CGX-L Review

Features

Close to ten years ago I bought my first decent mount for astrophotography, a Celestron CGE Pro. After many years of great service, something finally broke that I couldn't fix. The RA motor started to chatter and the pointing accuracy headed into the toilet. In its day the mount was a trail blazer and features like all star polar alignment were worth the price of admission. The ability to set up and be polar aligned and ready to start imaging in under 20 minutes was a big change from having to spend close to 40 minutes drift aligning each time I drove to my favorite dark sky site so I was anxious to keep that kind of simplicity in whatever mount I purchased to replace my trusty workhorse.

The CGX-L is Celestron's highest capacity mount, with a claimed capacity of 75 pounds not counting counter weights. The mount comes well packed in three boxes, one for the tripod, one for the counterweight and one for the equatorial head. Courtesy of the shipping company the boxes did not arrive together so I decided to check if the equatorial head would fit on my CGE Pro tripod. This was when I discovered that the hole pattern lines up very nicely, except Celestron purposely made the holes a little too low to get the bolts in to attach the head on the tripod. The difference was well less than 0.5 mm, but just enough that you would have to buy a new tripod or drill and tap new holes in the aluminum collar at the top of the old one (not a good plan to put steel bolts into tapped aluminum). Now I know that Celestron claims that the new tripod is lower and wider for increased stability (all true), but to move the holes just enough to prevent using your old tripod with the new mount seems a little chincy to me.

The next day the tripod arrived and I set about assembling the new system. There are lots of nice touches, like a clip inside one of the carrying handles to hold the Allen wrench used to put the thing together. Better still would have been some proper knobs that did not require any tools, but that would have probably interfered with the azimuth adjustment knobs so all in all the clip is a nice solution for those of us that need the mount to be portable.

At 52.6 pounds, the equatorial head is over 20 pounds lighter than the head of the CGE Pro, a very welcome change in a portable system. Gone is the electronics pier of the older design which makes for an easier lift when putting the thing together, another welcome change for those of us that travel to dark skies.

With the mount and tripod assembled I popped the scope in the dovetail saddle and immediately noticed the dual saddle design that accepts both Vixen and Losmandy style dovetail plates. It has newly designed knobs for clamping things in place and compared to the knuckle busters that were used on the CGE Pro they are a welcome improvement. The next thing I noticed was the wonderful altitude adjustment that actively drives the altitude both when raising and lowering the mount. Gone is that awkward altitude bolt of the CGE Pro. Celestron claims the new system is much easier to adjust and

having tried it I believe them, it is simply a joy to adjust with no jumping or sticking when raising or lowering the scope.

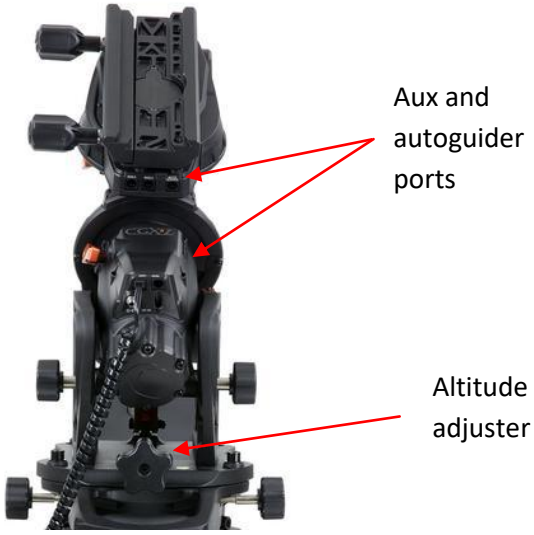

Figure 1 CGX-L Equatorial Head

Celestron has done away with the external motor cables of the CGE Pro in favour of a through the mount wiring arrangement. They have even put a couple of aux ports and a ST4 type autoguider port on the saddle to simplify cable routing. The arrangement works very well if you only use Celestron accessories, another chincy aspect of the design – would it have killed them to run a single USB port up to the saddle?

For use in automated applications like a remote observatory the mount has limit and home switches built in so the user does not have to align anything at startup and for the most part nothing will hit the tripod during the evening. Another nice feature is that the mount will for an hour and 20 minutes past the meridian, assuming your scope is short enough not to hit the tripod.

The design includes two carrying handles cast into the mount. These make it very easy to carry the equatorial head and are great points to tie down USB and dew heater cables that need to be run up to the scope. It is relatively easy to find a cable routing that will avoid any cable drag issues where the cables drag on some part of the mount as it moves around the sky.



