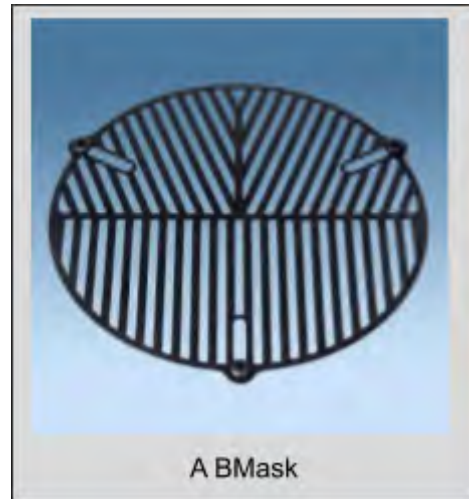


Frequently Asked Questions

Version 2021-07-21

How do I focus the telescope?

- Take the BMask (Bahtinov Mask) and loosely attach it to the outside rim on the front of the telescope with the three adjustment screws. You can also have a team member hold the BMask on the front end of the telescope.



- The BMask will create a diffraction pattern that can be seen through the telescope's eyepiece or the camera, and works best when pointed at a bright star.
 - The diffraction pattern will form an **X** with an additional horizontal line through the center. Adjust the focus of the telescope until the horizontal line is in the middle of the **X**.



Advanced Technique:

- After using the BMask to focus your telescope, you can use the focuser knob to make tiny adjustments by turning the knob clockwise.
- Wait 20 - 30 seconds between each tweak, making a mental note if more faint stars are appearing (better focus) or disappearing (worse focus).
 - **If faint stars are appearing:** Continue to turn the focus knob *clockwise* in tiny increments, until the faint stars disappear. When they disappear, you have moved past the best focus, so turn the knob *counterclockwise* to get back to the best focus.
 - **If faint stars are disappearing:** Turn the focus knob in the *counterclockwise* direction in tiny increments, until the faint stars appear. Continue to do this until the faint stars start to disappear again. Once they begin to disappear, you have moved past the best focus, so turn the knob *clockwise* to return to the best focus.

Source:

<http://tnorecon.net/participant-resources/equipment/recon-guides/focusing-tips/>

My camera power isn't working, what do I do?

When you plug in the power from the battery pack to the QHY camera, you should hear a fan begin to run. However, it is important to know that there are two different sources of power for your camera. The battery is one of those sources and it is responsible for providing power for the thermoelectric cooler that keeps the detector cool. This power has nothing at all to do with the detector itself or the GPS receiver that gives us the time for each image. This is why you can see images from your camera even if the fan isn't running. There is a danger here, though. When the computer is reading out and displaying images, you are dissipating energy in the detector as it operates and this power comes through the USB cable. This energy will cause the temperature to rise on the detector if the cooler is not running. You can run this way for short periods of time, especially if the air temperature is very cold (like it would be at night during

the winter at high elevations). No matter what, the quality of the data will suffer due to hot pixels that will emerge when the detector isn't cooled. (Remember the hot pixels on the old MallinCAMs?) In an emergency, you can still take data if the cooler (and fan) is not on, but it is very important to avoid this situation.

The most common cause of the cooler fan not coming on is a loose connection for the barrel connector that plugs into the camera itself. The fit on this type of plug is a little sloppy and it can wear out and get even looser over time. In your camera kit, there is a short (~2 ft.) cable that can be added to the normal Y-barrel cable. This short cable provides a slightly tighter fit to the camera plug and the barrel cable plugged into the battery. The short add-on cable also has a threaded nut that will screw onto the camera and make the fit even more secure. Why not use this all the time? Well, if your camera always fails to power on, you should use this extra cable. But, if you don't need the short cable, you should leave it off as a backup for when the other cable eventually becomes too loose to be reliable. This degradation of the plug can take a year or more to manifest and by waiting, we buy a lot more time for the camera. Eventually even the shorter threaded cable connection will wear out as well and we want it all to last as long as possible before it would have to be serviced (or replaced).

Note that it's always a good idea to plug in the cooler power cable first before connecting the USB cable to the computer. This way, the detector never gets a heat spike at the start. Excess heat is bad for the detector and you'll get better data for longer if the cooler is running when you begin to read out the camera.

I tried to turn my computer on but nothing happened, what's going on?

Most likely the laptop has 0% charge. If you have a power source you can use the power cord to charge the laptop for about a minute to see if the battery will charge. After this, with the power cord still connected, try to turn on the laptop again to see if it boots up. If you are out in the field, and there is no power source, you are out of luck. Make sure your battery packs and laptops are charged before going out to take data.

