

Volume

1

MALLINCAM

SkyRaider DS432CTEC



[Version 6.0]
Michael Burns
Rock Mallin

User
Manual



C1: The MallincamSky DS432TEC User Manual

Use this User Manual to obtain a deep understanding of all the features of both the MallincamSky and the SkyRaider DS432TEC camera. See the Quick Guide for an expeditious look at getting up and running with the camera and software.

To save time for those of you who are familiar with Mallincam imaging cameras, this User Guide will provide a Table of Contents to allow you to quickly locate the commands and controls you need in controlling the DS432TEC camera. It will include instructions on how to install the Software and Drivers and how connect the SkyRaider DS432 Camera to your computer. This manual will provide explanations of all the camera's settings so you can get up and running quickly and can experience the wonders of video imaging.

The **ICONS** at the left are quick indications of what that section performs.

ICON KEY	
	Take Note
	Hardware connection
	Download
	Running Software
	Commands
	Camera Controls



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Introduction

The New MallinCam SkyRaider DS432 is here at last. A video / imager with sensitivity high QE never seen before from anyone in the industry. Equipped with the new Sony Industrial IMX432 high performance CMOS sensor, sensitivity has now been made possible to match and surpass CCD sensors on the market today.

Having 9.0 X 9.0 microns pixels just like professional cameras, this new deep sky camera is a must of own for those who likes few seconds exposure to get their favorite deep sky targets live on the screen or to take pictures as well and, or, video of their observations.

The cooling system is the same as our other SkyRaider (DS10CTEC, DS16CTEC) cooled camera. MallinCam has successfully design a cooling chamber called refrigeration cooling - which subjects the CMOS sensor to cooling inside a triple sealed vacuumed sensor chamber controlled with a heating element mounted around the internal optical window to control and avoid dew formation on the optical window and surroundings. A vacuumed sealed chamber is used to eliminate the use of desiccant material and keep dew free environment permanently.

The Sony IMX432 CMOS sensor is industrial grade and made to work at a 100% duty cycle making this CMOS sensor one of the longest lasting continuous use sensors on the market. It is available in color or monochrome for the purist who demand mono performance and increase sensitivity. The IMX432LLJ and IMX432 LQJ have a diagonal of 17.6 mm (Type 1.1) CMOS active pixel type solid-state image sensor with a square pixel array and 1.78 M effective pixels. This chip features a global shutter with variable charge-integration time. Class 1 CMOS sensor is standard with this camera.

The result of this new technology, the SkyRaider DS432CTEC / DS432MTEC, is design for live visual application or video imaging. It is built to laboratory specifications, where CNC machining is used throughout to provide the rigid tolerances needed to provide precise component matching. The chamber has six stainless steel screws securing the chamber cover under 100 pounds of pressure to avoid possible air leaks into the chamber.

The internal electronics use Grade 1 components with tolerance of 0.5%, a military and aerospace standard in some cases. The camera contains 4Gb DDR3 internal memory to insure the smooth flow of data to the computer. The DS432TEC also has a built-in USB 2 hub that can support a guider or a USB type focuser or filter wheel.

So, thank you for your purchase, and let the adventure begin.

The Contents of the DS432 TEC

Specifications:



- PC Win XP, Win7, Win 8, Win 10. Mac.
- Convection Cooling
- Refrigeration Chamber
- Vacuum Sealed Chamber
- Linear Cooling
- Built-in Heater for Optical Window Dew Removal and Chamber Temperature Control
- 100 Pound Chamber Plate Pressure Held with 6- Stainless Steel Screws
- Built-In USB 2.0 hub for Guider, Focuser, filter wheel etc.
- Four Blue LED Status Indicators (power, system, cooler, fan)
- High velocity Ultra Quiet Fan with Dual Air Output
- High Grade Carrying Case
- Live Stacking on the Fly
- Live Star Registration, Ideal for all Motorized Alt-Az mounted telescopes
- Built-in Memories
- CDS (Correlated Double Sampling)
- 1.78 Mega Pixels CMOS ceramic color sensor
- 17.6 mm diagonal size
- Number of effective pixels 1608 X 1104 (1775232 pixels)
- Progressive Scan
- Full HD Support
- Sony IMX432 LQJ color IMX432LLJ mono Class 1 Hand Picked CMOS Sensor
- (Scientific Grade) Sealed Multi-Coated No IR Optical Window
- Pixel (μm): 9.0 X 9.0 square
- Connectivity USB 3.0 (USB2 compatible)
- Variable Sensor Gain
- 4910 mv Output color, 8100 mv mono version
- Resolution: 1600 x 1100
- All Aluminum construction, precision CNC machining
- Hand crafted electronics assembly.
- One USB 3 cable operation
- 5 volts operation @900 ma.
- 12 volts DC Cooling via supplied A/C power supply
- Weight: 534 Grams (1.17 lbs)
- Dimension: 3.39 inch by 3.14 inch (10.0 cm by 8.0 cm)

System Requirements:

- Equal to Intel Core2 2.8GHz or Higher
- Memory: 4GB or More
- USB port: USB 3.0 Port (Recommended)
- Display: 17" or Larger Recommended
- 200MB Free HDD

In the Box

The SkyRaider DS432 TEC Plus includes the following standard equipment:

- MALLINCAM SkyRaider-DS432 TEC Camera
- High Precision T-mount to 2" mount Eyepiece Adapter
- 5-metre (15 ft) USB 3.0 high speed cable.
- 12 volts dc, AC power supply.
- High Grade Carrying Case.
- MallinCam Software MallinCam SKY



Updated Software and Drivers can be downloaded at the Software Downloads Window located in the **Support Tab** at www.mallincam.net



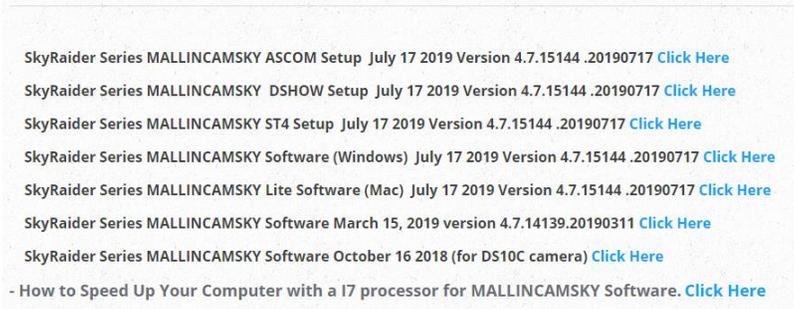
Dimensions



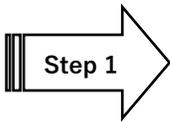


Download and Install MallincamSky

Visit the following website: www.mallincam.net. Select the **Support Tab**, then **Software Downloads**. Select and download the latest required software and drivers for your system.

