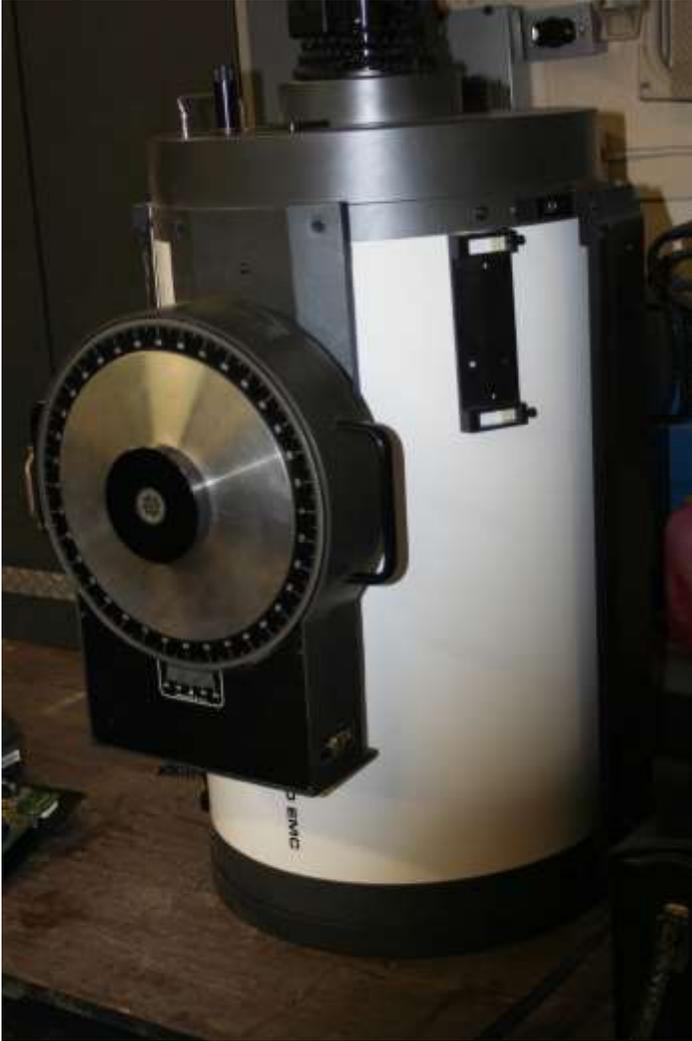
[A 6Z16-099018](#) .080" (MXL) Pitch, 99 Teeth, 3/16" Wide Single Sided Neoprene Belt with Fiberglass Cords

[A 6Z16-072DF2508](#) 72 Tooth Dual Flange .25 wide with a 0.25 bore size with Brass Insert

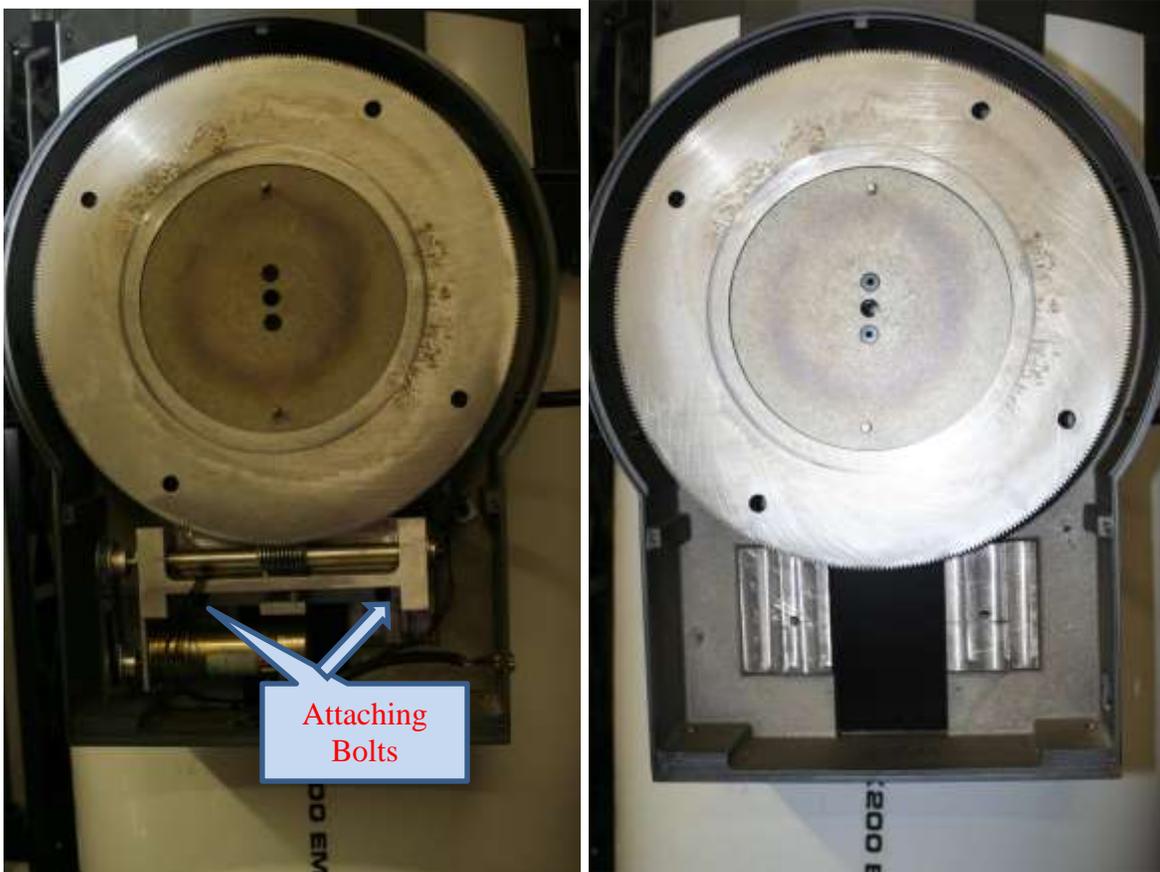
[A 6Z16-112018](#) .080" (MXL) Pitch, 112 Teeth, 3/16" Wide Single Sided Neoprene Belt with Fiberglass Cords