It is also possible that the battery has been charged and discharged too much and can no longer sustain the required voltage to start the laptop. While unlikely if you have a new laptop, contact us for a replacement battery.

Can I move the telescope while taking data?

Moving the telescope while taking data is generally a bad idea. Worst case, the telescope is knocked off the field entirely and you miss the occultation. Even the smallest movements from touching the telescope or stepping too heavily can shake the view of the field, making the data

analysis very difficult if not impossible. All tripod adjustments should be made prior to the event window.



NEW PIC PLZ Moving the telescope with the telescope's hand paddle is another way to move the telescope. Depending on the motor speed selected, centering the target star will not affect the data quality. Motor speeds of 1, 2, and 3 are ok for taking data. Motor speeds of 4 or higher will start to stretch the star into a line which is difficult for the computer program to track. Motor speed can be changed by pressing the lower-right button then pressing the numbered button which corresponds to the respective motor speed. For example, pressing the number 1 button after pushing the motor speed button will select a motor speed of one. Avoid moving the telescope in the center of the predicted time frame for the occultation. This is the highest probability time for the occultation to occur. Note that the minimum speed you can use depends on where in the sky you are pointed. A rate of 1 (or even 2) may be too slow when pointed close to overhead. When this happens, one

of the direction buttons (usually left and right) will both appear to move in the same direction. If this happens, move to the next higher speed.

Is it ok to take extra data for an event?

You should limit your event recordings to the recommended time windows. This minimizes the size of the data files that need to be uploaded. Shorter videos will make the data analysis a shorter process.

It is okay to record separate videos of other interesting objects. With the new QHY setups, each video is saved as the time when recording began, in a folder with the date and time of the recording. This way when we go to look for your data, we can look at the date and time file that should have started near the start of the recording window.

You are also encouraged to practice during nights before any occultation campaign to make sure all the equipment is working properly and it gives you a chance to find the star field.

How do I set the exposure time?

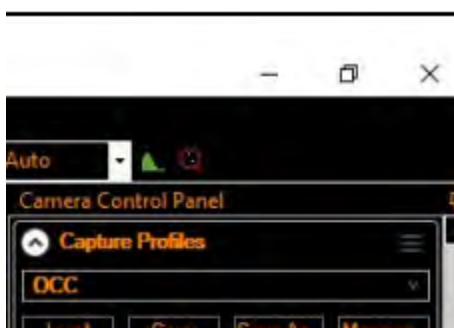
Inside of SharpCap, there are many parameters you can change on the right hand side of the window. Exposure time can be set under the “Camera Controls” tab/drop down menu.



This can be done by either typing in an exposure time (be mindful of the units, sometimes it will show ms for milli-seconds, and sometimes it can show seconds), or moving the slider. It is best to type in the exposure time so you can input the exact integer specified for the event. A click to the left of the slider position decreases the exposure time by a factor of 2. Click to the right, increase it by a factor of 2. You can also click and drag it to just about any arbitrary value you want. LX Mode is for long exposures but all our occultation work is with “short” exposures, generally 2 seconds or less. Quick Picks is useful if the precise value you want

is listed. Auto should never be selected.

What settings can I change inside SharpCap?



The most common settings that can be changed in SharpCap are the Camera and Display Histogram Stretch

settings. As of June 2021 we will only use the “OCC” capture profile.

Once you’ve selected and loaded the “OCC” profile you can also change the exposure time.

Camera Controls

Each RECON event will have its own unique **exposure** time depending on the object's size and speed. You can change the exposure time by either typing it in or using the slider. It is best to type in the exposure time so it is an exact integer.

Gain - this sets the amplification. A larger number is more amplification and is inversely proportional to the usual gain we talk about for astronomical detectors. This can be useful when working with bright objects. The setting imposed by OCC is 300. Do not use anything larger for occultation data. Using something less than 300 is only for bright stars and based on top-level project recommendations.

Offset - Think of it as an additive bias to the signal. It brings the sky level to a higher DN level. This value is set to 100 in the OCC profile and there will almost never be a reason to change it. (This setting defaults to 0.)

USB Traffic defaults to 50 but this is rarely a good value. For the SSD-based standard RECON laptops, this appears to be best when set to 0, and this is the value use in the OCC profile. For slower systems, it may require experimentation to find the best value for your system, likely between 5-15.

The Display Histogram Stretch is the bottom control on the stack on the right. The upper-right button on the graphic (looks like a lightning bolt) will cause SharpCap to compute an optimal hard sky stretch on your image. This stretch is very useful. Just remember that it gets reset whenever you load a profile.

Note that the values for **Image Controls** are really important to not be changed from what the “OCC” profile sets them to. These are the normal values but there is a chance you might mistake these for tools to let you see the image better. In fact, Image Controls change the values of the data and will make data analysis much more difficult and could actually damage data quality. **The histogram stretch** is the only tool you should use to change how the image looks. That tool doesn’t change the data, only the view.

