

- Introduction

The PoleMaster is an easy, convenient and fast way to achieve excellent polar alignment. It has been recognized by astronomy enthusiasts around the world and has become a must-have for anyone using an equatorial mount for visual use or for imaging. The PoleMaster electronic polar axis alignment device is a patented product of QHYCCD and is protected by Chinese, US patents and International PCT.

As any seasoned astroimager would agree, achieving good polar alignment is not an easy task. You may spend hours under precious dark sky trying to get that perfect polar alignment, but in the end you may not know whether good alignment has in fact been achieved. Even after you have obtained good alignment, a gentle knock on the mount may send the polar alignment off and you may have no other choice but to start from scratch again. With an hour here and an hour there trying to get polar aligned, it soon will be dawn and time to pack up the gear.

The PoleMaster is a great solution to this problem. The PoleMaster is an innovative product pioneered by QHYCCD to relieve the pain of polar alignment. Using PoleMaster and following a few simple, easy-to-follow, steps you can achieve perfect polar alignment in 2-3 minutes, with an accuracy of up to 30 arc seconds.

With Polemaster, You don't need to rotate the telescope to some uncomfortable position to keep the optical polar axis of the equatorial mount unobstructed. Also, you don't need to squat down to look through the polar axis scope. You don't need to turn off all the light sources to allow the naked eye to adapt to the darkness and look for the Polaris in the field of view. You also don't need to enter the date and time and then rotate the equatorial mount to a strange angle, finally you don't need to adjust the equatorial level. With the PoleMaster you can observe the alignment of the polar axis at any time, as well as continuously monitor the polar axis. When the equatorial mount moves inadvertently, you can also tune it back without having to redo everything.

The PoleMaster's pixel resolution is approximately 30 arc seconds. The camera's pixel matrix itself is a good ruler, so the accuracy it measures is much higher than the accuracy of the macroscopic lens. In the best case it can achieve an alignment accuracy of 30 arc seconds.

Wide Field of View: The electronic polar mirror has a large field of view of 11 degrees x 8 degrees, so it is easy to find the Polaris.

Once you have calibrated with a PoleMaster, you only need to perform a single-star sync (one-star calibration). This greatly facilitates the setup of an equatorial mount.

With a suitable adapter ring, the PoleMaster can be mounted to any equatorial mount. Even single-axis equatorial mounts that have no ability to correct in declination will benefit because with the PoleMaster, after the polar axis is aligned, the amount of drift in the declination direction will be very small, which can further improve the performance of such an equatorial mount.

- Features

The PoleMaster achieves polar axis alignment following this simple idea: Find the position of the pole and then make it coincide with the center of rotation of the equatorial mount's RA axis, so that the right ascension axis of the equatorial mount is aligned with the axis of the Earth's rotation. The PoleMaster can be mounted in front of the Equatorial Mount's RA axis. It contains a highly sensitive camera that dynamically captures star images near the North celestial pole in real time. Its sensitivity is higher than the naked eye, so not only can you see the North Star, but you can also see a few dim stars near Polaris. Based on the location of these stars, the software calculates the true north pole position. At the same time, the PoleMaster detects the position of the center of rotation of the right ascension axis and then marks the position of the two points on the screen. All you have to do is adjust the equatorial mount so that the two points overlap and the polar axis is aligned. Polar alignment is now a simple matter of moving the two centers of rotation so they overlap. Piece of cake!

In comparison with other polar alignment techniques, PoleMaster has the following advantage:

1. Speed and convenience: With PoleMaster you do not need to move the telescope to a specific place just to unblock the polar scope. You do not need to kneel or contort your body to look through the polar scope. You do not need to fully dark adapt just to see the pole star. You do not need to level your mount. You do not need to worry about the entering the date and time in your handset and figure out where to rotate the mount to coincide with the current pole star position.
2. Accuracy: With a high precision camera, one can achieve accuracy not achievable with the naked eye. The imaging camera in PoleMaster has a resolution of 30 arc second, so the best polar alignment that can be achieved by PoleMaster is also in the order of 30 arc seconds.
3. Wide angle view of the polar region: A wide field of view of 11x8 degree makes it very easy to locate the pole star
4. Easy to install: PoleMaster can be easily installed onto any equatorial mount through mount-specific adapters, even on mounts without a polar scope.
5. Real time polar alignment checking / adjustment: By using PoleMaster you can monitor your polar alignment in real time. In the event that polar alignment is lost, it is now a simple matter to bring it back without having to start from scratch.

6. Three star alignment no longer needed: Once you are polar aligned, you will only need to perform one star alignment – a real time saver.

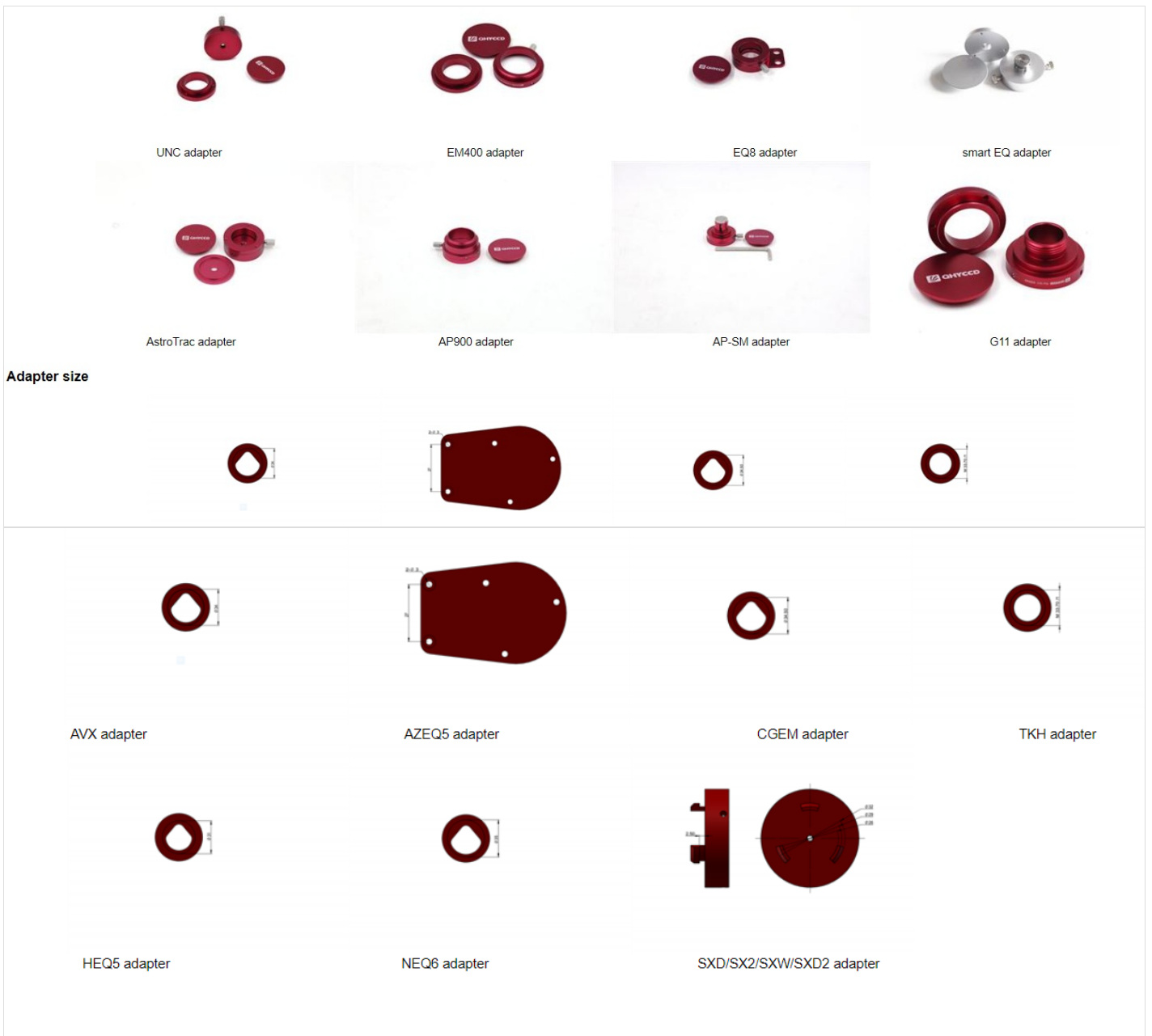
7. Perfect companion to single axis mounts: When used with single (RA-only) axis mount, good polar alignment will minimize drift in the DEC axis therefore maximizing the performance of your mount.