I made the mistake of not paying close attention and ordered Single Flange pulleys for the 48 and 72 tooth They work but I would have preferred Dual Flange pulleys also I ordered additional belts one tooth longer and one tooth shorter just in case, but the calculator selected the correct belt length and I found I didn't need the additional belts. Also each pulley only has one setscrew I would have preferred dual setscrews

Then we disassembled the Scope and moved it to my garage The 16 " LX200 Classic disassembles into 3 fairly manageable parts, the OTA the Forks and the base. Forks (not shown)



I started with the removal of the old components.
First the Clutch and motor from the upper Fork (still attached to the OTA)
The clutch simply unscrews and is removed



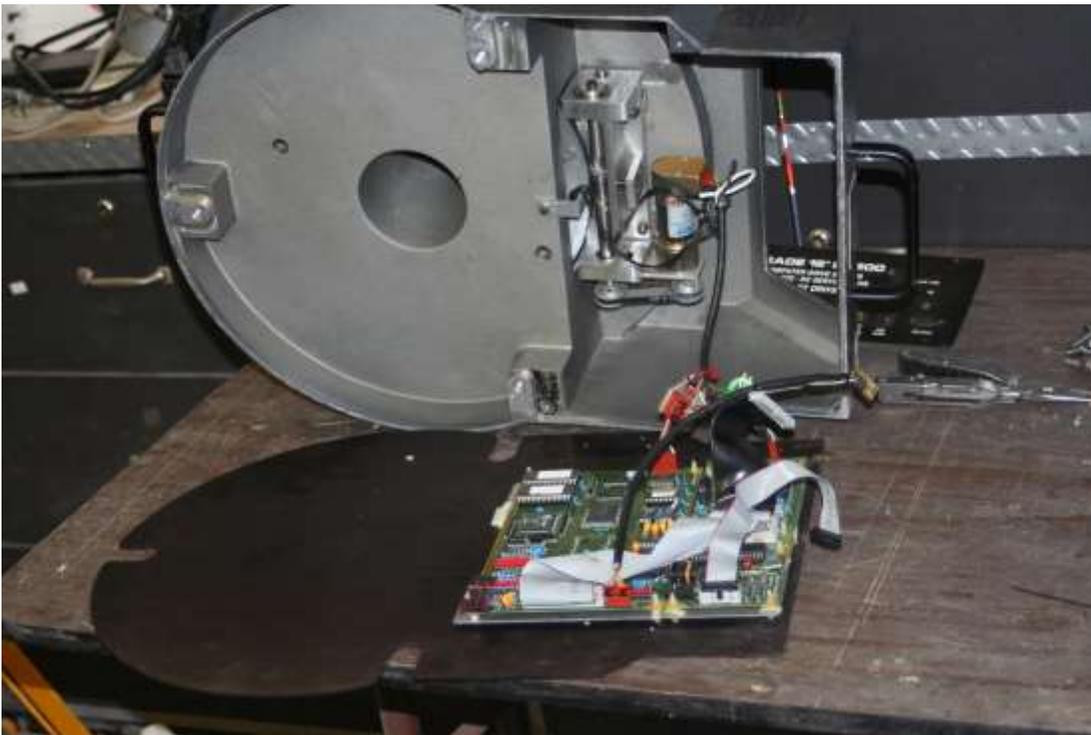
The home position sensors were removed as the Sitech controller does not need or use them.
The motor assembly has 2 Allen head bolts that are removed to remove the assembly. Be careful to not lose the tension spring



Then I removed the old components from the base.

