Losmandy's G-11 mount

Introduction

The G-11 is a German equatorial mount retailing at around 2200 US Dollars (plus tax and shipping), it is rated to carry telescopes to 60 lbs in weight. The G-11 is manufactured by Hollywood General Machining Inc. in Los Angeles, California.

A closer look

Losmandy are well known for their high standard of machining. Many parts on this mount are milled to a superb finish and then black anodized - although several parts seem to be milled for the sake of it! Examples include the control electronics being housed in a box milled from an aluminium block and a beautifully finished stainless steel counterweight shaft. If there was a bracket to hang the hand controller on and a machined counterweight these examples wouldn't seem so out of place. The counterweight is a roughly finished cast iron lump, painted in grey hammer finish paint - it doesn't match the rest of the mount.

The mount is useable from a latitude of 12 to 64 degrees in either hemisphere. The optional polar alignment scope is also useable in the northern or southern hemisphere. Both axis are driven via Hurst 'ABS' series stepper motors, the final drive being via a dual ball raced stainless steel worm to a 5.6 inch 360 tooth aluminium wheel. There are mechanical 5 inch setting circles calibrated to 1 degree in declination and 4 minutes in ra (plus verniers). The hand controller has a diamond pattern of buttons for tracking corrections, together with reversing switches for both ra and declination. The ra circle is 'driven'. The counterweight shaft can be removed for storage/travel.

Assembly was quite straight forward despite the sometimes limited instructions for accessories such as the Meade DM10 mounting plate. The manual consists of 26 loose pages from a GM-8 mount manual plus one sheet describing how to assemble the G-11 tripod. Since writing this, Losmandy have updated the manual - a copy can be found at their web site.

In addition to the G-11 mount, I bought a Meade DM10 dovetail plate (to fit my Meade 10" SCT optical tube) and the Losmandy digital setting circle encoders. The first omission from the package were a complete set of Allen keys. A set were supplied but they didn't fit all the Allen headed screws (notably those with the DM10). There weren't any details of which way round to fit the DM10 plate -for some reason it fits with a single bolt at the corrector plate end and three at the mirror end, the three bolt spacer could have been used at both ends. While the dovetail plate seems securely fixed, using one small bolt at the corrector plate end doesn't inspire confidence. At first I thought the wrong part had been supplied, but all the Losmandy catalogues show two different spacer blocks for the DM10.

The digital setting circle hardware kit (DSCH) is very well made, it even includes needle bearing thrust washers in the kit. While not having seen other manufacturers hardware for G-11 encoders, I doubt they could match the Losmandy units. Also included are machined aluminium covers for the supplied encoders, aluminium gears, plastic gear wheel covers and covers for the extended washer/needle bearing stack. Also supplied is a cable for connecting the encoders to Losmandy (or JMI) DSC units. The encoders are 2048 step units, geared 2:1, giving 4096 steps per rotation of each axis. There's no mention of how to fit the covers onto the gears. Earlier DSCH units apparently didn't include covers, the fitting sheet hasn't been updated to reflect this.

Also missing from the kit were short set screws for fitting the encoder gear wheels to the ra and dec shafts. This meant sawing the supplied screws in half to allow the gear covers to slide over the screws!

How does it work in practice?

The mount is heavy and awkward to move around, it would take a major effort to transport it to a dark site and bring it home afterwards. The tripod part weighs around 20 lbs, the equatorial head 31 lbs and for balance there is a 21 lb counterweight supplied with the standard mount. Add 25 lbs of telescope and you have around 100 lbs of kit. This isn't a problem for me as the whole lots sits permanently in an observatory.

Fitting the SCT onto the mount is straight forward, there are a couple of small hand bolts that stop the dovetail plate sliding off the end. A larger hand wheel bolt secures the SCT's dovetail bar by a vice-like clamp, by slackening this clamp the telescope tube can be slid back and forth to achieve balance on the declination shaft.

The height of the tripod is adjustable from 33 to 48 inches high (earlier units apparently had fixed length legs). The tripod legs are 3 inches in diameter and include massive machined aluminium clamps. For some odd reason the lower end of the tripod legs don't include feet, the tube ends are just cut off at about 60 degrees. The tripod is rated for a load of 300 lbs. The legs have sufficient adjustment for comfortable use with a 10" SCT. The supplied 21 lb counterweight nicely balances the Meade tube with a CCD camera, Telrad, etc. There is a safety bolt to prevent the counterweight falling off the end of the declination shaft.