All other settings should not be changed for RECON events. Refer to [SharpCap Settings and Usage 20210415](#) for more information about all settings in SharpCap.

What version of SharpCap should I be using?

Use version **v3.2.8642.0** as of 06/18/2021.

Should I upgrade SharpCap when it tells me there is a new version?

No. In order to avoid any issues, such as a new version of SharpCap not working with our current system or updates with glitches, please wait for specific instructions to update your SharpCap software. If you have any questions regarding SharpCap updates, please reach out through the RECON listserv at tnorecon-org@mailman.boulder.swri.edu.

Source:

https://docs.google.com/document/d/16jePYRXZXlpe_EfzjEVI7KCdWeGn7LwEFPfVMPYcbM/edit?usp=sharing

Should I upgrade NextCloud when it tells me there is a new version?

NextCloud is the cloud sharing service that automatically uploads the data and keeps everything synchronized. For security reasons, you should update NextCloud whenever it prompts you to update to ensure everything runs smoothly.

How do I handle Windows Updates?

You should check for new software upgrades **more than a week before an observing event** to ensure the Windows Update pop-up doesn't interfere with taking data. The best time to check for these updates would be after an observing event once all the data has been synced.

Checking for these updates too close to an event could trigger a pop-up while taking data and freeze SharpCap. Also, updating Windows should be limited to only minor updates, such as security patches. If there is a minor update available, then go ahead and update Windows. After checking for updates and/or installing these updates, turn on Airplane Mode on your computer. If a major update to a new platform (such as from Windows 10 to Windows 11) is available, do not update it, as our current version of SharpCap runs on Windows 10. If you see an update come through like this, please reach out through the RECON listserv at tnorecon-org@mailman.boulder.swri.edu.

Source:

<http://tnorecon.net/participant-resources/equipment/recon-guides/recon-pre-event-checklist/>

When can I connect my laptop to the internet?

During observing, your laptop should be set to Airplane Mode so nothing interferes with capturing your data. After observing is completed and you have returned to home base, plug in

your laptop to charge. Once your laptop is charging, you can connect it to the internet to transfer the data to SwRI. A green checkmark will appear in the “SharpCap Captures” folder icon when the data transfer is complete.

Source:

Patroclus Slack Channel

<https://cloud.boulder.swri.edu/index.php/s/eQZBoxgop2bM9oW>

How long can I safely run my system before running out of power?

The various different runtimes for your equipment are below, however, these are just estimates so it's important to charge all your gear up before an observing event.

[Dell Latitude Laptop:](#)

Approximately 2 hours.



[Celestron PowerTank Lithium Pro:](#)

Up to 17 hours.

[Celestron PowerTank Lithium:](#)

Up to 10 hours

Please remain aware of your own power usage and report if your usage is significantly less than the above times.

The SharpCap screen froze up. What does that mean and what can I do?

If SharpCap was taking data and you were seeing images and then it stopped updating, then this is most likely an issue with the USB cable connecting the camera to the laptop. The USB cable may have become disconnected, either completely or just an instant if it was jiggled. In some instances, the issue could be due to a bad USB cable, in which case SharpCap will start making a screeching noise. To fix the issue with SharpCap freezing, shut down SharpCap, disconnect the USB cable at the computer, then reconnect it to the left side of the laptop, and boot up SharpCap again. If the issue persists and you're trying to record data during an observation event, then leave everything plugged in and avoid jiggling the USB cable. Please report the issue of SharpCap freezing up to the RECON Team so we can resolve the issue.

What do all the logsheet columns mean and do I need to fill them all in?

There are two separate logsheets for QHY cameras and MallinCam cameras. It is important for both types of cameras for you to fill in the initial information at the top of the logsheets. The most important are UT date, site, observers, latitude, longitude, altitude, and sky conditions. Atmospheric conditions like Temperature, RH, and pressure are less important, but fill them in if you have the info available. Quantitative or qualitative observations are fine too.

All columns need to be filled in.

For [QHY Logsheets](#):

The first column is '**UT folder name**'. This is the UT date of the occultation in the following format: "YYYY-MM-DD". The QHY camera will automatically save any video you take on that day and save it into this folder.

The second column is '**Object Name**'. This is the name of the object doing the occulting of the star. If an object has two two names, put both names in if they will fit inside the box.

The third column is '**Nexp or Duration**'. This is the duration of the video you took. You should have preset this before you started the video so the values should be the same. Nexp stands for number of exposures

The fourth column is '**Exposure**'. This is the specific exposure that you had the camera set to during the video. Be sure to add units so we know the video was taken at "200 ms" rather than just at "200" something.