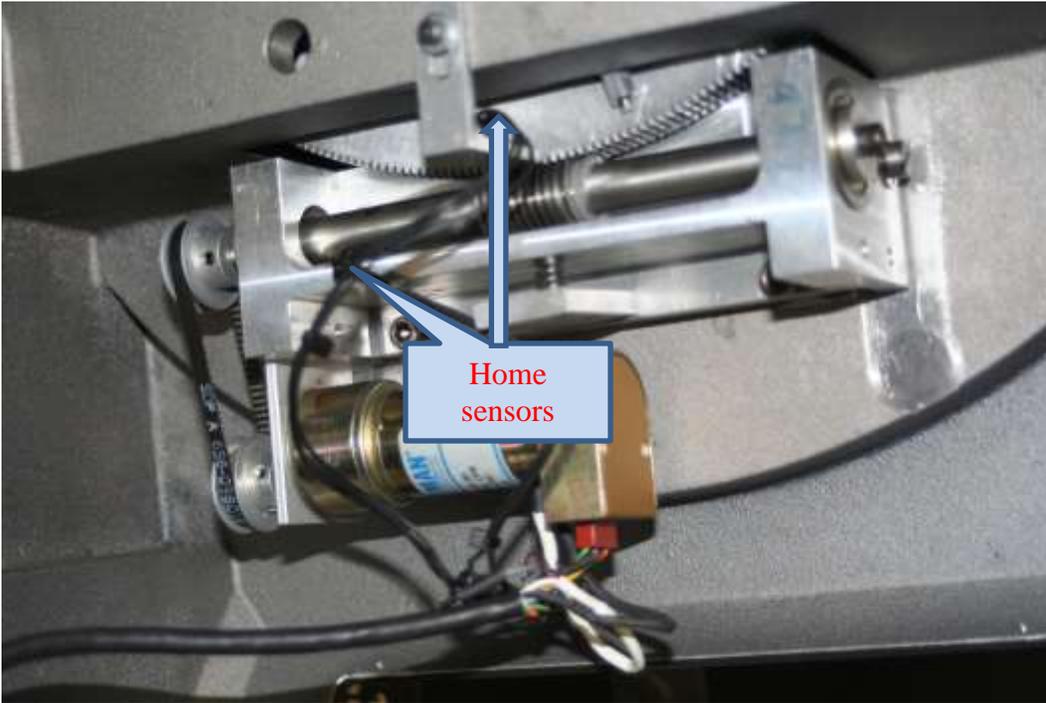


The front plate has 4 small Allen head screws holding it in place then the connector wires unplug from the main boards.



Then remove the bottom plate with the main board and disconnect the wires connecting it to the AZ motor. Then remove the main board from the bottom plate. If I remember correctly there are only 2 screws and 2 clips holding it in place.

Then remove the AZ motor assembly much like you removed the ALT motor assembly earlier. Again the motor assembly has 2 Allen head bolts that are removed to remove the assembly. Be careful to not lose the tension spring. Disconnect home sensors



With all the old components removed we start the conversion process.