- Specifications

Model	PoleMaster
Field of View	11 degrees x 8 degrees
Sensitivity	9th Magnitude
Coarse Adjustment	5 arc minutes
Fine Adjustment	Up to 30 arc seconds
Computer Interface	Mini USB2.0 Port
Software	QHYCCD PoleMaster Calibration Software
Internal non-volatile memory	Non-volatile internal EEPROM memory capable of storing several small frames for calibration routines, focus, optic analysis, etc.
Weight	106g
Reference Price (without adapter)	US\$269
QHYCCD Standard Adapter Ring	US\$30
QHYCCD Large Adapter Ring	US\$45

- Adapters for PoleMaster





- **PoleMaster User Guide for windows**

- **Hardware Installation**

Please find the following in your package:

- PoleMaster camera body
- Lens cap with a lanyard
- USB cable
- Mount adaptor*
- Mount adaptor cap
- M4 hardware for attaching the adaptor
- Allen key for lens focus adjustment

* The adapter differs for different mounts. The standard package should include a mount adapter (type to be specified when ordering). However, some dealers may sell the PoleMaster without an adapter or sell the adapter separately.



To install your PoleMaster onto the mount, you will need an adaptor specifically made for your mount. The illustrations below use the Skywatcher NEQ6 mount adaptor as an example, but the instructions apply to adaptors made for other mounts.

The mount adaptor comes in two parts. There is a camera base disc which is attached to the back of the camera body; and there is a mount ring which is attached to the polar scope aperture of your mount. In use, the camera disc is attached to the mount ring by thumbscrews (the picture below shows the mount ring already attached to the mount, while the camera base disc is held in the hand).



To install the mount ring, simply insert it into the aperture / hole of the polar scope. Occasionally, the fit can be very snug due to variations in the thickness of paint that is on the mount. You can either scrap off some paint or use a rubber mallet to gently push the ring squarely into the polar scope aperture. Once the ring sits squarely in the aperture, secure the ring to the aperture by tightening the grub screws using the allen key provided from within the aperture of the adaptor ring. You only need to perform this step on your first use.

Attach the camera disc to the back of the camera body using the bolts provided. You only need to perform this step on your first use.



In use, place the camera (with its camera base disc attached) onto the mount ring and secure the camera in place by tightening the thumbscrew. The USB port of the camera should be directed to the left side when you are facing the camera.



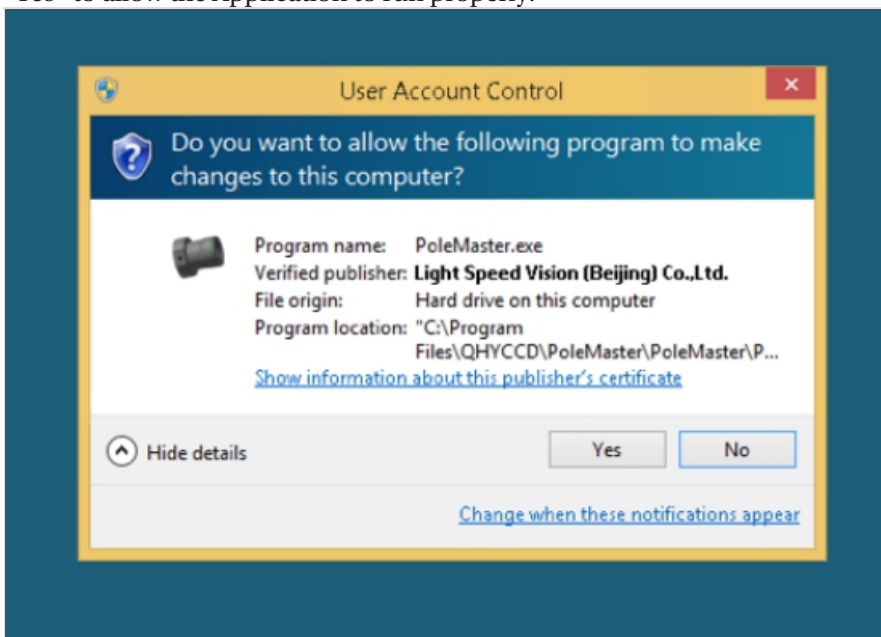
When not in use, you can either leave the camera on the mount attached; alternatively, you can remove the camera (with its camera base disc) from the mount ring by loosening the thumbscrew. Always protect the camera lens using the screw-on lens cap when not in use. If you choose to remove the camera, you may also want to prevent ingress of dust, dirt, bugs, etc into the mount through the mount ring by covering the mount ring opening with the adaptor cap provided.

- Software Installation

Download the driver and the PoleMaster application from the QHYCCD website. The latest web link is printed on the quick start card within the box the camera comes in.

Unzip the files and run the executable files following the on-screen instructions.

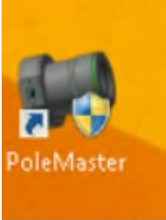
If Windows gives any security warning during installation or during the launch of the Application, you must choose "Yes" to allow the Application to run properly.



- Use PoleMaster

Before you use the application, you should have the mount roughly polar aligned. This can be achieved by aiming the mount due North (Northern hemisphere) or due South (Southern hemisphere) using a orienteering compass; and the adjust the latitude setting on the mount to match your local latitude. Refer to your mount manual on how this should be achieved. The purpose of this rough alignment is such that your pole star will be visible to the camera. (PoleMaster has 11×6 degrees of field of view and in most circumstances the pole star should be visible if the mount has been rough polar aligned).

