

1000HPS – Building an guiding model for DSLR users

by Sabin Fota

When I bought it, I knew that is an long way from Celestron CGEM or Losmandy G11 to an absolute encoders mount like my 10Micron 1000HPS and on this way I have to reconsider and to rethink all that I have learned from the nights before in the matter of calibrating my gear.

After some frustrating nights interleaved with an long period of health problems, I begin to taste from the benefits af an supermount and I made some routine in building an guiding model for my 1000HPS mount.

This is my workflow that works for me, an DSLR user, and go through all the steps to follow in order to build an guiding model from scratch.

My mount stays on leveled pier and is oriented to North, but is not an permanent location, because after every night everything is disassembled and stored in an safe place.



everything is assembled

So, the steps that I follow are:

1. Everything is assembled:

– pay attention to cable management because the mount has to move free in all directions.



Cable management

– pay attention to focuser – be sure to know the approximate focus area of your setup, specially at refractor users, (my Moonlite focuser is at aprox. 21000 steps) and be around there before you balance your setup, this is an very important step.

2. Balance, at 0,00% both in RA and Dec:

– after everything is well balanced it is wise that you do not touch the setup or mount something else on it (like another camera for widefield).

3. Software connections – here comes the troubles, drivers, firmware, software issues. I got everything from this even blue screens.

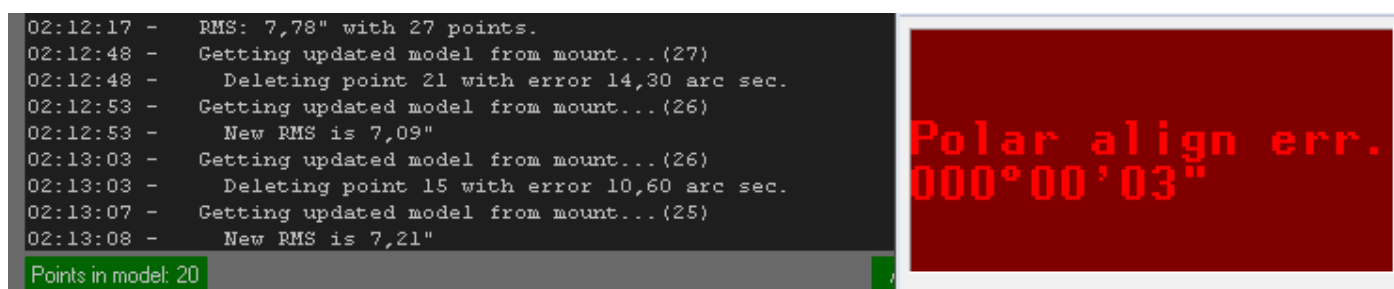
- internet, for time updates
- ASCOM platform
- *Virtual Key Pad 2*, is more convenient than handpad
- *Clock Sync*
- Stickstation or Mountweather 2.75, NOT both
- *Per Frejvall's ASCOM driver*
- *NTP time server*
- I use *BackyardEOS* for his great tool live-view, it also has 5x zoom
- *ModelMaker* – same exposure like MaximDL and binning 1x1, Solve expansion 70%
- *MaximDL 5.24* – same exposure like ModelMaker and binning 1x1
- *PinPoint* – install this software after MaximDL to override PinPoint LE from MaximDL
- *GSC 1.1 Star Catalog* for plate solving

4. Alignment I

- **3 stars alignment** – I use the 5x zoom tool from BackyardEOS live-view to be spot on
- **Refine stars** – I use to take 3 or 4 stars

5. Polar alignment

- here, the 5x zoom from BackyardEOS live-view is indispensable.
- delete alignment.
- on the night 18.07.2015 my polar alignment error was 0' 03" .