First I replaced the old motors with the new Sitech Motors



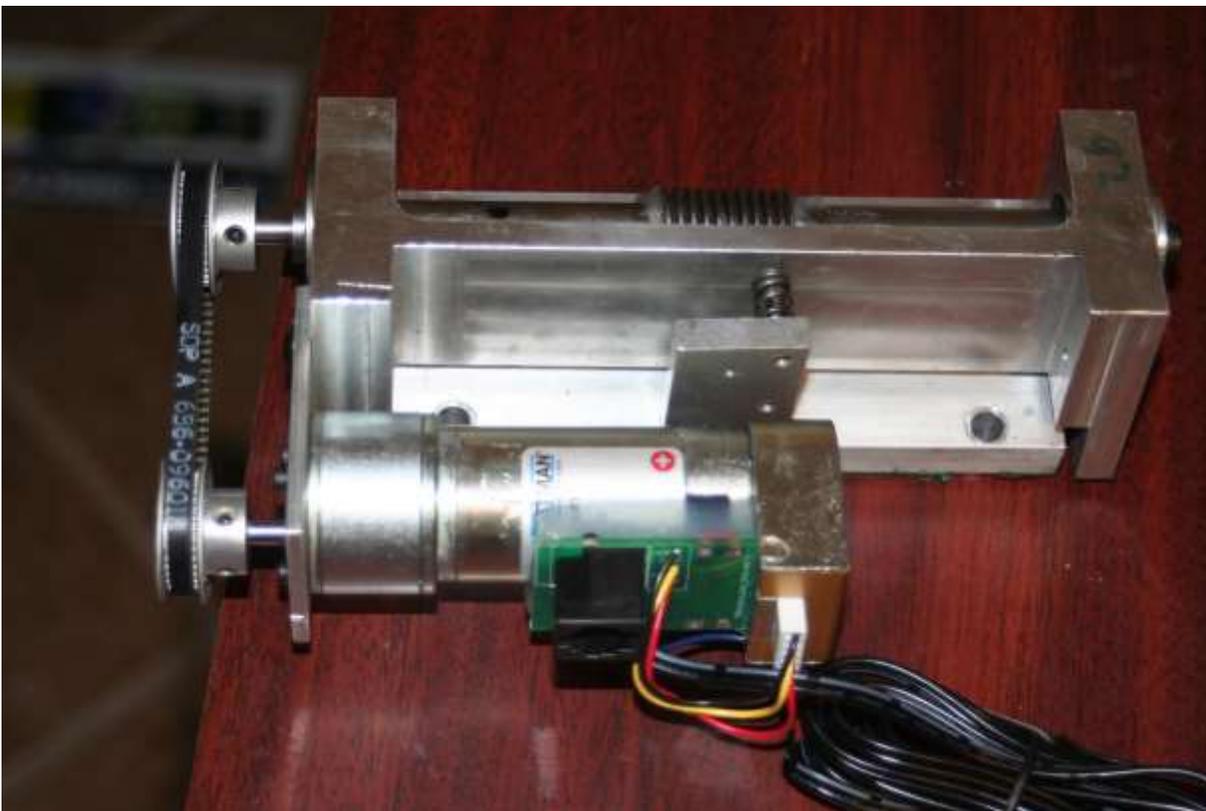
First remove the pulley and drive belt then remove the 3 screws holding the motor to the assembly.



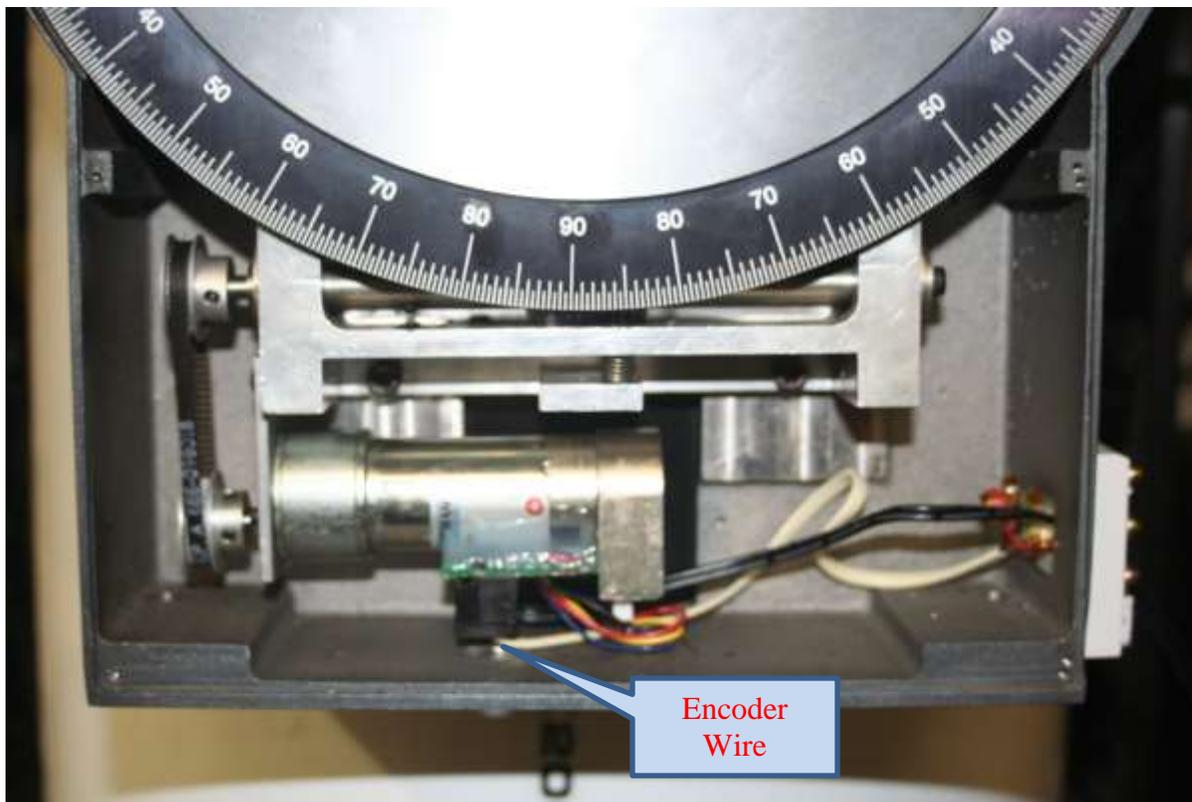
The old motor is removed and the Sitech motor fits perfectly in its place.