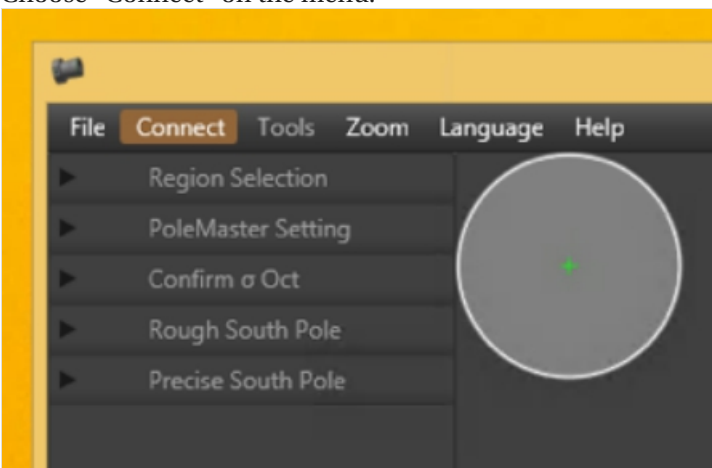
Connect PoleMaster to the computer using the supplied USB cable and launch the PoleMaster. During the first use, the computer will recognize the camera and install the driver for the camera. Launch the PoleMaster application (a shortcut would have been created on the Desktop for you during the software installation)



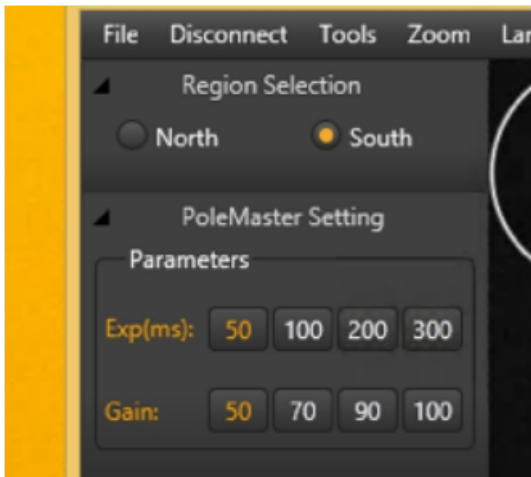
You will see the following screen:



Choose "Connect" on the menu.



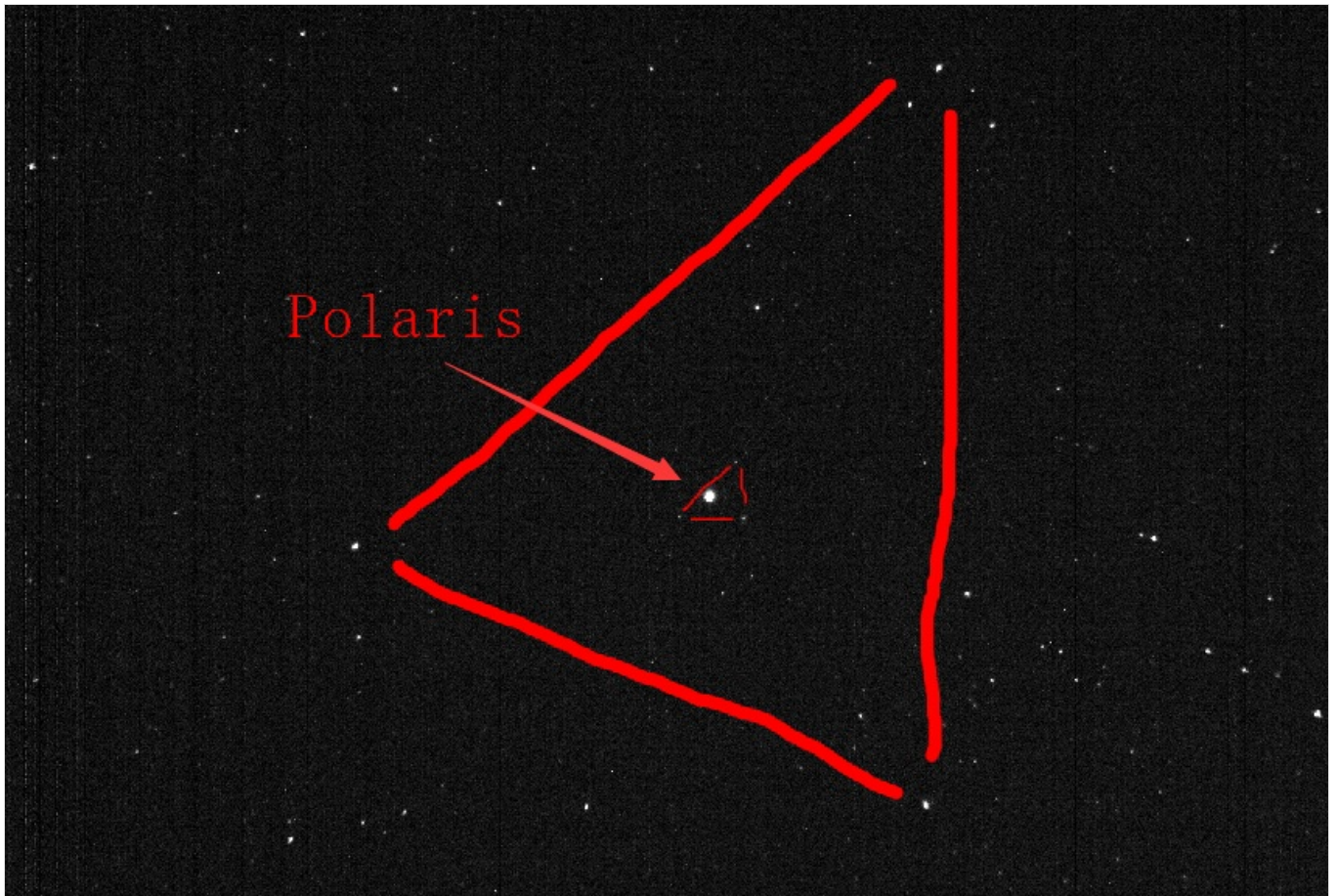
The following section will become available:



Choose either Northern or Southern hemisphere. Enable “Astronomical Refraction”, if you wish. Enter your local latitude and longitude.

Adjust the exposure settings (gain and exposure time) to optimize the display. Ideally you should adjust the setting until you can clearly see the pole star (Polaris in Northern hemisphere and sigma octantis in Southern hemisphere) plus a number of adjacent stars. Click “Finished” when done.

Verify the position of the pole star using the onscreen overlay. This picture shows how the Polaris looks like in PoleMaster FOV.



Locate your pole star on the screen. Double click on the pole star (Polaris or Sigma Octantis). If you have difficulty identifying the pole star or if you are not sure whether the pole star is on the screen (i.e. rough alignment is not good enough), you can save the screen as a .bmp file by choosing “File” then “Save as BMP”. You can plate solve the BMP file using a number of free plate solver, including the online nova.astrometry.net. This will tell you which star is the pole star, or if the pole star is there at all. This is particularly useful for Southern Hemisphere as Sigma Octantis can be difficult to identify.

Once you have double clicked on the pole star, the application will ask you to align the overlay to match the display. The aim is to line up the stars adjacent to the pole star with the on-screen overlay. You can rotate the overlay by either using the keyboard arrow keys or by sliding on the slider tool named “Rotate”. You can also use the middle scroll wheel of your mouse if the mouse cursor is over the slider. At the end there should be a star visible in each of the red circle of the on-screen overlay. If this is not the case, verify that you have indeed selected the correct star as the pole star. Click “Success” to proceed to next step.

This picture show how the Sigma Octantis looks like and the mask for it in the PoleMaster.



Determine the RA rotation center

Choose a bright star adjacent to the pole star in the next step by double clicking it. To make the process more accurate, it is best to use a star that is not too close to the pole star. The on-screen instruction will prompt you to rotate the mount. In this step the application will try to determine the mechanical axis of rotation of your mount. To do that, keep an eye on the bright star that you selected, while slewing your mount using your mount control (usually the East button will rotate the mount in the direction required by the Application – some experimentation is required).

Rotate the mount such that the star moves by about 15 degrees. Click “Finished” then double click on the bright star again. Repeat one more time. Please make sure you are using the handset controller or computer software (like EQMOD, ASCOM etc) to perform the rotation. Don’t manually perform the rotation by loosening the RA clutch as it will cause the rotational center to shift and result in large apparent error.