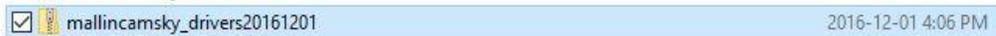


Ensure **DS432TEC** is not connected.



Once downloaded, place your mouse on the zipped file, **Right-Click** to pop-up an **Action Window**, and choose **Extract All ...**

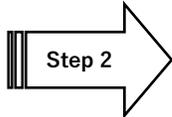
Just **Click** on the **Extract** button when the next Window pops-up. Windows should now open the actual folder that contains the software to install.



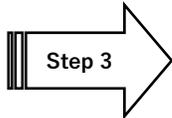
Un-Zip the folder, then **Double-Click** on it to open it up, revealing the 5 programs it contains (or 1 program if just downloading MallincamSky).

<input type="checkbox"/> Name	Date modified	Type	Size
ASCOM DRIVER	2018-05-05 11:32 ...	File folder	
DIRECTSHOW DRIVER	2018-05-05 11:32 ...	File folder	
LINUX SOFTWARE	2018-05-05 11:32 ...	File folder	
MAC SOFTWARE	2018-05-05 11:32 ...	File folder	
WINDOWS APPLICATION	2018-05-05 11:32 ...	File folder	

The **ASCOM DRIVER** folders contains the ASCOM Drivers for the camera
The **DIRECTSHOW DRIVER** folder contains the Direct Show Drivers for the camera
The **WINDOWS APPLICATION** folder contains the camera control software.

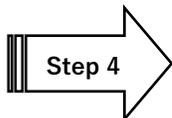
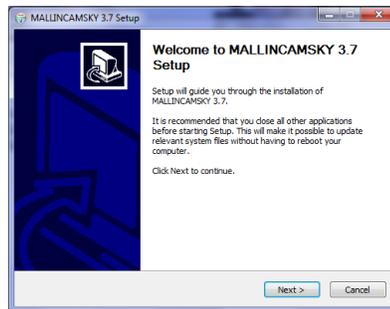


Double-Click on the **WINDOWS APPLICATION** folder to open it up.



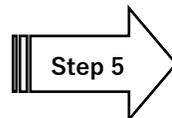
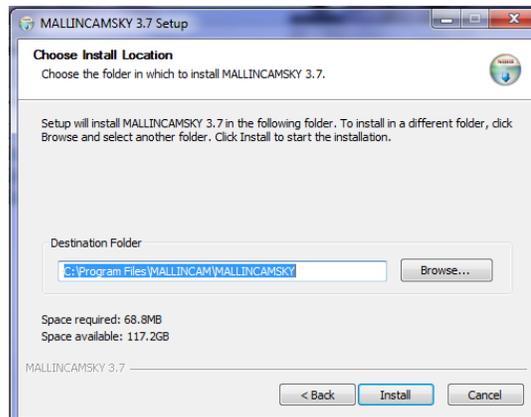
Double-Click on the **MALLINCAMSKYSetup** file and follow instructions to install the **MallincamSKy** software and drivers onto your computer:

The following **MallincamSky Setup Screen** will then appear:



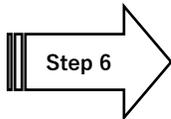
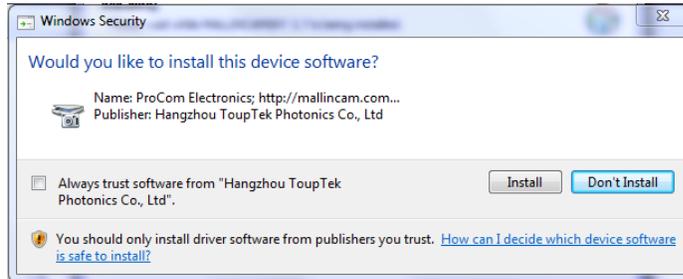
Click on Next to start the installation process.

The installation program now wants to know where you would like to install the software. Either choose your own location or select the **default**.



Click on Install to proceed.

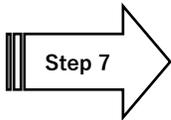
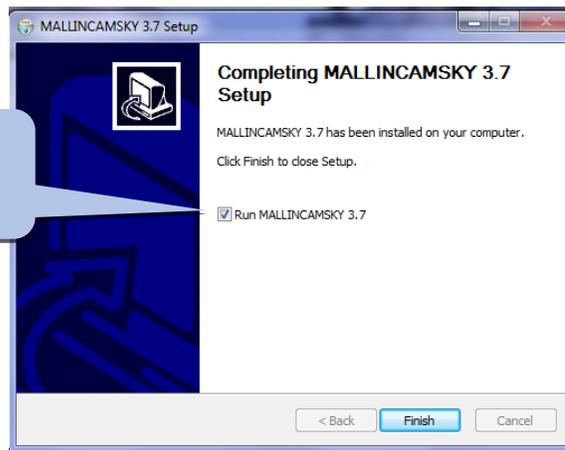
Windows may again ask for permission to install the device software.



Click on **Install** to accept.

The **MallincamSky Software** will take about a minute to be installed. When completed, the following screen will appear:

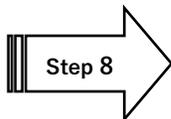
Uncheck the Run MALLINCAMSKY 3.7 checkbox



Click on **Finish**, and the **MallincamSky** Icon will appear on your screen.

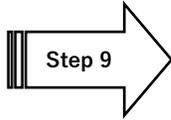


MallincamSky and its drivers are typically all you need to install to control the DS432 camera, but if you would like to have other image programs control of the DS432 then you can install two other optional drivers: ASCOM and DIRECTSHOW



Optionally (see **Installing the ASCOM Driver** for more in-depth details), **Double-Click** on **ASCOM DRIVER** folder, then **Double-Click** on the **ASCOMMallincamSetup** program and follow the instructions to install the **ASCOM** driver.