The fifth column is '**Gain**'. This is almost always set to 300 for occultations, but be sure to check each time and record the value used for the video.

The sixth column is '**Comments**'. This column is used for any relevant comments about the quality or events during the video and is very useful. Noting a cloud passing through the view or losing the star at a certain minute are useful things that could be put in this section. If nothing notable happens during the video, record that it was a clean recording or add extra information about other conditions during the video.

For [MallinCam Logsheets](#):

The first column is '**File#**'. This is where you will differentiate between videos

The second column is '**Object or RA/Dec**'. This is the name or sky location of the object doing the occulting of the star.

The third column is '**SenseUp**'. This should reflect the sensup used for the video.

The fourth column is '**UT Start**'. This should match the time you started recording the video. Be sure that you record the UT time and not your local time.

The fifth column is '**Comments**'. In this column you should indicate what type of video this was.

event video
IOTA-VTI position video record
flat field calibration video
dark frame calibration video
other star field video (practice)

Any other relevant comments about the quality or events during the video are very useful. For event videos, noting a cloud passing through the view or losing the star at a certain minute are useful things that could be put in this section. If nothing notable happens during the video, record that it was a clean recording or add extra information about other conditions during the video.

Where do I save my logsheet?

There are two separate logsheets and methods to upload them for QHY cameras and MallinCam cameras.

For [QHY Logsheets](#):

- In the folder named "SharpCap Captures" on your desktop, navigate to the folder labelled with the UT date of the campaign. Save an electronic version of your QHY Logsheets in that folder. (You can either scan or take a cell phone image of a hand written

logsheet or save a text file with the information asked for on the logsheet.) Name the QHY Logsheet in the format of “YYYYMMDD_log” where YYYYMMDD is the UT date of the event.

For [MallinCam Logsheets](#):

- Save an electronic version of logsheet as **C:\Users\RECON\Data\YYYYMMDD\YYYYMMDD_log**, where YYYYMMDD is the subdirectory titled with the UT date of the event.
- There are two ways to save the electronic MallinCam Logsheet:
 1. Make a scan or take a cell phone image of the completed logsheet and save the image file as YYYYMMDD_log
 2. Save [this .txt file](#) to your RECON laptop, and then fill it out. Save as “YYYYMMDD_log” in the proper directory.

Source:

<http://tnorecon.net/reporting-observations/>

How do I send my data?

There are 3 separate things that need to be uploaded after an observing event:

#1. RECON Campaign Report Form:

- Regardless of outcome, file this report to let the RECON team know which sites were able to take data, and follow up with teams that may have had technical difficulties. This should be completed within a week of the observing event and can be found [here](#).

#2. Logsheets:

- See above FAQs for how-tos.

#3. Upload video and log file:

- For QHY Cameras:
 - Before the event, visit the [SharpCap Data Standardization Guide](#) to ensure your directories where you will be saving and sending data are formatted correctly. (Not usually needed for standard RECON systems.)
 - Connect your laptop to Wifi and data will automatically be uploaded to SwRi.
- For MallinCam Cameras:
 - Data is transferred using the RECON Data Transfer Tool. Please see [this webpage](#) for more details.
 - After you have organized your files in C:\Users\RECON\Data, your data is ready to be uploaded:
 1. Open cwrsrc by clicking on desktop icon
 2. If a Security Warning window appears, select Run

3. A cwrscopy window will open with information on the data transfer status. The tool will copy any new directories and files found in C:\Users\RECON\Data to the RECON master storage and backup computer in Boulder. Note that this will likely take a long time (several hours or possibly days depending upon file sizes), so we recommend you plug in the laptop and let the program run continuously until the transfer is complete.
4. After data transfer is complete (or if you need to interrupt data transfer at any time), close the cwrscopy window.

Source:

<http://tnorecon.net/reporting-observations/>

My image is too bright (dark), how do I make it look better?



In SharpCap, in the Camera Control Panel, the Display Histogram Stretch shows a histogram of the image pixels.

The broad spike at the very left of the plot indicates that the image is too dark. The other uniform spikes are an artifact of the camera, you can safely ignore them.

In order to make the stars visible, click on the lightning bolt button on the right side of the histogram. This will cause an automatic stretch of the image based on the sky signal.

You can also change this setting manually by clicking and dragging the dashed lines on the left and the right.

Note that changing anything in this setting will not change the data.

How do I know if my camera settings are correct?

To ensure your camera settings are correct, please refer to the QHY174M/C Camera Guide located here:

<http://tnorecon.net/wp-content/uploads/2021/04/SharpCap-Settings-and-Usage-20210415.pdf>