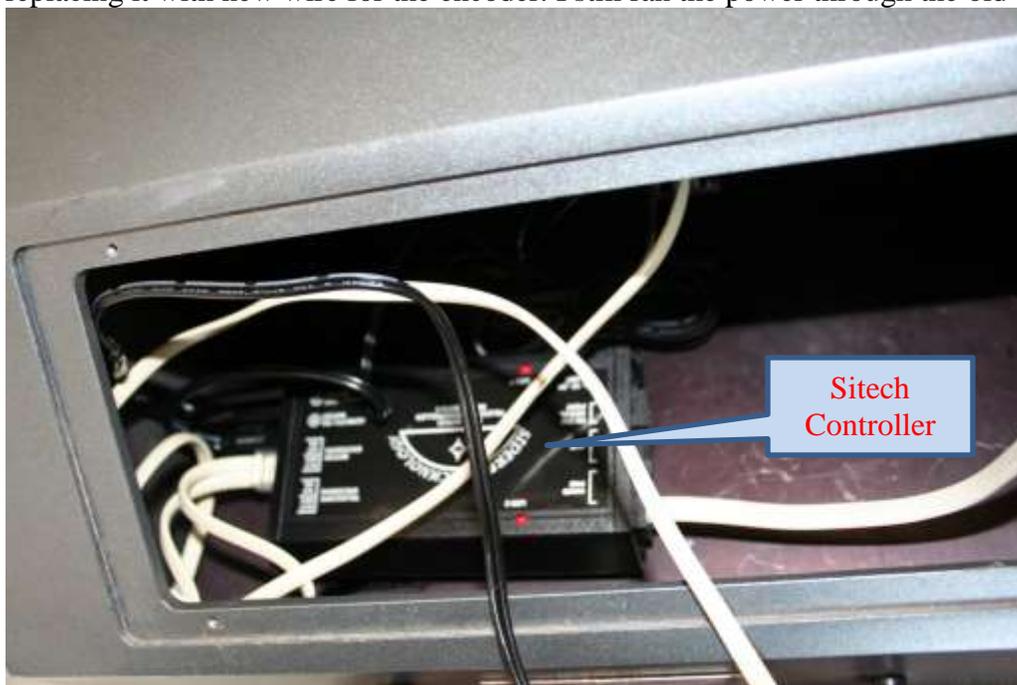
I reinstalled the original Pulleys and belts



I then reinstalled the motor assemblies in the base and upper fork assembly.