Alining the telescope onto an object requires the mount to be shoved to the approximate position, fine setting is done by by pressing the control buttons in the required direction then pressing the opposite button at the same time, this engages the x16 setting speed and makes centering an object very easy (unfortunately this isn't possible while PEC is engaged). There are no manual controls with this mount. Correction/setting rates are x0.3, x0.5, x2, x4, x8 and x16. Rates of x0.3 and x0.5 are the only ones possible when PEC (periodic error correction) is set. There are four tracking rates of sidereal, King, lunar and solar. A really useful feature is the TVC or time variable control, this is a means of setting the declination motor to turn quickly for a moment, if the declination drive is reversed when tracking, it effectively removes backlash in the gearbox.

I originally didn't purchase the polar alignment telescope, as the mount is left permanently in the observatory it didn't seem to be needed. However, having taken the mount and scope out on the occasional field trip did make me wish I'd bought the polar scope. After a year of not having the polar scope I bought one. They are excellent units and really simple to use. I won't go into the details, except to say it works and is quick to set the mount up with one.

The azimuth and latitude adjustments on the head unit are easy to adjust while aligning the mount. There are also two bubble levels in the mount head to assist with setting the tripod level (although it's not necessary to level a mount in order to achieve good polar alignment). Earlier users complained of a lack of a solid clamping arrangement for the latitude axis; there is now an extra set of bolts to secure this. Aligning the mount by the drift method is described in the manual, it takes about one hour to achieve. Aligning the mount with a polar scope takes about 2 minutes and is as accurate as I need for CCD and photo work.

While other reviews talk of virtually perfect tracking from the G-11 mount, I haven't found this to be the case. Celestron's catalogues quoted a rather vague specification of +/- 5 arc seconds periodic error (Celestron used to supply the G-11 mount as part of their CG-11 telescope), the Losmandy catalogue and manuals don't specify it. I measured the periodic error on my mount at +/- 12 arc seconds. This error is quite a problem for CCD work as it seems to occur over a 20 to 30 second period and may be due to errors in the stepper motor gearbox rather than in the worm. Furthermore, the PEC circuits seem to have little or no effect on this error. The good news is longer term drift seems virtually non existent. A couple of CCD images images taken 8 minutes apart were virtually identical.

Since the original measurement of periodic error, I swapped the ra and dec stepper motors/gearboxes. The periodic error is currently +/- 6 arc seconds, which is beginning to be as good as it's possible to achieve with an amateur mount. The exact reason for the improvement may be the difference between the two motors and their gear boxes, in any case if you have a G-11 mount with similar errors, it's worth swapping them to see what effect it has.

For those who wish to check their own mount for periodic and other errors, this can be

done by calibrating an illuminated reticle eyepiece. Using a 9mm eyepiece and a x2 Barlow lens combination on my 10" SCT, Jupiter is almost exactly twice the diameter of the outer circle on the eyepiece, making the outer ring approximately 25 arc seconds across. By following a star for several minutes it is easy to measure the tracking errors of the mount using an eyepiece equipped with rings - such as the one described above.

The usual 'tapping' of the mount produces little vibration. A knock on the tripod legs is damped in about 1/2 a second, a similar knock on the telescope dies down in about 1.5 seconds. Sliding the counterweight along the shaft to alter the balance generally leaves an object visible in the eyepiece at even high magnification - quite an impressive feat when you consider the weight is 21 lbs. There is no noticeable play or backlash in the mount.

Conclusions

The mount is basically made to a very good standard, it is held in high esteem by most amateur astronomers and performs very well with a little tweaking. In the various astronomy newsgroups, there has been a lot of speculation as to how the G-11 compares to the new Celestron offering. I haven't tried the Celestron mount, but others regard the Losmandy G-11 as 'the standard' and dismiss the Celestron.

There are several small irritations such as a lack of mounting for the hand controller. I'm sure that Scott Losmandy can improve the customer presentation with only a few minutes work per mount. Certainly earlier limitations with the mount have been resolved in later models, so Scott does take notice of user comments. The mount is very sturdy and is ideal for instruments such as 10 to 12 inch SCTs. There are double mounting plates, piggy back bars and several accessories to fit this mount. It forms a nicely finished 'system' mount that looks and feels like a work of art. Losmandy mounts are available in the UK from Venturescope and Broadhurst, Clarkson and Fuller.