ASCOMMallincamSetup 2019-03-03 12:11 ... Application 1,596 KB



Step 9

Optionally, (see [Installing the DIRECTSHOW Driver](#) for more in-depth details), **Double-Click** on the **DIRECTSHOW DRIVER** Folder to open it up, then **Double-Click** on the **MALLINCAMshowSetup** program and follow the instructions to install the **Directshow** drivers onto your computer.

 MALLINCAMshowSetup

2019-03-03 12:11 ...

Application

1,460 KB



Windows may display a warning asking for permission to run the program, if it does, select **YES**.



Connecting the DS432TEC to your computer

Un-screw the plastic dust cover from the front of the SkyRaider-DS432TEC camera (place it back in the box for safe keeping) and Screw in the 2-inch eyepiece adapter (M42 x 0.75mm) to the front of the DS432TEC and inset camera into a 2" eyepiece adapter on your Telescope.



Depending upon the telescope, you may need extenders so that you can reach focus with your telescope. It is recommended that you set this up in the daytime, so you can see what you are doing (plus can aim at an easy to find tree or telephone pole).



The T2 (M 42 x 0.75 mm) female thread on the SkyRaider-DS432TEC is a standard size, and numerous adapters are available to connect your camera to various devices such as filter wheels, camera lenses, filters, etc...

⇒ Now connect the 12V AC adapter to a power source and attach the other end to the camera.

⇒ Attach the 5 metre USB 3.0 cable from the back of the to the SkyRaider DS432TEC to a free USB 3.0 (or USB 2.0) port on your computer.



The SkyRaider DS432TEC has some strict power and thru-put requirements, and not all computers are created equal. If you find you are having difficulties with the following steps, it maybe the USB 3.0 port on your computer. If that is the case, one option to try is: connected a Powered USB 3.0 Hub to your USB 3.0 port on your computer. This simple step can improve, both thru-put, power and distance between your computer and the SkyRaider DS432TEC camera.



⇒ Power on the DS432



The first time the DS432 camera is powered on and connected to the computer, Windows will finish installing its drivers will recognize the camera. You will hear and a beep should be heard acknowledging the connection.



Using the USB 2.0 Ports on the SkyRaider DS432TEC

The **USB 2.0 HUB** on the SkyRaider-DS432TEC can be used to connect with various accessories, such as a guide camera, filter wheel, or electronic focuser. This will allow you better management of your cables. The integrated USB 2.0 hub on the SkyRaider-DS432TEC is powered by the 12V external power source.





Running MallincamSky

Locate and **double-click** on the MallincamSky icon located on your Desktop to start **MallincamSky**. When the software loads, you will be able to locate under the Camera Tab the DS432TEC camera name. **Click** on this name to activate the camera and thus display in the Video window what the telescope is pointing at.

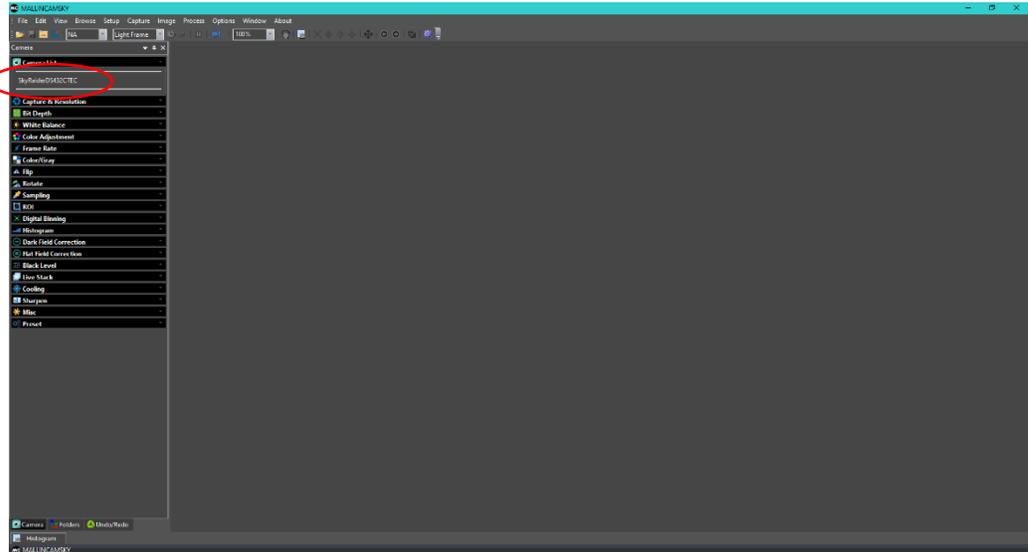


FIGURE 1.0 - MallincamSky's opening screen. Note: the SkyRaider camera is not yet activated



If the driver has been successfully loaded, you will see the name of the **SkyRaiderDS432TEC Camera** in the **MallincamSky Camera List** on the upper left of the Window. You can install more than one SkyRaider Camera to your computer, but the software can only control one SkyRaider Camera at a time.

You can run multiple instances of MallincamSky at the same time, this way you can have one instance control one Mallincam camera and the other instance control the other Mallincam camera.