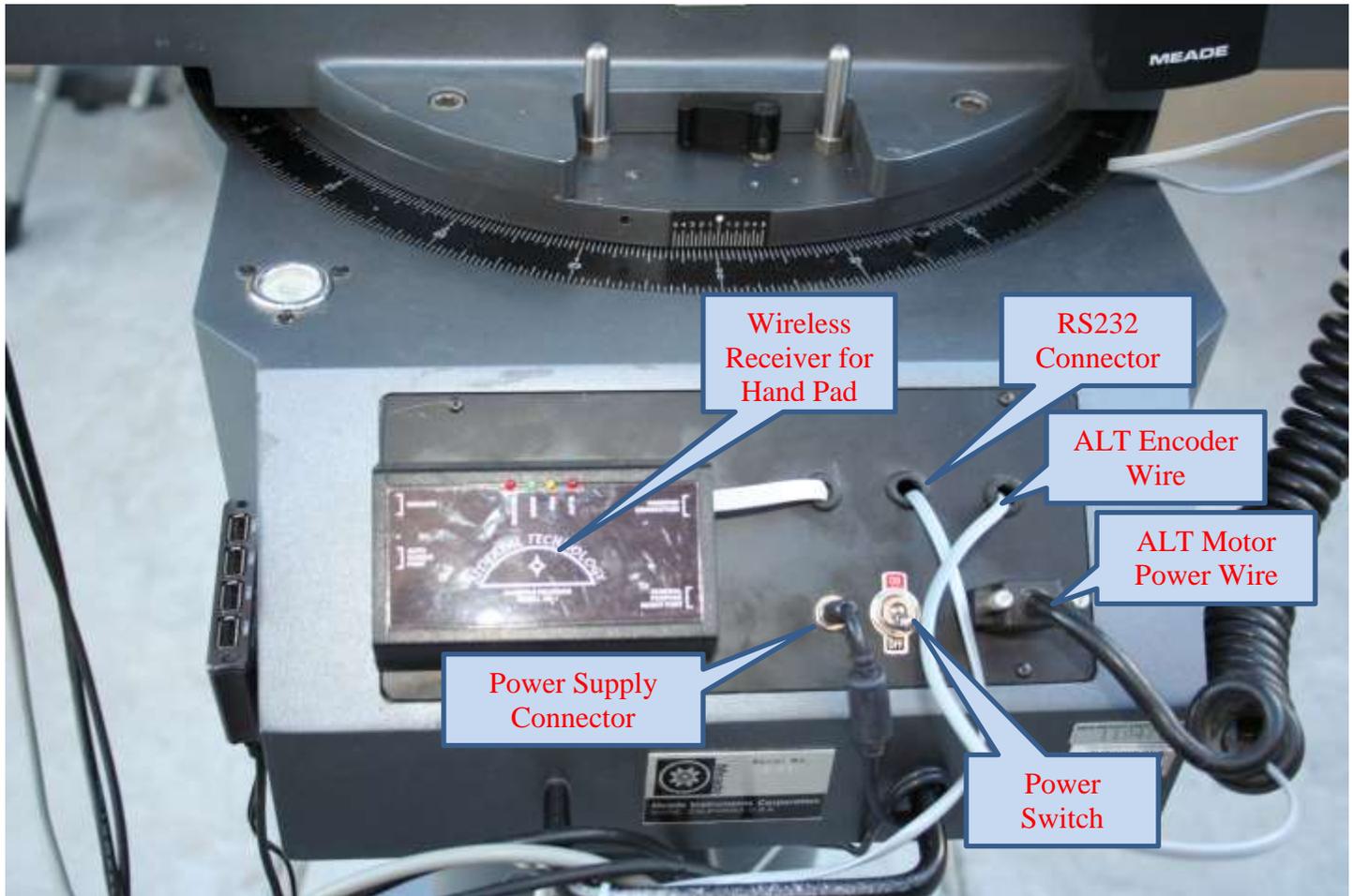


As you can see the encoder wire is a tight fit under the ALT motor I eventually ended up cutting a large hole to make room for the encoder wire connector. I used a hole saw, you will see the enlarged hole later. I also tried to use as much of the old wiring to the Alt motor assembly as possible. This proved to be a mistake and I ended up replacing it with new wire for the encoder. I still ran the power through the old wiring.



I installed the Az motor assembly (not shown) and reinstalled the bottom plate to the base then connected the Controller to the Az motor and used Velcro to attach it to the inside Base plate.

I attached the wires and routed them through a front cover plate I fabricated and added a power connector and switch to control the power for the scope. I suppose you could use the original plate but I chose to build a new one. I attached the Wireless receiver to the cover plate with Velcro and routed the connector wire through a grommet and into the base and connected it to the controller. The wireless receiver also works as a power indicator when I turn on power. I am using a 19.5 VDC power supply which I had from an old Dell Laptop. It puts out 19.5 VDC clean and regulated with plenty of amperage. I added a power switch and holes with grommets for the RS232 Serial connection which goes to the controlling laptop and a hole with a grommet for the Alt Encoder wire (not in my original design). I also added a serial connection for the coil wire which supplies the Power to the ALT motor



I reassembled the scope and gave it its first power test.

I had numerous problems with the encoder and control of the Alt motor after several tests and numerous communications with the user group I narrowed it down to a bad Encoder cable. I had built one that had a short lead for the AZ motor and I ran the encoder through the original coil wire along with the power for the ALT motor. That proved to be a problem. I still use the coil wire for the Power and ran a new encoder wire to the Alt motor.