The Application will draw a green circle on the screen with the bright star on it. The center of the circle is where the Application think the center of rotation is. To verify this is correct, slew the bright star back to its original position (usually the West button, if you have used the East button in the previous step, or you can use the “Park” function of the mount if you start off from the Park position in the previous step)

Click “Correct” if the bright star moves along the circle. Click “Reset” to try again if it does not move along the circle.

Rough polar alignment

Double click on the pole star again and match up the on-screen overlay as per the earlier step. Click “Success” when done.

On the screen there is a small green circle. This is where your pole star should be. Use the mount azimuth and altitude adjusters, align the pole star with the green circle. When done, click “Finished”.

Double click on the pole star again and match up the on-screen overlay as per the earlier step. Click “Success” when done.

Precise polar alignment

Click “Start Monitor”

Fine polar alignment is achieved when the small green circle and small red circle become aligned.

Click “Finished” when done or “Restart” to try again.

Please note there must be a star in each of the green box. If there is no star in it, the pole axis position cannot be determined. The green circle will drift randomly as a result.

After monitoring is started, as long as a GOTO has not been executed, the software will continuously determine the pole position frame by frame. If the mount is moved by accident and polar alignment is lost, the alignment can be restored by adjusting the mount to bring these two stars back into the green rectangle box. The pole position will be determined again and you can further adjust the mount to get it well aligned again.

After a GOTO, the stars will no longer be within the green boxes, but it is possible to rotate the green boxes to align them with the stars again manually.

- **Polar lens focusing**

Before the electronic polar lens leaves the factory, the focal length has been adjusted. If you find that the focal length is still incorrect and the star point is not fine enough, you need to readjust the focal length. Once locked, you don’t need to be right again.

The method is:

1. Unscrew the protective barrel of the electronic polar lens
2. Use an M2 Allen key to loosen the top screw on the side of the inner lens
3. Adjust the lens towards the starry sky to make the star point the finest
4. Lock the top wire and replace the protective sleeve.



- PoleMaster For Raspberry Pi

PoleMaster For Raspberry Pi is based on QHYCCD's cross-platform SDK and POLEMASTER's QT cross-platform version.

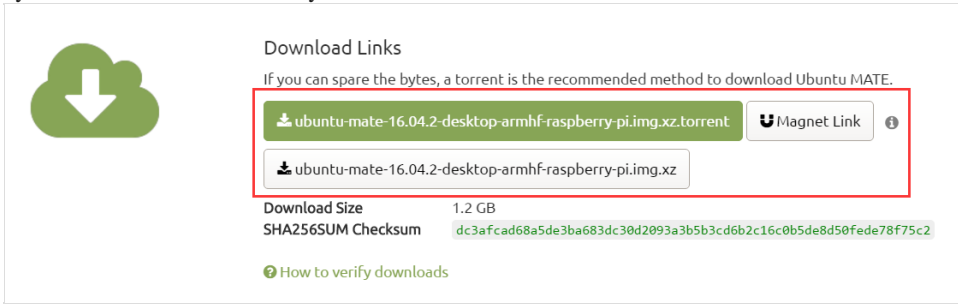
QHYCCD cross-platform version provides cross-platform support for WINDOWS (X86, X64), LINUX (based on INTEL CPU and ARM CPU), MAC/OS, Android and other mainstream operating systems. Can run most QHYCCD cameras. If you want to use QHYCCD to develop your own software, please visit the developer page to get the library files of the QHYCCD SDK, DEMO programs, etc.

1. Image burning (for the Raspberry Pi machine production system)

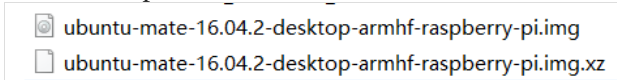
The Raspberry Pi supports many versions of the system, such as linux, raspberry pi, windows, and so on. The startup mode of the Raspberry Pi is to start the memory card. The kernel and system files written in the memory card are automatically loaded at startup. It is recommended to use 16G and above memory cards for image programming. The steps to program the system to the memory card are as follows:

Download the image file of the required system with the suffix .img. The download URL can be found on the official

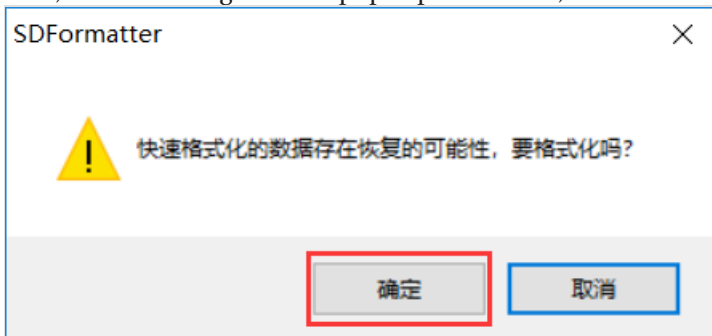
website of the Raspberry Pi (<https://ubuntu-mate.org/download/>). The Ubuntu MATE version is used here. Mirroring, the system is based on Linux system;



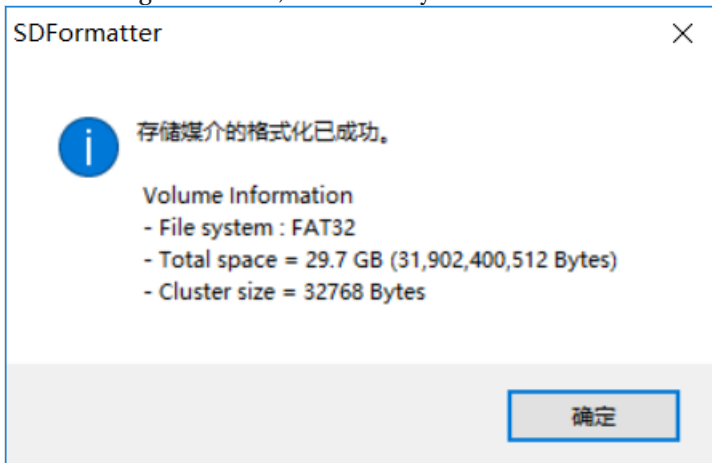
after decompressed:



Usually the program will automatically select the memory card device. If it is not automatically selected or selected incorrectly, you need to select the correct memory card device at the Driver, click Format to start formatting the memory card, and the dialog box that pops up selects OK;

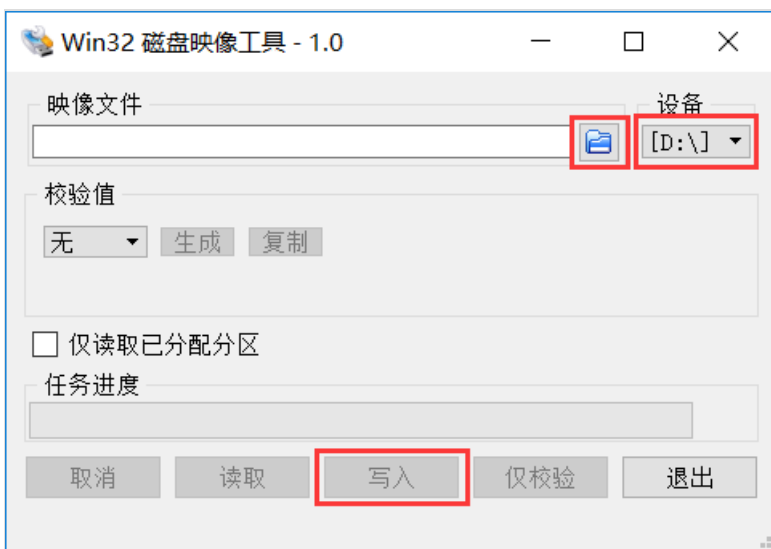


After waiting for a while, the memory card is formatted successfully;