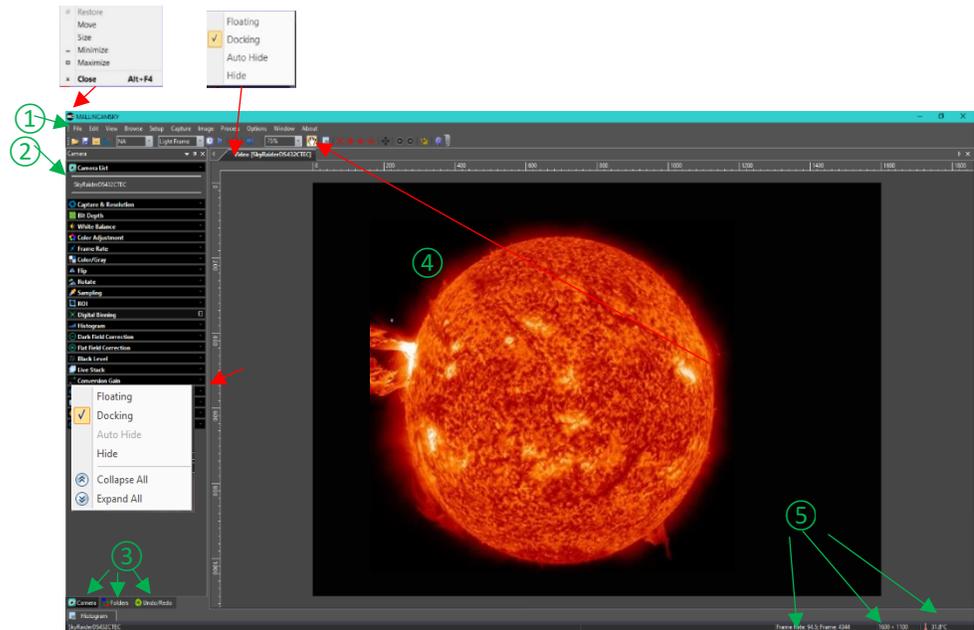


If you notice that the **SkyRaiderDS432TEC** has a **(USB2.0)** behind it, then you are either using a USB 2.0 port, or the distance is too great for the USB 3.0 cable, and the system has entered USB 2.0 speeds. Remember USB 2.0 utilizes slower speeds but gives you greater distances.



Chapter
2

C2: The MallincamSky Window



The **MallincamSky Software Window** is segmented into a few regions to make viewing and adjusting the SkyRaider camera easy and intuitive.

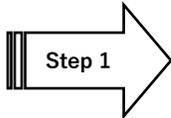
- ① The **Top Menu Line** provides dropdown menus and icons to allow you to make major settings of the software
- ② The **MallincamSky Left SideBar** provides the simple click activation and selection capabilities to control all aspects of the image and camera.
- ③ The **Left SideBar Base** provides selection options for **Camera**, **Folders**, or **Undo**. **Left Clicking** on the selection choice will fill the **Left SideBar** with its options.
- ④ The **Video Window** will contain the display image from the **SkyRaider Camera**. It is here that you will see the live video, or images.
- ⑤ The **Information Line** will indicate the current camera, current frame rate, number of frames displayed, resolution, information about captures, etc.

Quick Work-Flow Procedures



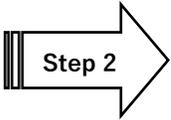
Quick Workflow for Starting MallincamSky

So, you do not like to read manuals, and you just want to just jump right into imaging. Then this section gives you a **Quick and Dirty** method to get going. Then, I follow this section with an even more detailed section on **Planetary Imaging Workflow**, and finally a more detailed section on **Workflow on Imaging Deep Sky Objects**.



Step 1

Double Click on the **MallincamSky Icon** to start the program.

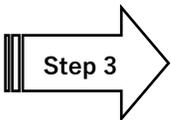


Step 2

Select the **SkyRaiderDS432 TEC** from the **Camera List** in the **Camera Tab**.

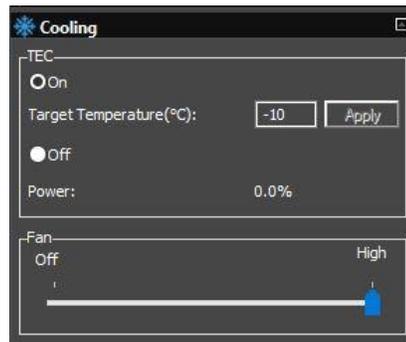
With the **Camera Tab** selected on the **Left SideBar**; **Left-Click** on the **SkyRaiderDS432 TEC** (between lines in **Camera Heading**).

Once the SkyRaider is selected, a black rectangle (with **SkyRaider Camera** name) will appear in the **Video Window** of the **MallincamSky** Software along with the **Horizontal** and **Vertical Rulers**, and the fan on the SkyRaider **DS432 TEC** may start running.



Step 3

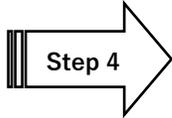
Activate **TEC** from the **Cooling** tab to cool camera (set about 30° below ambient temperature). The current temperature of your camera is displayed on the bottom right corner of the MallincamSky Window.



You can also turn **On** or **OFF** the fan via the Slider in the Cooling Tab



The **Mallincam SkyRaider DS432 TEC Camera** provides a processing technique called **Dark Field and Flat Field Corrections** (see Detailed Sections below for techniques and explanations on using both **Dark Fields and Flat Fields**).

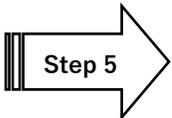
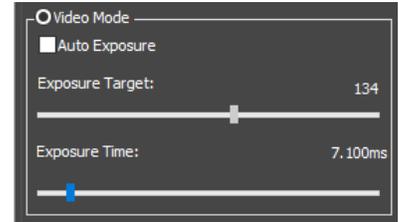


Step 4

Reduce Exposure Time to Align Telescope

As you will most likely use the camera to align and focus your Telescope, now is the time to reduce the **Exposure Time** to **1 or 2 seconds**, and if not already attached to the Telescope, **remove the lens cap** from the **SkyRaider Camera** and insert the camera into the eyepiece holder of your telescope. The shorter exposure will make it easier for you to align and focus your telescope.

Select the **Video Mode** radial button on the **Capture and Resolution Tab**. The **DS432 TEC** will start imaging and displaying what it sees, now move the **Exposure Time** slider to some value less than 5 seconds (note that the units are in milliseconds, so 1 second = 1000 ms), and align and focus your telescope. In **Video Mode**, images are automatically continuously taken once activated.



Step 5

Increase Exposure Time to Image

Now is the time to expose some **Deep Sky Objects** or **Planetary Objects**. So, go back into **Trigger Mode** (if you are imaging **Deep Sky Objects**, else remain in **Video Mode** if imaging **Planetary Objects**) and adjust the **Exposure Time** to match the current target and the equipment you are using.

Video Mode

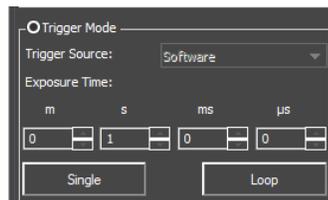
Simply adjust the **Expose Time** slider anywhere from 1 ms to 5 seconds (5000ms) so the object you are imaging is not over or under exposed.