The image shows a terminal window on the left with the following log output:

```
02:12:17 - RMS: 7,78" with 27 points.
02:12:48 - Getting updated model from mount... (27)
02:12:48 - Deleting point 21 with error 14,30 arc sec.
02:12:53 - Getting updated model from mount... (26)
02:12:53 - New RMS is 7,09"
02:13:03 - Getting updated model from mount... (26)
02:13:03 - Deleting point 15 with error 10,60 arc sec.
02:13:07 - Getting updated model from mount... (25)
02:13:08 - New RMS is 7,21"
Points in model: 20
```

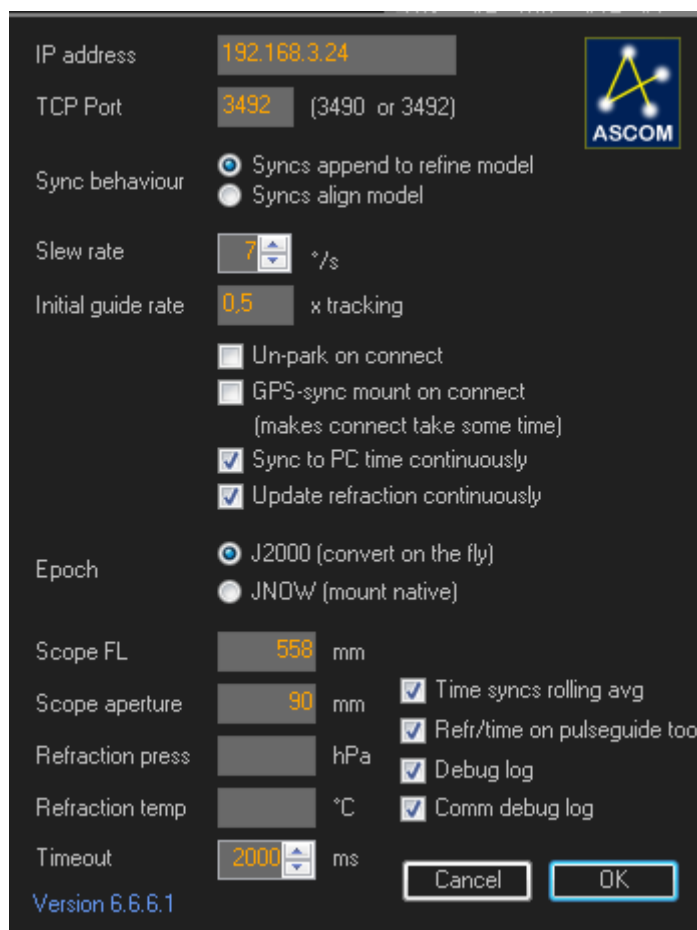
On the right, a red display shows the text: "Polar align err. 000°00'03"

6. Alignment II

- **3 stars alignment** – I use the 5x zoom tool from BackyardEOS live-view to be spot on
- **Refine stars** – I use to take 3 or 4 stars

7. Model Maker

- Per Frejvall's ASCOM driver
- in mount driver settings choose "Sync append to refine model".

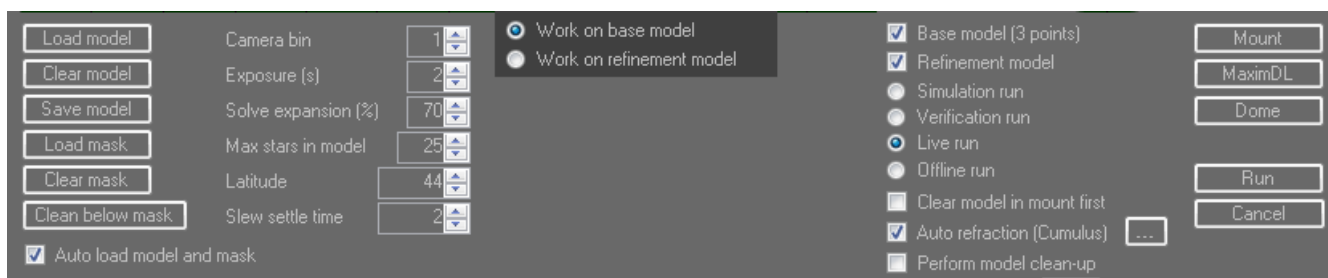


The image shows the ASCOM driver settings dialog box. The settings are as follows:

- IP address: 192.168.3.24
- TCP Port: 3492 (3490 or 3492)
- Sync behaviour: Syncs append to refine model, Syncs align model
- Slew rate: 7 */s
- Initial guide rate: 0,5 x tracking
- Un-park on connect
- GPS-sync mount on connect (makes connect take some time)
- Sync to PC time continuously
- Update refraction continuously
- Epoch: J2000 (convert on the fly), JNOW (mount native)
- Scope FL: 558 mm
- Scope aperture: 90 mm
- Refraction press: hPa
- Refraction temp: °C
- Timeout: 2000 ms
- Version 6.6.6.1

Buttons: Cancel, OK

- even if you select "Clear model in mount first" in ModelMaker settings it will work



The image shows the ModelMaker settings dialog box. The settings are as follows:

- Buttons: Load model, Clear model, Save model, Load mask, Clear mask, Clean below mask, Auto load model and mask (checked)
- Camera bin: 1
- Exposure (s): 2
- Solve expansion (%): 70
- Max stars in model: 25
- Latitude: 44
- Slew settle time: 2
- Work on base model, Work on refinement model
- Base model (3 points)
- Refinement model
- Simulation run
- Verification run
- Live run
- Offline run
- Clear model in mount first
- Auto refraction (Cumulus)
- Perform model clean-up
- Buttons: Mount, MaximDL, Dome, Run, Cancel

Here are the results from the night of 18.07.2015 when I experimented an 20 stars model.

05:03:37 – Mount reports 20 points in alignment model

05:03:38 – Point 1 err 3,6" at 107° Az 310, Alt 47

05:03:38 – Point 2 err 4,6" at 28° Az 194, Alt 62

05:03:38 – Point 3 err 3,7" at 315° Az 324, Alt 35

05:03:38 – Point 4 err 6,5" at 231° Az 201, Alt 36

05:03:38 – Point 5 err 2,5" at 139° Az 350, Alt 36

05:03:38 – Point 6 err 5,0" at 335° Az 22, Alt 37

05:03:38 – Point 7 err 5,0" at 351° Az 289, Alt 41

05:03:38 – Point 8 err 5,6" at 158° Az 238, Alt 42

05:03:38 – Point 9 err 6,9" at 130° Az 167, Alt 42

05:03:39 – Point 10 err 1,4" at 172° Az 80, Alt 44

05:03:39 – Point 11 err 8,0" at 320° Az 133, Alt 44

05:03:39 – Point 12 err 8,9" at 152° Az 40, Alt 49

05:03:39 – Point 13 err 5,6" at 28° Az 222, Alt 53

05:03:39 – Point 14 err 7,1" at 339° Az 9, Alt 57

05:03:39 – Point 15 err 2,2" at 245° Az 286, Alt 61

05:03:39 – Point 16 err 3,6" at 207° Az 322, Alt 61

05:03:39 – Point 17 err 5,6" at 349° Az 109, Alt 61

05:03:40 – Point 18 err 2,7" at 247° Az 161, Alt 62

05:03:40 – Point 19 err 4,2" at 131° Az 65, Alt 62

05:03:40 – Point 20 err 5,3" at 175° Az 33, Alt 71

05:03:40 – **RMS: 5,26" with 20 points.**

8. Save the model in database:

– it is advisable to save the model for future use

After I published this routine on [10micron forum](#), the user [francois](#) suggested some steps that, I consider to complete my routine and are useful on future nights if I had saved an good model in database.

9. After pass through steps 1 to step 3, load model saved at step 8.

10. Select an South star and correct the star positions using Alt-Azm knobs and BackyardEOS live-view.

– this is gonna lead to an good polar alignment and I will be able to use model maker to further refine polar alignment or directly refine stars.

Hope this tutorial to help you, DSLR users, and to enjoy many nights under the stars and next to an great piece of equipment.

Clear skies!

Sabin, 26.07.2015