**How to create a baseline for guiding results using OpenPHD2**

Last updated March 3, 2020

(Please note: this has been reviewed by PHD but this document is a personal recommendation and not official openPHD documentation)

Before you start, make sure you are on the latest development version of PHD. You can find the latest version here: https://openphdguiding.org/development-snapshots/

1. Start by creating a new profile using the profile wizard.
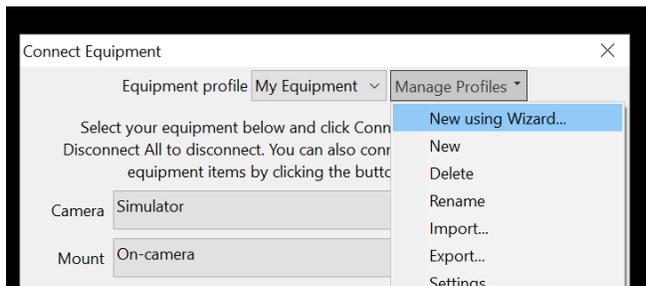
Make sure to enter all your information correctly. Resist the temptation to reuse or think "my existing setup is fine, i dont need to create a new one". A new profile will also reset some defaults you do not see in the new profile wizard, so please go with creating a new one

*Special note to EQMod users***:** The default values for EQMod driver are not ideal for guiding. please see this link for correct settings: https://github.com/OpenPHDGuiding/phd2/wiki/EQASCOM-Settings

2. When you are ready to start calibration (i.e., it's night)**,** make sure your equipment is connected and working and your guide camera is focused. Make sure your polar alignment is as good as you can make it. Any tools or techniques you use to improve polar alignment should be done prior to calibrating.

Slew your telescope so your mount's counterweight is horizontal (i.e., parallel to the ground) and your telescope is perpendicular to ra axis (polar axis). Here is an example of where your telescope should be pointed:

Avoid calibrating when your scope is close to the horizon. (if you're interested in knowing more about where is the meridian and celestial equator and celestial coordinates in general, check out http://stars.astro.illinois.edu/celsph.html)

3. **Move your mount's DEC axis a little in the northern direction prior to calibration.** This will clear out any DEC backlash that may be present. You can do this any number of ways, including using the Manual Guide tool in PHD2, and use the north direction button until you see the stars move. It may take several (or many) attempts before the star moves. (Personally I just use the hand paddle on my mount and press the northern button, visually confirming i see my telescope moving just slightly north.)

4. **Calibrate.** To calibrate, use an exposure of 2-4 seconds. Click the green "begin looping" button.
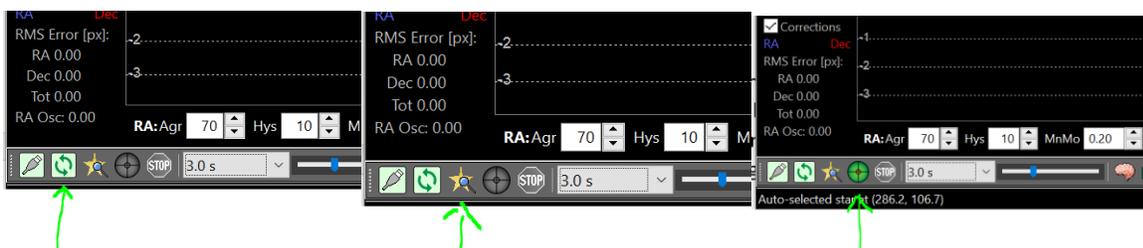
Once you get an image, click the "auto-select star" button to the right of the looping button. Then hold down your shift key while clicking the "start guiding" button. These steps will initiate the calibration

5. **Fix calibration errors if any are reported.** If the calibration process results in any errors, make sure to address them and re-calibrate before continuing. Errors may include versions of 'could not move the mount enough', 'guide star lost' coupled with the calibration stopping, and questionable orthogonality.

The informational warning "little southern movement detected" is not an error, so you can continue if that is the only message.

6. **Run the Guiding Assistant.** Immediately after a successful calibration PHD will start guiding automatically. Use Tools-> Guiding Assistant (GA) and let it run for only 2-3 minutes.
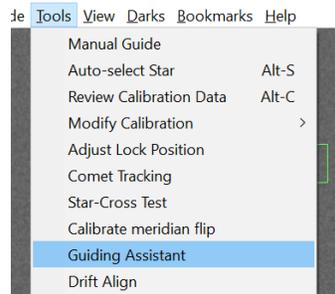

You do not need to run it for multiple worm cycles or an extended period of time. During the Guiding Assistant run, your guiding will be turned off. Your graphs may look like they are going crazy, but that's okay for now. PHD is working to characterize your system and the sky conditions, not optimize guiding. Do not panic (or at least do not panic *yet).*

7. **Click stop. Guiding Assistant will do some additional analysis and measurements and make some settings recommendations for you**. The GA may say you need to improve your guidestar focus, your polar alignment, and/or calibration. Follow these recommendations and go back and fix these problems and repeat until the GA does not make any of these recommendations.

Accept all the setting changes GA proposed. Here is an example of proposed changes:
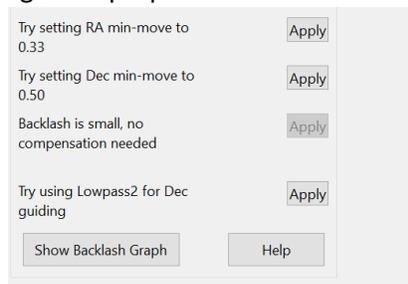
At this point PHD should now be guiding

8. **Let your system guide for approx 20-30 minutes without interruption or changing of any settings**. The guiding may be good, bad, or mixed. The goal here is to let it run and see how your guiding performs with defaults.

This should give you a solid baseline for your guiding performance.

9. **At this point you have created a baseline guiding result.** You can now evaluate your guiding and determine if you would like additional help.

There are several resources you can use to understand your guiding results and possibly improve them

The best resource is Analyzing your PHD2 Guiding Results from openPHD, available here: https://openphdguiding.org/tutorial-analyzing-phd2-guiding-results/

It's also worth looking at PHD Best practices: https://openphdguiding.org/PHD2_BestPractices_2019-12.pdf

If you feel you still need help, you can then upload your guidelog and companion debug log to the PHD forums using the built-in log uploader tool in PHD, here are some instructions on how to do this: https://openphdguiding.org/getting-help/

When choosing which guide/debug logs to upload, try to match up the date of your baseline session with the date of the logs you see in the list. Also try to send just the guidelogs that show your baseline (or the problems you are experiencing). Sending all your files can create unnecessary overhead and time to diagnose and help you. Remember this is all volunteer, so please try to help everyone use their time efficiently.