Also play with the **Gain** Slider to see how that affects your image.

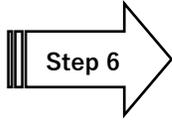


Trigger Mode

In selecting **Trigger Mode**, the camera will wait for you to tell it to commence (**Loop**). So, enter your time in the **m(in)**, **s(ec)**, **ms**, and **us** boxes, and **Click** on the **Single** button to do just one exposure.



If necessary, adjust the exposure time settings and repeat. Once you are happy with the exposure time, you can now tell MallincamSky to continuously take images at that exposure by clicking on the **Loop** button. To stop the camera from imaging, again **Click** on the **Loop** button (which has now changed its name to **Stop**).

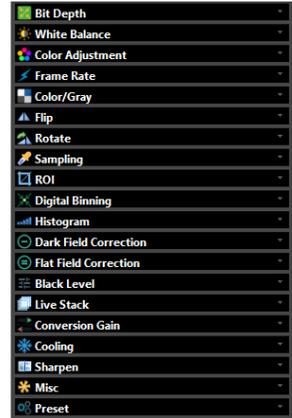


Step 6

Adjust the Parameters

Choose a parameter from the **Camera Tab** on the **Left Side Bar** and see what you can adjust, and how it affects your image.

You will have to wait until the next image is exposed to see how your adjustments look (keep an eye at the bottom of the screen to see when the next adjusted image will appear).



Video Mode

You can adjust all the control commands in real-time to experience how the adjustment affects your image. We recommend you experiment with the Gain, White Balance, Color Adjustment, and Histogram to see how easy they are to control your image.

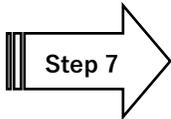
Trigger Mode

Trigger Mode is more restrictive to what you can perform in real-time, not to mention that you will not see how your adjustment affects the image until the camera's next exposure.

The control commands available to you when Looping are: White Balance, Color Adjustment, Frame Rate, Color/Gray, Flip, Histogram, Dark Field Correction, Flat Field Correction, Black Level, and Live Stack,



You will have to wait until the next image is exposed to see how your adjustments look (keep an eye at the bottom of the screen to see when the next adjusted image will appear).



Step 7

Have Fun and Experiment

You can now spend some time to become more comfortable with the **MallincamSky** Software. The **SkyRaider DS432 TEC User Manual** will go into more detail about all the options and adjustments you can perform with the **SkyRaider** series of cameras. But don't be afraid to experiment.

Detailed Work-Flow Procedures



Detailed Workflow of Video Imaging Planetary Objects

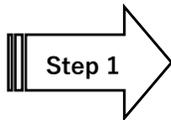
The following instructions will guide you in setting up your SkyRaider camera for imaging Solar, Lunar, or Planetary Objects.

For planetary objects, the exposure setting will be very small (as the objects themselves are usually very bright). It is recommended that you start imaging objects, such as the Moon and bright Planets, as it will allow you to become comfortable with all the adjustments that MallincamSky provides for you. With planetary objects, you want as much resolution and data as possible, so choose the highest resolution your SkyRaider provides.

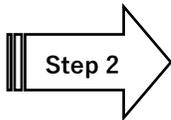


Since the exposure rate is so short, you may find that you do not need to take any **Dark Fields** preparation shots before imaging. But if you do notice warm pixels and would like to eliminate them. Then follow the step-by-step instructions located in the section called: **Dark Field Correction** later in the manual.

The following instructions are used as a guide to assist you in doing planetary video imaging. Don't forget, when finished with a particular step that uses a particular feature **Tab**, you can collapse the **Tab** by **Clicking** on the little **up- arrow** in the right corner of that **Tab** (This will remove, any green, red, or blue boxes which may be displayed over your image).



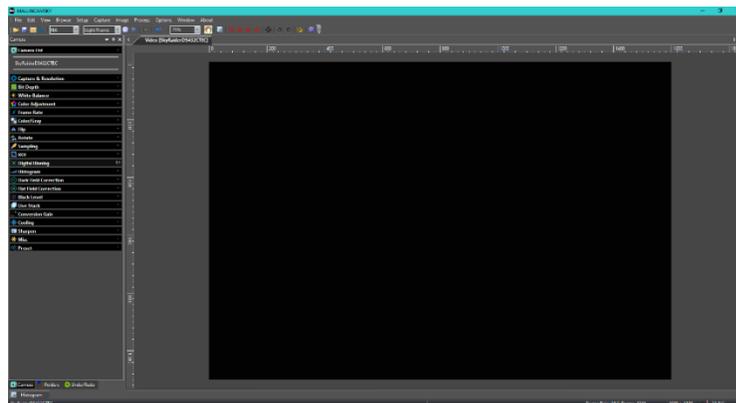
If not started, **Double Click** on the **MallincamSky Icon** on your **Desktop** to start the program.

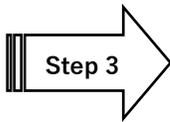


Select the **SkyRaiderDS432 TEC** from the **Camera List** in the **Camera Tab**.



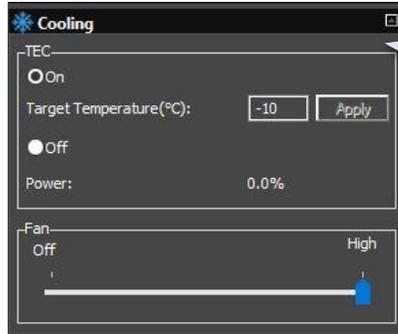
Once the SkyRaider is selected, a black rectangle (with **SkyRaider Camera** name) will appear in the **Video Window** of the **MallincamSky** Software along with the **Horizontal** and **Vertical Rulers** and if the camera is connected, it will display what it is imaging.



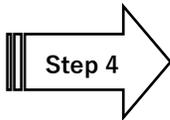


Step 3

If needed, activate the **TEC** from the **Cooling** tab to cool camera (set about 30° below ambient temperature).



Do you have your AC adapter plugged into the Camera?

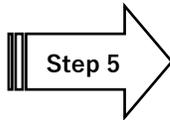


Step 4

Have your telescope pointed to the Planetary Object of Interest, and it is recommended that you use a **Barlow Lens** attached to your Telescope to provide a “Larger (Longer Focal Length)” image.