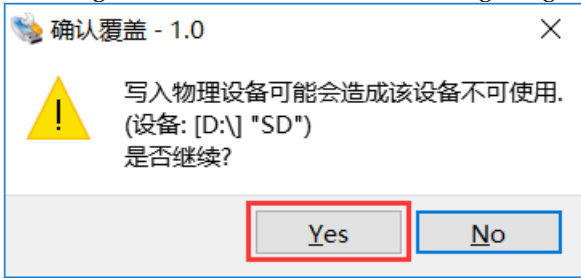


1.3. Image burning, the tool for burning is win32diskimager, you can use other programming software;

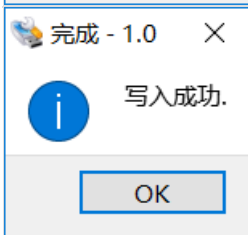
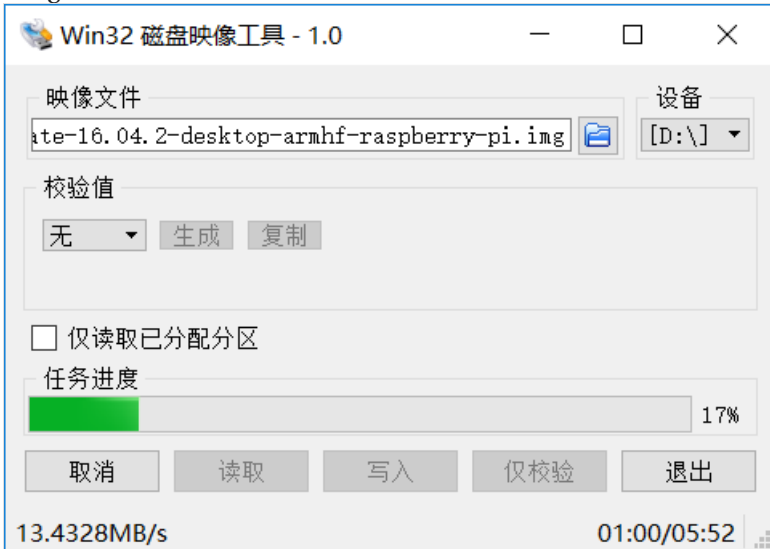
<https://www.qhyccd.com/uploadfile/2018/1222/20181222054228354.zip>



The device usually does not need to be selected. If the software does not automatically select or select the error, you need to select it manually. Click the Select button. In the pop-up window, select the image file that you just unzipped. After selecting it, click the Write to start burning image. ;

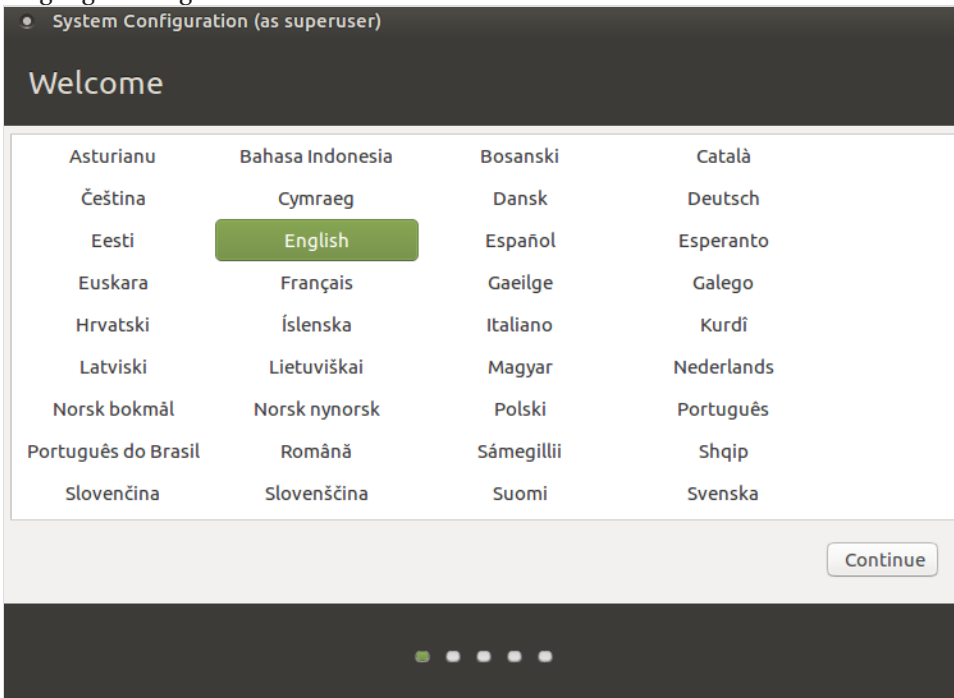


During the programming process, the software will display the progress of the task. After waiting for a few minutes, the image will be burned.



After the image is burned, connect the mouse, keyboard, monitor and power. After power-on, the device will automatically run and run the mirror system in the memory card. The system needs to be set up for the first time, such as language, WiFi, device name, power-on password, etc. After the system is configured successfully, it will automatically enter the system interface.

language setting:



Wireless

Connecting this computer to a wi-fi network allows you to install third-party software, download updates, automatically detect your timezone, and install full support for your language.

I don't want to connect to a wi-fi network right now

Connect to this network

- INNOBEAM807
- QHYCCD
- SMIT
- Xiaomi_5212**
- Xiaomi_808
- mikrouna2.4G

Password: Display password



Where are you?



Keyboard layout

Choose your keyboard layout:

- | | |
|------------------------|--|
| English (Ghana) | English (US) |
| English (Nigeria) | English (US) - Cherokee |
| English (South Africa) | English (US) - English (Colemak) |
| English (UK) | English (US) - English (Dvorak alternative international no dead keys) |
| English (US) | English (US) - English (Dvorak) |
| Esperanto | English (US) - English (Dvorak, international with dead keys) |
| Estonian | English (US) - English (Macintosh) |
| Faroese | English (US) - English (Programmer Dvorak) |
| Filipino | English (US) - English (US, alternative international) |
| | English (US) - English (US, international with dead keys) |



Set the name and power-on password:

System Configuration (as superuser)

Who are you?

Your name:

Your computer's name:
The name it uses when it talks to other computers.

Pick a username:

Choose a password:

Confirm your password:

Log in automatically
 Require my password to log in
 Encrypt my home folder

.....

Once set up, the system will be installed automatically, and it will take a little time in the middle to wait patiently. install the system:

System Configuration (as superuser)

Welcome to Ubuntu MATE

A community developed Ubuntu based operating system that beautifully integrates the MATE desktop.