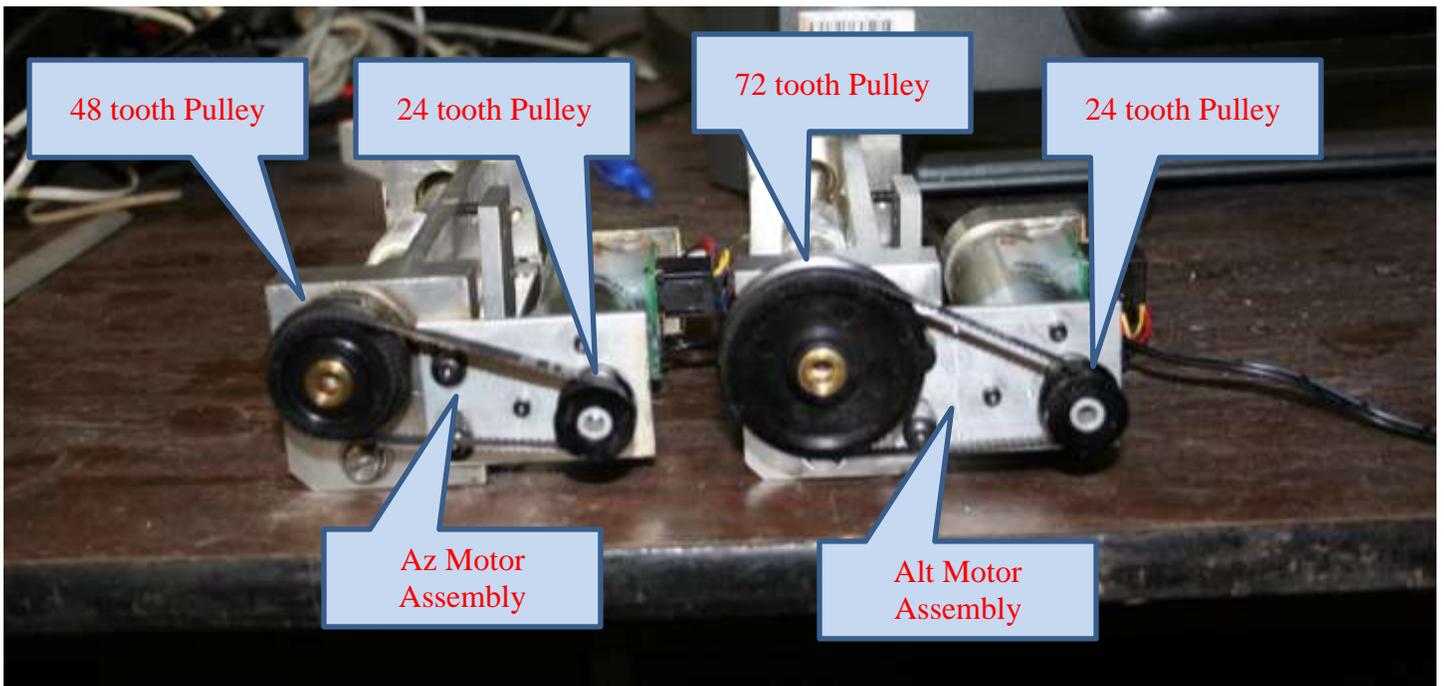
With this new configuration everything worked but the Alt motor was very jerky, not smooth at all. That is when I learned the gear reduction was inadequate and I needed to order the new Belts and pulleys to further reduce the gear ratio. The Az seemed pretty Smooth but I opted to also reduce the gear ratio on it.



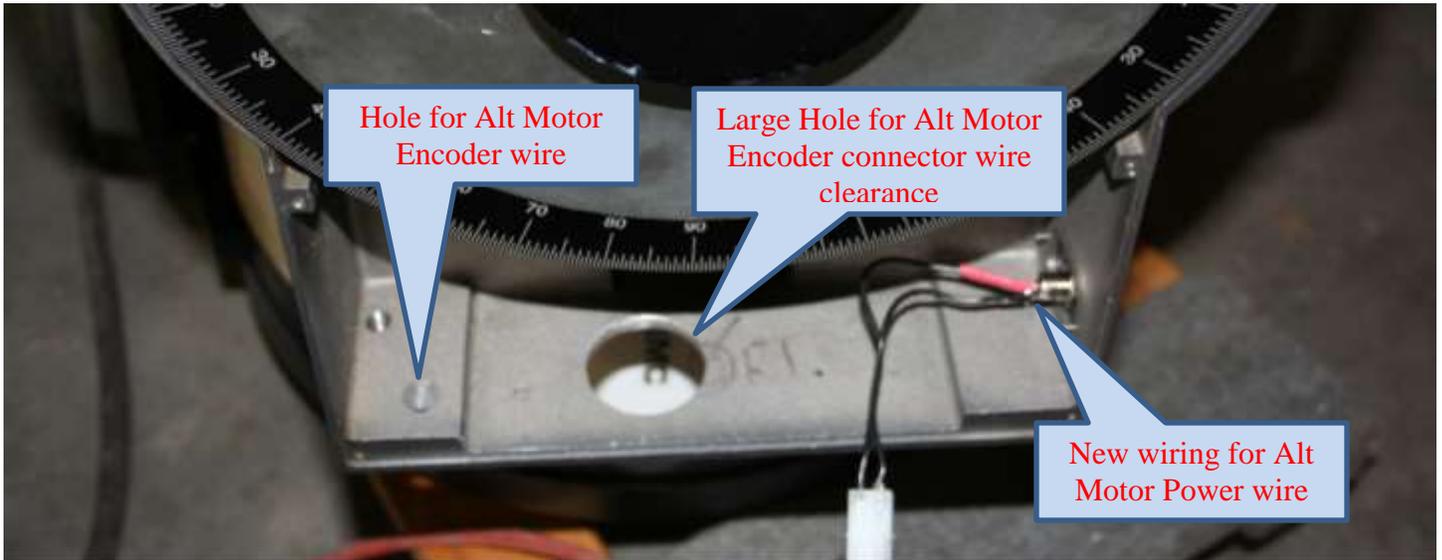
So the scope was again disassembled and the motor assemblies removed and the pulleys and belts were replaced with the new ones I ordered from SDP/SI