Since you will want to “**push**” the capabilities of the SkyRaider in displaying the Planetary object, you will require the **highest resolution** that your particular SkyRaider can produce, along with the largest **bits of data** (for color or shades of Back and White) for each pixel that the SkyRaider is able to produce. This will provide enough data for external stacking programs to pull out the finest detail from your video images.

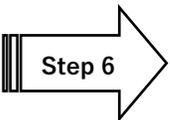
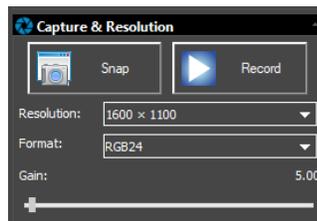


Step 5

From the **Capture and Resolution Tab** on the **MallincamSky ToolBar**, select the **Largest** resolution values that your SkyRaider is capable of.

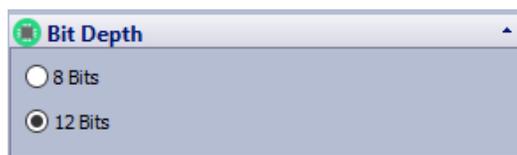


The **SkyRaiderDS432 TEC** is capable of only: **1600 x 1100**



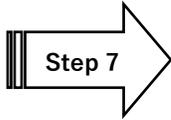
Step 6

If you are going to be saving and processing images taken with the SkyRaider, you will want to increase the Bit depth to 12 bits, the highest value your particular SkyRaider camera supports.





Since you have chosen a **High Resolution** and a **Large Bit Count**, this will slow down the **Frames per Second** rate at which the MallincamSky can process the images (huge amounts of data moving through the system). We will make an adjustment in a later step that will increase the **Frames per Second** rate.



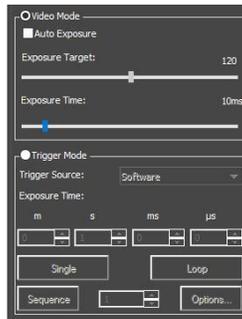
With MallincamSky running, **Left-Click** on the **Capture and Resolution Tab** to expand the exposure window.

- Move the **Gain Slider** all the way to the Left.
- **Click** in the **Video Mode Selector** to choose **Video Mode**.
- Make sure that the **Auto Exposure CheckBox** is **unchecked**.



The SkyRaider **DS432 TEC** has two exposure modes:

- **Video Mode**
- **Trigger Mode**



Since we are imaging planetary objects, our exposure should not exceed **5 seconds**. Therefore, we will be using **Video Mode** exclusively for setting our exposure times. **Video Mode** will continuously take and display images at the duration you set in the **Exposure Time** slider.

If you have the **Green Exposure Rectangle** on your image, then you have selected the **Auto Exposure** checkbox, just uncheck it to remove the rectangle.

If you use **Auto Exposure** and the Green Box annoys you, you can **Left-Click Hold and Drag** corners of the rectangle to resize it to either cover the whole image window, or even to be a zero-size box at one of the corners of your image window. This way you can always have the **Capture and Resolution Tab** open without the annoying green rectangle in the middle of your image.

Step 8

Set the Exposure Time

Set your exposure to a small value, say **10ms** as a starting point. We are using a small time, but the actual exposure amount depends upon the f/ratio, size of telescope, filters, seeing conditions, You can adjust the exposure using one of the three methods below:

- You can either use the **mouse button** and **Left-Click-Hold and Drag** the **Slider Marker** (This method is best for making large movements).
- You can also **Click** on the **Slider Marker**, then use the **Left** and **Right** arrows keys on your keyboard to precisely move the **Exposure Marker** (this method provides the most accurate tiny adjustments to the exposure times).
- You can **Click** on the **Exposure Time's** current setting and a pop-up window will appear that allows you to enter the required exposure time in milliseconds (This allows you to be very precise in the exposure time you require, **5000 ms = 5 seconds**).



You should be able to see the Planetary object of interest on your screen. So now adjust the **Exposure Time** to make the object bright enough match your viewing requirements. You can also adjust the **Gain** to the **Right** to brighten your image.

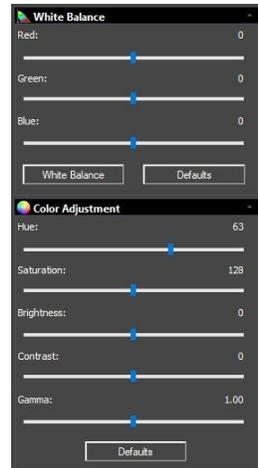
Step 9

Adjust the Parameters

Now is the time to adjust the **White Balance** and **Color Adjustment** (Contrast, Gamma, ...) to your required preferences.

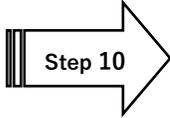
Located in the **Left SideBar** are the **White Balance** and **Color Adjustment** Tabs. Clicking on the Tab Title will expand the Tab displaying the controls you can adjust. **Left-Click-Hold and Drag** the sliders to tweak your image.

If you get lost by making too many wrong adjustments, just click on the Defaults button to reset the image back to its original parameters.





Read the appropriate sections in the **User Manual** (it is great reading, if I do say so myself) to obtain more information as to what each setting does in the **White Balance** and **Color Adjustment** Tabs in MallincamSky. There is no precise value for every user, as we all use different equipment, so this is a great time to *'play'* with the settings to see what value work best for you. Just have fun.



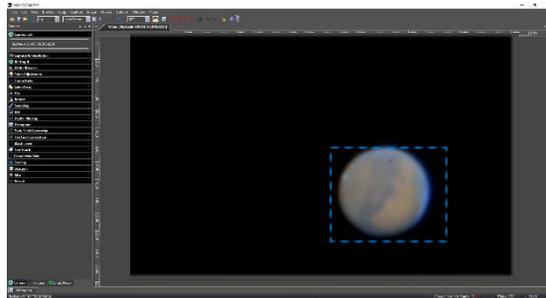
Step 10

To improve the Though-put (**Frames per Second**) or if you want to isolate the planetary object, choose a **Region of Interest (ROI)** that just includes the image of the planetary object.