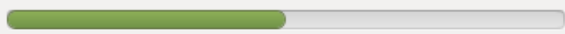


Installing system

Set the system configuration:

Applying changes (as superuser)

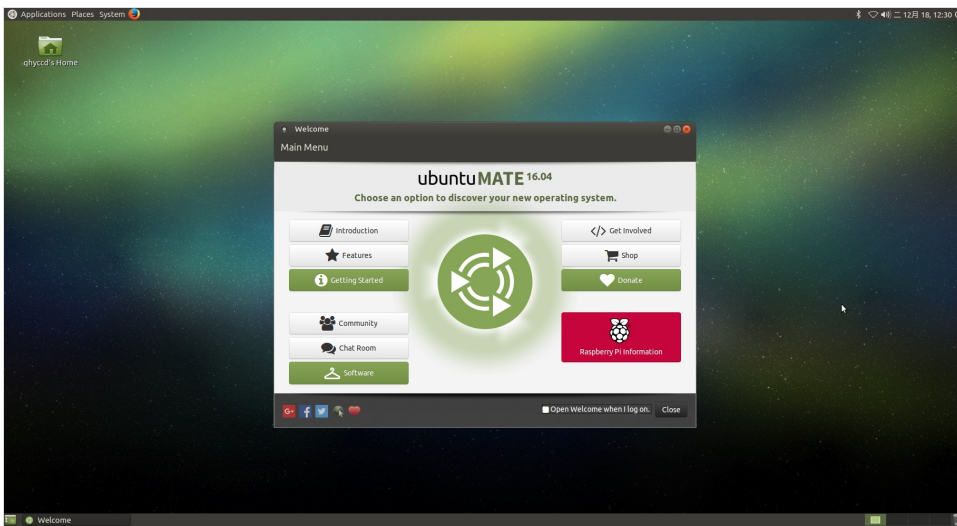
Applying changes

Running post-installation trigger dpkg-exec

▸ Details

The configuration is successful:



The method of making a Raspberry Pi image is not unique. Other methods are also available, but you should pay attention to the Ubuntu MATE version of the image file. Other versions of the image are not supported.

2. Install the QHYCCD SDK

<https://www.qhyccd.com/uploadfile/2018/1222/20181222054316365.zip>

Download and unzip installer_sdk.tar.gz, go to the installer_sdk directory and run installer.sh

```
$ cd installer_sdk
```

```
$ sudo ./installer.sh //Installed successfully without prompting an error
```

```
qhyccd@qhyccd-desktop:~$ cd installer_sdk/
qhyccd@qhyccd-desktop:~/installer_sdk$ ls
firmware  fx3load  install.sh  lib  udev
qhyccd@qhyccd-desktop:~/installer_sdk$ sudo ./install.sh
```

3. Install and modify the system configuration file

<https://www.qhyccd.com/uploadfile/2018/1222/20181222054634222.zip>

Download and unzip PoleMaster PoleMaster_Qt-for-RPI-Ubuntu-1.3.5.0.deb.zip and install it using the dpkg command.

```
$ sudo dpkg -i PoleMaster_Qt-for-RPI-Ubuntu-1.3.5.0.deb
```

```
qhyccd@qhyccd-desktop:~$ sudo dpkg -i PoleMaster_Qt-for_RPI-Ubuntu-1.3.5.0.deb
Selecting previously unselected package polemaster.
(Reading database ... 171486 files and directories currently installed.)
Preparing to unpack PoleMaster_Qt-for_RPI-Ubuntu-1.3.5.0.deb ...
Unpacking polemaster (1.3.5.0) ...
Setting up polemaster (1.3.5.0) ...
Processing triggers for bamfdaemon (0.5.3~bZR0+16.04.20160824-0ubuntu1) ...
Rebuilding /usr/share/applications/bamf-2.index...
Processing triggers for desktop-file-utils (0.22-1ubuntu5) ...
Processing triggers for mime-support (3.59ubuntu1) ...
```

After installation, go to the /usr/bin/PoleMaster directory and check if the installation is successful and the link to the library file is correct.

```
$ cd /usr/bin/PoleMaster
```

```
$ ldd PoleMaster //If the not found library file link , the link is correct
```

```

qhyccd@qhyccd-desktop:/usr/bin/PoleMaster$ ldd PoleMaster
linux-vdso.so.1 => (0x7ecb4000)
/usr/lib/arm-linux-gnueabi/libarmmem.so (0x76f83000)
libqhyccd.so.4 => /lib/arm-linux-gnueabi/libqhyccd.so.4 (0x743ba000)
libusb-1.0.so.0 => /lib/arm-linux-gnueabi/libusb-1.0.so.0 (0x7439a000)
libopencv_imgproc.so.2.4 => /usr/lib/arm-linux-gnueabi/libopencv_imgproc.so.2.4 (0x741d3000)
libopencv_core.so.2.4 => /usr/lib/arm-linux-gnueabi/libopencv_core.so.2.4 (0x74075000)
libQt5Widgets.so.5 => /usr/lib/arm-linux-gnueabi/libQt5Widgets.so.5 (0x73c74000)
libQt5Gui.so.5 => /usr/lib/arm-linux-gnueabi/libQt5Gui.so.5 (0x7398c000)
libQt5Core.so.5 => /usr/lib/arm-linux-gnueabi/libQt5Core.so.5 (0x73644000)
libstdc++.so.6 => /usr/lib/arm-linux-gnueabi/libstdc++.so.6 (0x73536000)
libm.so.6 => /lib/arm-linux-gnueabi/libm.so.6 (0x734be000)
libgcc_s.so.1 => /lib/arm-linux-gnueabi/libgcc_s.so.1 (0x73496000)
libc.so.6 => /lib/arm-linux-gnueabi/libc.so.6 (0x733a9000)
/lib/ld-linux-armhf.so.3 (0x54b39000)
libudev.so.1 => /lib/arm-linux-gnueabi/libudev.so.1 (0x73393000)
libpthread.so.0 => /lib/arm-linux-gnueabi/libpthread.so.0 (0x7336f000)
libz.so.1 => /lib/arm-linux-gnueabi/libz.so.1 (0x7334d000)
librt.so.1 => /lib/arm-linux-gnueabi/librt.so.1 (0x73337000)
libgobject-2.0.so.0 => /usr/lib/arm-linux-gnueabi/libgobject-2.0.so.0 (0x732ee000)
libglib-2.0.so.0 => /lib/arm-linux-gnueabi/libglib-2.0.so.0 (0x73216000)
libX11.so.6 => /usr/lib/arm-linux-gnueabi/libX11.so.6 (0x73125000)
libGLv2.so.2 => /usr/lib/arm-linux-gnueabi/mesa-egl/libGLv2.so.2 (0x7310d000)
libpng12.so.0 => /lib/arm-linux-gnueabi/libpng12.so.0 (0x730e5000)
libharfbuzz.so.0 => /usr/lib/arm-linux-gnueabi/libharfbuzz.so.0 (0x73095000)
libcui18n.so.55 => /usr/lib/arm-linux-gnueabi/libcui18n.so.55 (0x72efc000)
libcuc.so.55 => /usr/lib/arm-linux-gnueabi/libcuc.so.55 (0x72dde000)
libpcre16.so.3 => /usr/lib/arm-linux-gnueabi/libpcre16.so.3 (0x72d88000)
libdl.so.2 => /lib/arm-linux-gnueabi/libdl.so.2 (0x72d75000)
libffi.so.6 => /usr/lib/arm-linux-gnueabi/libffi.so.6 (0x72d5e000)
libpcre.so.3 => /lib/arm-linux-gnueabi/libpcre.so.3 (0x72d01000)
libxcb.so.1 => /usr/lib/arm-linux-gnueabi/libxcb.so.1 (0x72cdd000)
libglapi.so.0 => /usr/lib/arm-linux-gnueabi/libglapi.so.0 (0x72caa000)
libfreetype.so.6 => /usr/lib/arm-linux-gnueabi/libfreetype.so.6 (0x72c33000)
libgraphite2.so.3 => /usr/lib/arm-linux-gnueabi/libgraphite2.so.3 (0x72c0c000)
libcudata.so.55 => /usr/lib/arm-linux-gnueabi/libcudata.so.55 (0x71345000)
libXau.so.6 => /usr/lib/arm-linux-gnueabi/libXau.so.6 (0x7133a000)
libXdmp.so.6 => /usr/lib/arm-linux-gnueabi/libXdmp.so.6 (0x71326000)

```

Add command line

Modify the .bashrc file and add “export PATH=\$PATH:/usr/bin/PoleMaster” on the last line. After modification, you can use the “sudo PoleMaster” command to start the software from any location. If you use the sudo command after adding it, you will be prompted. “sudo: PoleMaster: command not found”, you need to add “alias sudo='sudo env PATH=\$PATH &>/dev/null” later

\$ sudo nano ~/.bashrc

```
alias sudo='sudo env PATH=$PATH &>/dev/null'
```

\$ source ~/.bashrc // Make the changes take effect

4. Start the software and connect the camera

After the camera is connected to the device, enter lsusb to see if the camera is recognized by the Raspberry Pi device and the firmware is loaded correctly. If the device of 1618 0941 can be found in the display, the camera has been recognized and the firmware is loaded correctly.