Figure 2 - My setup, note the cabling tied off the carrying handles with a loop to allow for motion of the declination axis.

Mount and CPWI software

This is an area where the CGX-L really shines. The hand controller is simple to navigate and has lots of useful features. Using two *alignment* stars and a minimum of three *calibration* stars, the pointing accuracy is usually less than 5 arc-minutes anywhere in the sky and you can synch to a star in a given area to improve pointing substantially in a small section of the sky. The system comes with the usual features like backlash compensation, variable guide and tracking rates, extensive object databases and a nice identify function that will let you know the name of whatever you are pointing at any given time. The pointing accuracy is good enough to make the all star polar alignment very usable and this feature is the chief reason I decided to purchase another Celestron mount. This proprietary polar alignment system is fast, simple and more accurate than most polar scopes. On my CGE Pro, polar alignment usually took about five minutes and you were ready for a night of imaging. The software also includes a permanent periodic error correction system where the corrections are stored in non-volatile memory and are ready to be used at any time.

Celestron has partnered with Planewave to create CPWI, a software package running on a PC that includes a TPoint-like modelling system that improves overall pointing substantially. The user interface is a little hokey, but the pointing accuracy is spectacular! After just four alignment stars I was unable to find the desired star in my camera's field of view in each of four all sky slews. After a little head scratching it turned out that I couldn't see the stars in the display because they were under the

crosshairs! Aside from a slightly clunky planetarium interface, the pointing accuracy of this software coupled to the CGX-L is simply amazing.

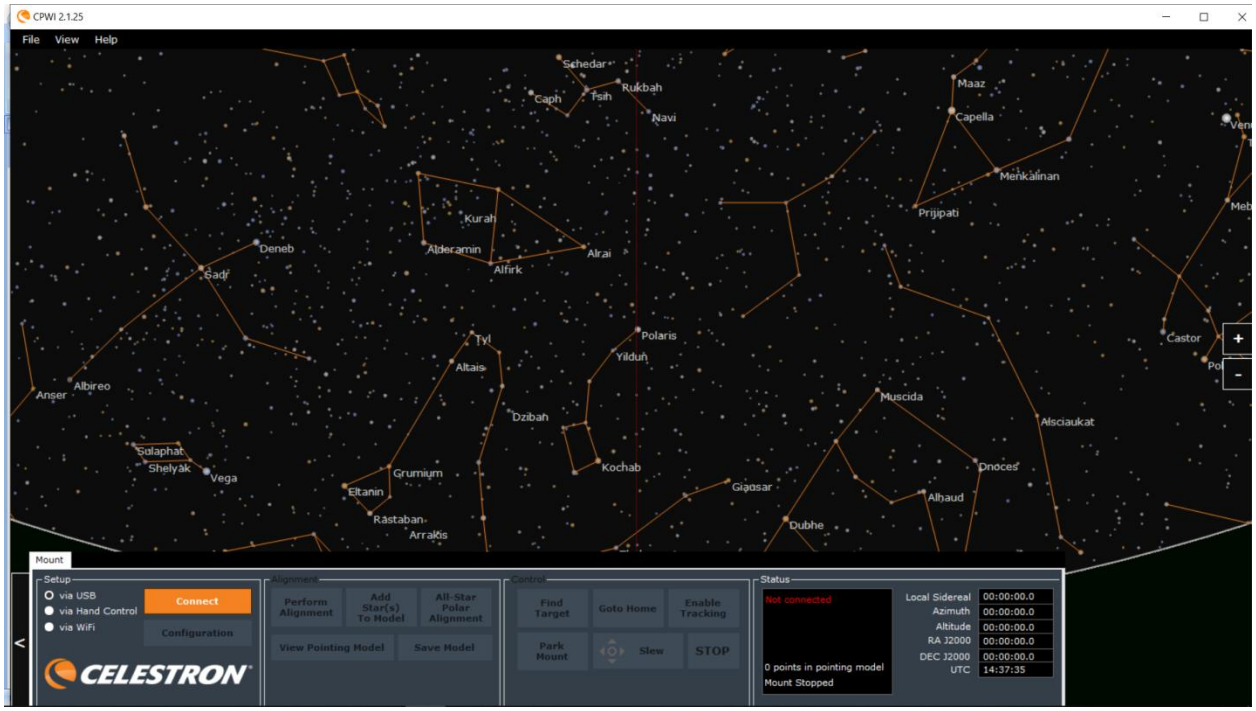

Figure 3 - CPWI interface

Tracking

This is where the rubber meets the road for any mount. Periodic error was reasonably smooth with little in the way of large abrupt transitions. Overall the peak error was about 9 arc-seconds as shown in the PHD log plot below.