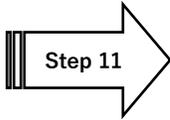
You select the **ROI** by using **Left-Click-Hold and Drag** the handles of the **Blue Rectangle** that will appear over your **Image Window** when you selected the **ROI Tab**. Once you have framed the **Blue ROI Rectangle** over your image, then **Click** on the **Apply** button in the **ROI Tab** to accept it.



This will make the Video Screen contain just the object that was enclosed by the **ROI's Blue Rectangle**. To return to **Full Video Mode**, just **Click** on the **Defaults Button** on the ROI Open Tab.



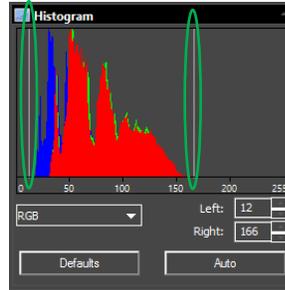
Using the **Scroll Wheel** on your **mouse**, when the mouse is over the **Image Window** will enlarge and reduce the image size in the **Image Window**.



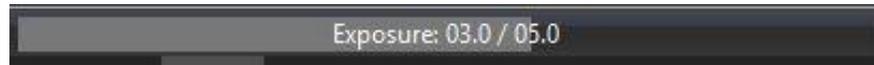
Step 11

Adjust the Histogram

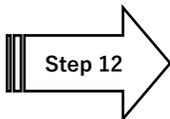
To finely adjust the image characteristics, open up the **Histogram Tab**, and either enter in the **Left** and **Right** values, or **Left Click, Hold and Drag** the two **Vertical Bars** so that you are not clipping data, on either side of the window. These adjustments will help improve the image on the screen. The **Histogram Tab** will take a bit of practice to become comfortable with it (read the section below covering the **Histogram Command** for more details). Set the exposure so that the peak of the histogram is someplace between **50** and **100**.



For any Exposure over **3 seconds** (3000 ms), you can determine how long your camera's exposure time has left by looking at the bottom of the MallincamSky's Window, near the middle. It will provide a real-time indicator that informs you of the time used of the exposure time that you had previously set.



The example above is telling us that we have used **3 seconds** of our **5 second (5000ms)** exposure.



Step 12

Have Fun and Experiment

You can now spend some time to become more comfortable with the **MallincamSky** Software. The **SkyRaider DS432 TEC User Manual** will go into more detail about all the options and adjustments you can perform with the **SkyRaider** series of cameras. But don't be afraid to experiment.



Try different values of **sharpen** to see what details you can pull out of your planetary image.



If you are imaging the Sun in the daytime, then select **Options** from the **Top Menu Line**, then choose **Preferences**. It is here that you can set options for the **MallincamSky**. If you go into **Misc.**, you can change the Display Color Style of the **MallincamSky** software which may be easier to see in bright daylight. If you select another **Color Style**, **Apply**, then **Left-Click** on **OK**. Choose the **Color Style** which works for you. (Use a bright **Color Style** if using computer in Daylight).



Detailed Workflow of Video Imaging Deep Sky Objects

The following instruction will guide you in setting up your SkyRaider **DS432 TEC** camera for imaging **Deep Sky Objects (DSO)**.

For Deep Sky Objects, the exposure setting will be very large (as the objects themselves are usually very dim). It is recommended that practice imaging objects, such as the these, as it will allow you to become comfortable with all the adjustments that MallincamSky provides for you.



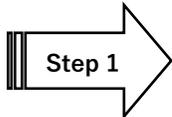
Since the exposure rate can be very long, you will need to prepare your system by taking **Dark Fields** and a **Flat Field**. If this is the first-time imaging DSO's, you may not have saved previous **Dark Fields**, so this Walk-Through will take you through the **Dark Field** preparation step.

Remember complete explanations of each of the processes and controls are provided later in the User Manual.

The following instructions are used as a guide to assist you in doing Deep Sky imaging. Don't forget, when finished with a particular step that uses a particular feature tab, you can close the Tab by clicking on the **little arrow** in the corner of a Tab (This will remove the red, green and blue boxes which may be displayed over your image).

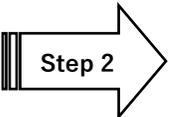


Have your SkyRaider **DS432 TEC** connected to your telescope, and since you are video imaging Deep Sky Objects, you should have a **Focal Reducer** attached. This will provide you two benefits: first you will be presented with a larger field of view (see more of the object), and second, you will have a faster telescope (shorter exposure times).



Step 1

If the program is not Started, **Double Click** on the **MallincamSky Icon** on your Desktop to start it.

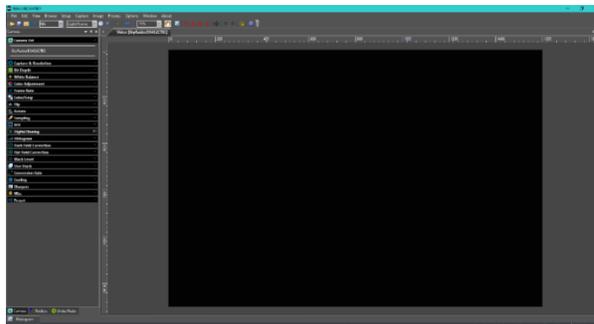


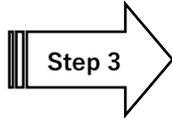
Step 2

Select the **SkyRaiderDS432 TEC** from the **Camera List** in the **Camera Tab**.



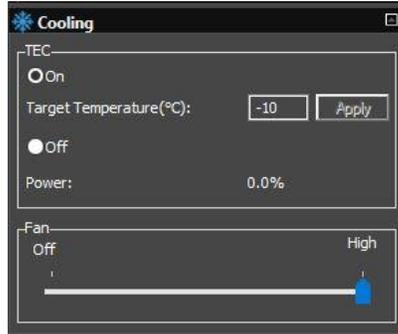
Once the SkyRaider is selected, a black rectangle (with **SkyRaider Camera** name) will appear in the **Video Window** of the **MallincamSky** Software along with the **Horizontal** and **Vertical Rulers**.



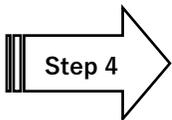


Step 3

Activate **TEC** from the **Cooling** tab to cool camera (set about 30° below ambient temperature).