\$ lsusb

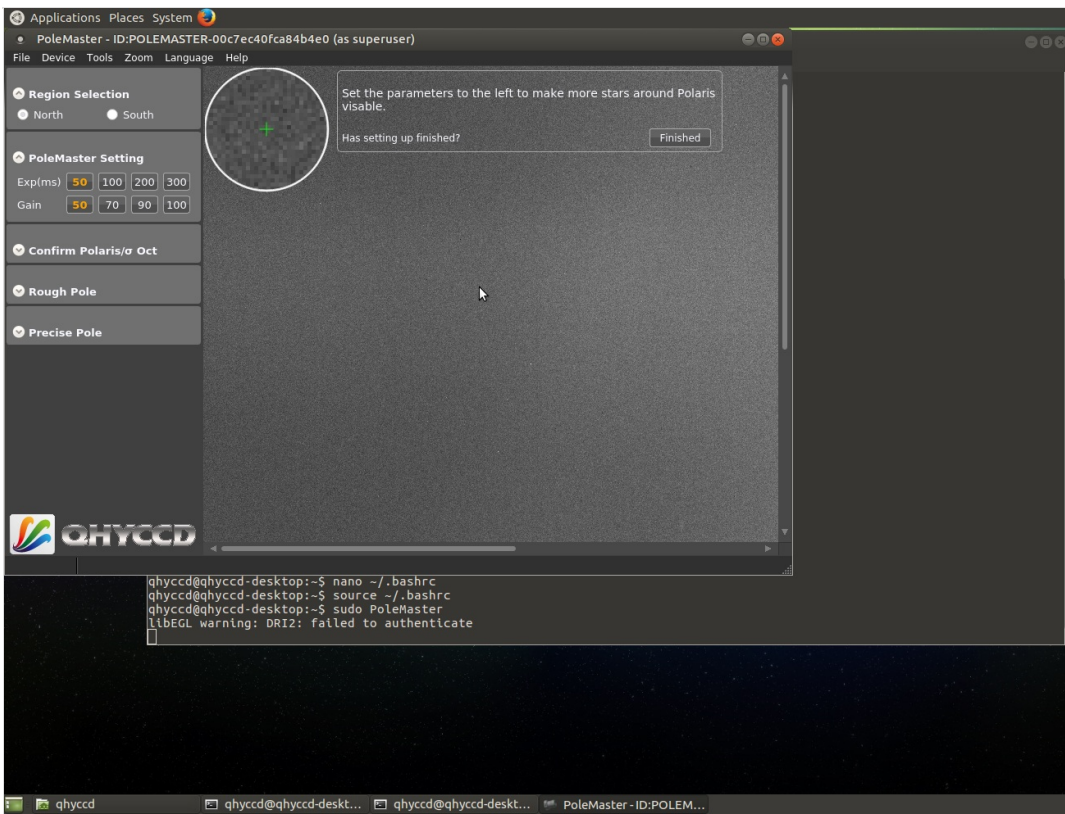
```

qhyccd@qhyccd-desktop:/usr/bin/PoleMaster$ lsusb
Bus 001 Device 006: ID 093a:2510 Pixart Imaging, Inc. Optical Mouse
Bus 001 Device 009: ID 1618:0941
Bus 001 Device 005: ID 1a2c:2124 China Resource Semico Co., Ltd
Bus 001 Device 004: ID 0bda:5411 Realtek Semiconductor Corp.
Bus 001 Device 003: ID 0424:ec00 Standard Microsystems Corp. SMSC9512/9514 Fast Ethernet Adapter
Bus 001 Device 002: ID 0424:9514 Standard Microsystems Corp. SMC9514 Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub

```

PoleMaster

\$ sudo PoleMaster //Note that you must start the administrator with PorMaster. Otherwise, the camera will not be recognized. Please refer to the user manual for the software usage.



- FAQs

1. Why is the calculated pole position changing from time to time?

Atmospheric condition will cause the apparent star position change slightly from time to time. It is best if you monitor the pole position reported and adjust the mount when the reported pole position is relatively steady. In low signal to noise condition (for example, in the presence of heavy light pollution, increased cloud cover), the fluctuation may become excessive and may even disrupt the software enough that the two stars are no longer within the two green rectangle boxes. You need to ensure that the same two stars remain in the green boxes at all time for valid pole position calculation.

2. Is it necessary to install PoleMaster coaxial to the RA axis?

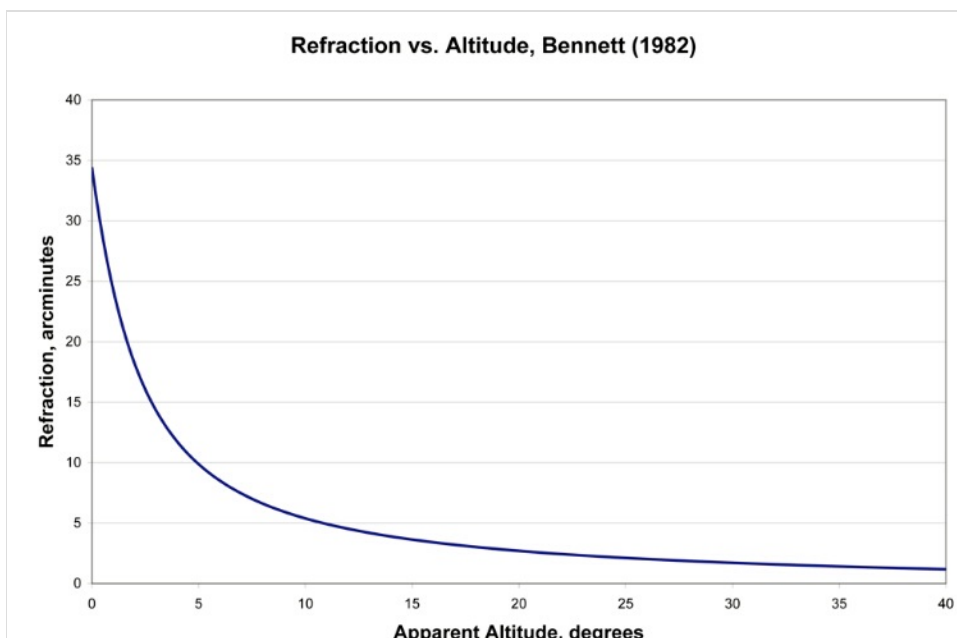
No. You will only need to have them approximately aligned. The rotation center determination is determined algorithmically and does not rely on accurate mechanical alignment .

3. Use in low latitude location?

At locations of low latitude, atmospheric refraction can become a significant factor and affect the perceived pole position. The latest software has included atmospheric refraction correction by shifting the calculated pole position.