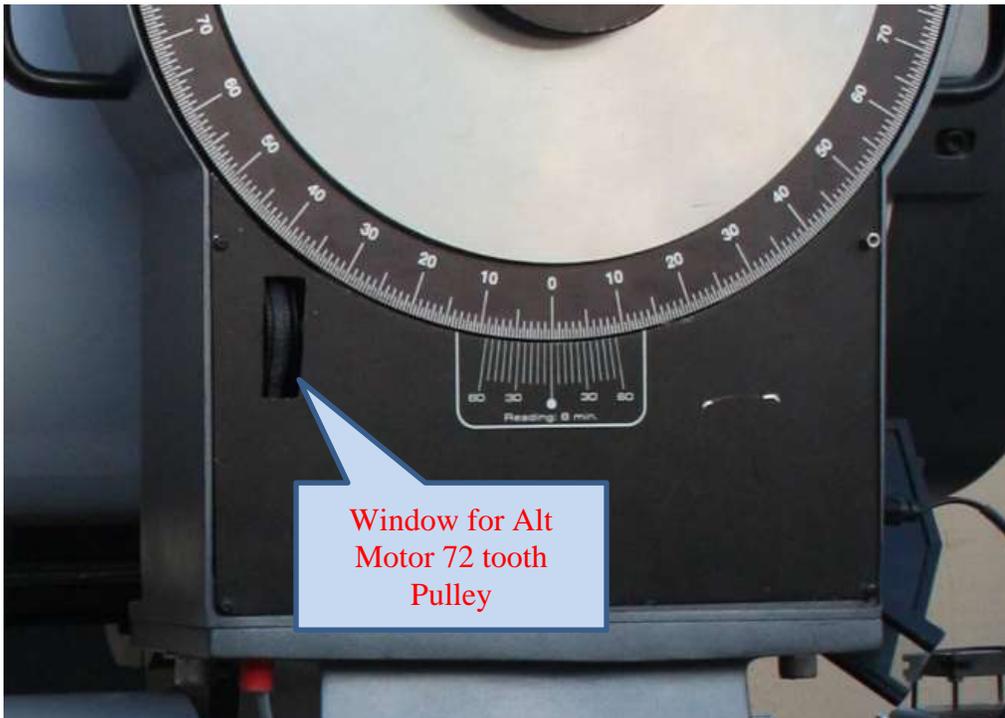
Originally I thought I would change both the ALT and Az to the 3:1 gear reductions belts and pulleys however I found out the 72 tooth pulley would not fit in the Base without major modification of the Base. And as the Az worked with the original pulleys I opted to only use the 2:1 pulleys and belts for the Az. The Sitech controller allows for different ratios for different axis so I stayed with the 3:1 ratio on the Alt axis.



The original LX200 Pitman motors had a 19.5:1 gear reduction with the new Belts and Pulleys I was now at a 20:1 on the AZ and a 30:1 on the Alt.



I made some additional modifications for the Alt Motor Encoder. I drilled a new hole to rout the Encoder wire through. I also cut a large hole to allow more clearance for the Encoder wire connector which allowed the connector to be connected and disconnected for scope disassembly without having to remove the motor assembly. I also changed the connector for the Power wire to the Alt Motor.



I had to make a small window in the Alt Motor cover where the 72 Tooth Pulley interfered with the cover installation. I could have went to the 48 Tooth Pulley and made the Gear reduction the same for both axis but it worked so well with this gear reduction I didn't want to change it. This also provided another advantage I later discovered. It allowed me to monitor the belt and pulley movement which proved invaluable when I had a problem with a loose setscrew and slipping pulley. (I suggest you grind a Flat on one side of the worm gear shaft to tighten the setscrew against to prevent slippage)

I still routed power through the original LX200 Coil Wire and fork wiring but the encoder wire is routed separately.





Plastic Hose used for Grommet

Encoder wire for Alt Motor

Encoder wire for Alt Motor routed through Coil to prevent cord snag during slew



The scope is now installed and fully functional in our Public Outreach Observatory thanks to Sitech

One last Plug ;-)
The Sitech controller allows us to park the scope in any position so we can park it upside down allowing the roof off roof to close without hitting the scope. This option was not available with the Meade LX200 Classic prior to the Conversion



This is my conversion experience and I am very happy with the results. This is in my opinion a very good way to return a dead or dying Classic Meade to service if you have any questions or comments please sent them to me at jerry@gabers.com

Jerry Gaber Vice President Astronomical Society of Las Cruces New Mexico USA