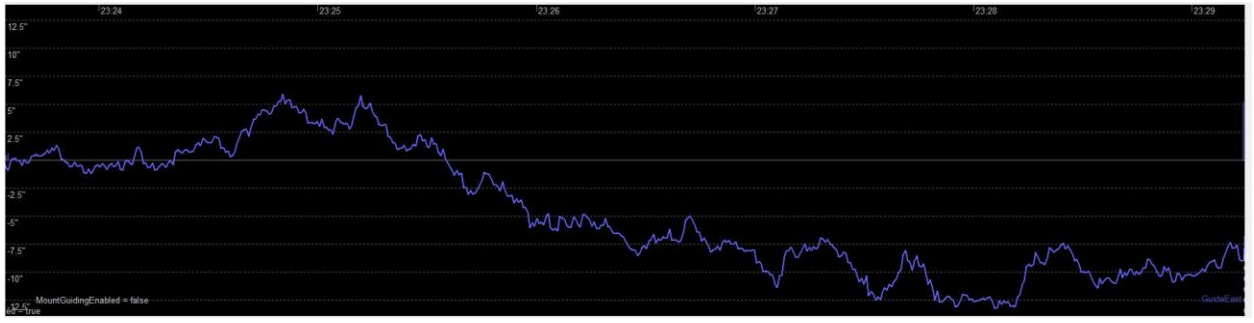

Figure 4 - Uncorrected periodic error

Even without PEC trained this was very easy to guide out as the slow periodic error was easy for the SSAG to remove as shown in the M5 image below.



Figure 5 - M5 guided without PEC

After PEC training the error was essentially random with about 2 arc-seconds peak amplitude. I suspect I could get this down to the arc-second level if I was careful, but since my setup is portable and not in an observatory it simply wasn't worth it.

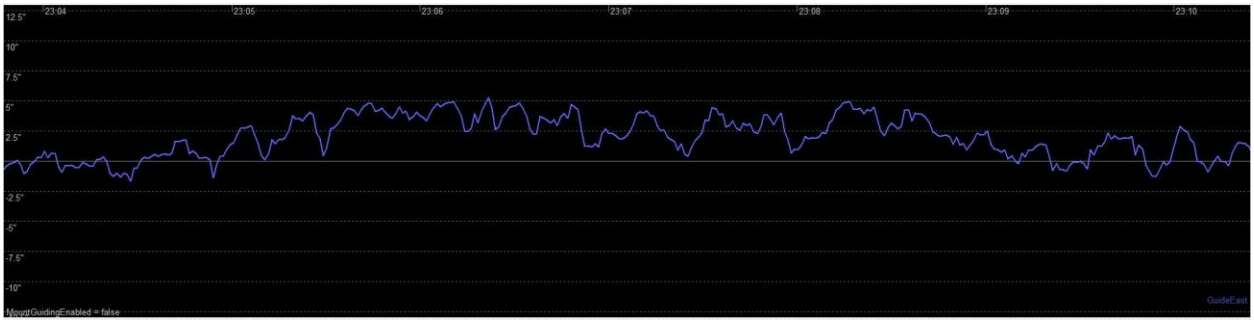

Figure 6 - Periodic error with PEC enabled

Shooting from my urban driveway for an hour produced twenty, guided, 180 second exposures with perfectly round stars. The guiding was done on a dim star so the guider exposure could be increased to 10 seconds. With PEC enabled the system produced the image in Figure 7.



Figure 7 - Guided exposure with PEC enabled

Even at a 100 percent crop the stars are nice and round. The mount was loaded with about 30 pounds of equipment including a SkyWatcher Esprit 120, Orion 80 mm guide scope, Canon 60Da, Orion SSAG, USB hub and cables.



Figure 8 -100% crop of the Crescent Nebula image. Note the nice round stars

All in all the CGX-L is an excellent mid-priced mount for either permanent or portable applications offering good tracking and with the addition of CPWI, spectacular pointing accuracy. For those needing a portable setup, the heavy duty tripod is rock solid and even has a holder for tablets or cell phones. Aside from the lack of a USB connection on the dovetail saddle, just about every required feature is included.

NOTE:

The previous version of this review incorrectly stated that the pointing corrections were not applied to the ASCOM interface. The error was that the display uses the J2000 epoch for coordinates while the ASCOM interface uses the current epoch. This means that precession must be applied to any coordinates written to or read from the ASCOM interface.