25°NS Shift 2 pixels (about 1 arc minute)
 20°NS Shift 3 pixels (about 1.5 arc minute)
 15°NS Shift 4 pixels (about 2 arc minute)

The direction of shift is towards the horizon. You need to check the direction on the PoleMaster video display.



4. How to test the precision of the alignment?

You can use guide software to record DEC drift with both RA and DEC guiding off. The DEC drift present reflects precision of the alignment. The formula is :

Precision (arcsec) = 6 * drift (arcsec per hour)

For example: if in one hour the DEC drift is 3arcsec, the precision is 6*3=18arcsec.

5. When selecting a star using the mouse, how accurate does one need to be?

The software will determine the star position based by weight centroid algorithm rather than merely using the cursor X-Y position, so one does not need to be exact when selecting a star.

6. Why is the star is not round on the display?

The lens used in PoleMaster is working at maximum f-stop and some optical aberration may be visible but it will not affect the calculation because the software use the weight centroid algorithm to determine the star position.

7. When using the PoleMaster, is it necessary to stop RA tracking?

No. It is best to keep tracking on when using PoleMaster.

8. Why can't I get the good PA precision?

If you have difficulties getting sub-30 arcsecond polar alignment accuracy, please check the following:

(1) Polar alignment accuracy should be measured by the amount of declination drift. Polar alignment errors as reported by other means may not be accurate as they are influenced by atmospheric refraction and in some cases, by the mount characteristics such as backlash.

(2) Check that the RA axis has been correctly determined. The accuracy of the RA axis is verified when one can see the star moving along the green circle. If the star does not move along the green circle, you will need to repeat initial steps until it does.

(3) In low latitude location, atmospheric refraction correction should be turned on.

(4) Make sure that PoleMaster is installed such that the USB port faces the left hand side when you faces the PoleMaster

9. Does Polemaster software allow for different epochs?

Current PoleMaster software version calculates the pole position for the period between November 2016 and May 2024.

We will publish a new version for the next five years.

10. Can the PoleMaster work with Fork mount?

Yes, Please take an reference of this setup by one of PoleMaster user.

http://www.cloudynights.com/index.php?app=core&module=attach&attach_id=643984

<http://www.cloudynights.com/topic/520902-qhys-new-polemaster/page-5>

if you need connect the PoleMaster to a tripod connector, you can use the PoleMaster Generic Portable Mount adapter.

Which has a screw hole for the tripod screws.

11. Does PoleMaster Support WINDOWS Vista?

No. Due to the DirecX version issue the PoleMaster can not run under Windows.

12. Does PoleMaster support WINDOWS7,8,10?

Yes

13. Is the PoleMaster MAC/OS version available?

Yes, We have a beta MAC/OS version. Please download it at PoleMaster web page.

<http://qhyccd.com/bbs/index.php?topic=5349.0> There is some bug report on some MAC computer the software may crash but some is not. QHYCCD will keep on debugging.

14. The PoleMaster software screen flickr

If you meet this problem .It maybe due to the dual video display card. You can disable one card. Please refer to

<http://qhyccd.com/bbs/index.php?topic=5399.0>

15. I find some hot pixel on the image. Is this the sensor problem? Is there any affect to the calculation?

No. The PoleMaster use the median filter to remove all hot pixels before calculation. There is no any problem for these hot pixels. And hot pixels is very normal for uncooled camera in high gain and long exposure more than 100ms.

16.A frame rate reduction may occur while using PoleMaster in the software, which usually happens when the laptop battery power is low and the Core CPU is down in the energy saving mode. When connected to the notebook AC adapter power supply, it will become smooth again.

When this issue happens, turning off C-States can solve the jamming problem caused by the processor. And you need to do as follows:

1 Enter the Bios interface (startup hotkeys may be different on mutiple computers),the open the Advanced Settings–CPU Configuration–CPU POWER–Mangement Configuration–select Intel C State–close.

Please select boot device:

Windows Boot Manager
Windows Boot Manager
Enter Setup

↑ and ↓ to move selection
ENTER to select boot device
ESC to boot using defaults

Aptio Setup Utility

Main Advanced Chipset Security

- ▶ CPU Configuration
- ▶ PPM Configuration
- ▶ PCI Subsystem Settings
- ▶ USB Configuration
- ▶ Security Configuration
- ▶ Miscellaneous Configuration
- ▶ LPSS & SCC Configuration
- ▶ System Component
- ▶ OS/BOM Configuration
- ▶ Thermal Configuration

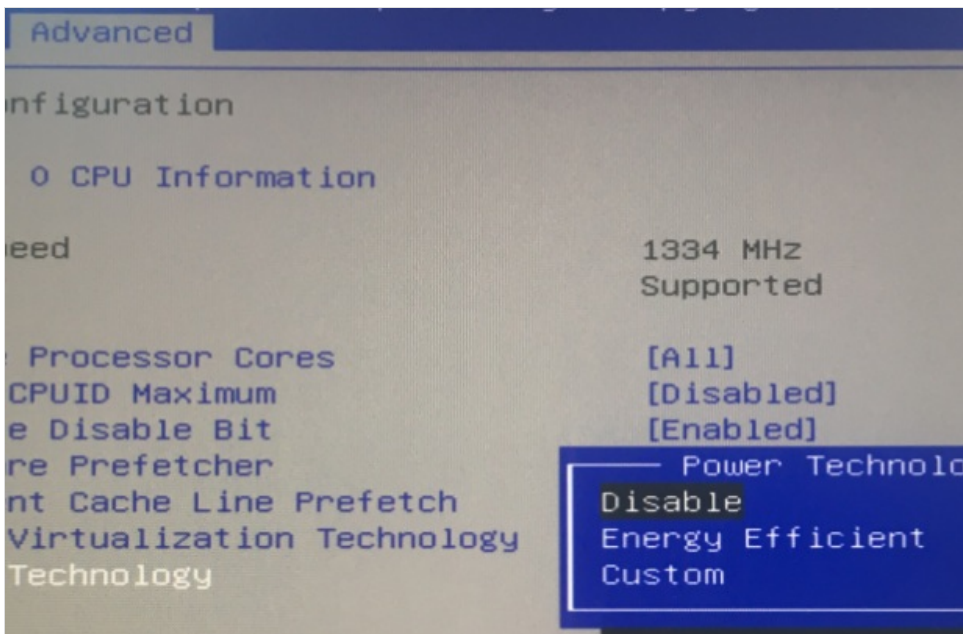
Advanced

CPU Configuration

Socket 0 CPU Information

CPU Speed 1334 MHz
64-bit Support

Active Processor Cores [All]
Limit CPUID Maximum [Disable]
Execute Disable Bit [Enabled]
Hardware Prefetcher [Enabled]
Adjacent Cache Line Prefetch [Enabled]
Intel Virtualization Technology [Enabled]
Power Technology [Energy]



C-State Tech is a processor that saves energy which is based on a deep energy-saving technology based on Intel components. It can be set on or off in BIOS. When the operating system runs to high RAM or the CPU is highly used, this function can properly adjust the energy consumption and CPU to save energy.

However, according to our test, the energy-saving mode will affect the efficiency of real-time reading the USB of the camera. When C-States is on in the BIOS, the computer is prone to images stuck, not smooth. Close C-States can solve such issues effectively.

2 Windows power setting steps: 1. Click "Start button" and click "Settings". 2. Click "Power and sleep", click "Other power settings". 3. Click "Change Power Plan". 4. Click "Change advanced power settings." 5. By default, the "USB Selective Suspend" function is turned on, which will cause image freezes, low frame rates, unsmooth video, images not refreshed, and other problems. We need to replace this feature. 6. Supplement this function.