Since you will want to “**push**” the capabilities of the SkyRaider in displaying the Deep Sky Object, you will require the **highest resolution** that your particular SkyRaider can produce, along with the largest **bits of data** (for color or shades of Back and White) for each pixel that the SkyRaider is able to produce. This will provide enough data for external stacking programs to pull out the finest detail from your video images.

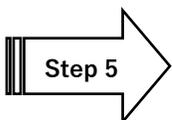
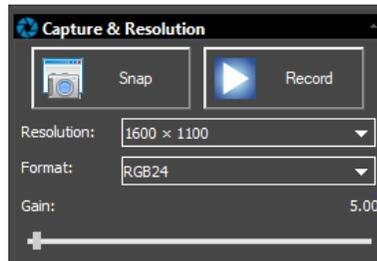


Step 4

From the **Capture and Resolution Tab** on the **MallincamSky ToolBar**, select the **Largest** resolution values that your SkyRaider is capable of.



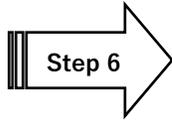
The SkyRaider **DS432 TEC** currently has only one resolution: **1600 x 1100**



Step 5

If you are going to be saving and processing images taken with the SkyRaider, you may want to increase the Bit depth to the highest value your particular SkyRaider camera supports.

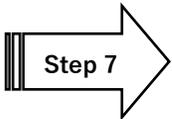




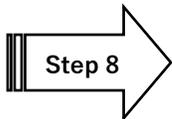
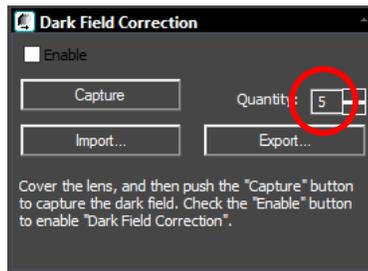
Step 6 Take a set of Dark fields

Due to the Large Exposure times you will be using in imaging Deep Sky Objects, the SkyRaider (in fact every camera no matter what the cost) will sometimes display noise such as, warm pixels and amp glow. The longer the exposure the more noise that can appear on your image. The MallincamSky software can remove this noise, by applying pre-prepared **Dark Fields** to your images, effectively removing the noise.

Either place the Lens cap over your Telescope or place the dust cover cap over your SkyRaider **DS432 TEC** camera to block any light from hitting the sensor of the camera.



Open the **Dark Field Correction Tab** on the **Left SideBar** of MallincamSky. You will normally determine the maximum exposure time that you will be using for the evening, but to get started for the first time, we will choose **5** exposures of **30** seconds. Adjust the **Quantity** to **5**.



Step 8 Select an Exposure Time for Dark Field Correction

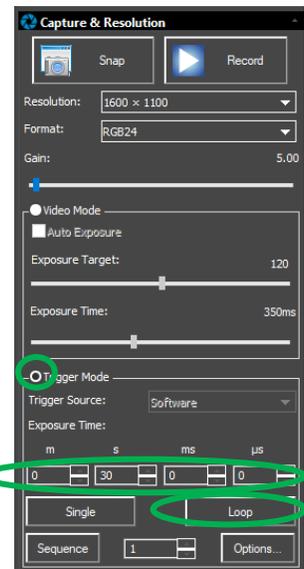
With the **Camera Tab** selected on the **Left SideBar**, **Left-Click** on the **Capture & Resolution**.

You must determine what you believe will be the maximum exposure for this session. As, you will create Dark Field's with this time (or close to it). In this example we will choose **30 seconds**.

In the **Capture & Resolution Tab**; **Click** on the **Trigger Mode Radial Button** (Trigger Mode is used to select any exposure time over 5 seconds).

Move the **Gain Slider** to about where you would normally use it (start with **5** if not sure).

Either enter in the time into the appropriate exposure **time unit boxes** or use the **up** and **down** arrows beside the chosen Exposure time unit to set your maximum time. For us, set the seconds (s) time unit to **30** for 30 seconds.



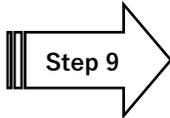
To start the SkyRaider **DS432 TEC** taking continuous exposures, **Left-Click** on the **Loop** button.



Since we have chosen **30 seconds**, you will notice, on the bottom of the Main Window of MallincamSky is the **Exposure indicator**. This shows you the current set exposure time used in the exposure.



The example on the left is telling us that we have used **8.9 seconds** of our **30 second** exposure.

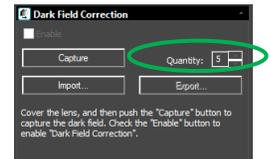


Step 9 Take Dark Field Correction

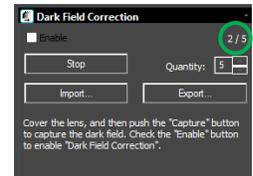
Ensure that the cover is either on the **SkyRaider Camera** or the Telescope itself is covered, then **Left-Click** on the **Dark Field Correction Tab**.

The **Dark Field Correction Tab** will expand allowing you to select the **Quantity of Dark Fields** and the option to start the **Dark Field Capture** process.

Select **5** for the **Quantity**, then **Left-Click** on the **Capture** Button (which will change its name to **Stop**, in case you need to abort the Dark Field capture). The Software will display its progress above the selected **Quantity**. Remember, it is beneficial to set the Dark Field exposure time greater than the longest time you will be imaging at.



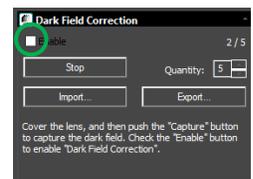
As the **Dark Fields** are being exposed, you can watch the **exposure counter** in the **Dark Field Correction Tab** go up to let you know how many **Dark Fields** have been taken (**2 out of 5** in the above example).



Once the **Dark Fields** have been taken, you have the option of saving them by **Clicking** on the **Export button** and saving them in a folder of your choice. This way you can use them again on another night.

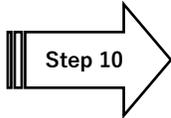
You can also import previously saved **Dark Fields** by using the **Import Button**.

When you are ready to apply the **Dark Fields** to your images (in real time), simply check the **Enable** box in the **Dark Field Tab**. Unchecking the Enable box will prevent **Dark Fields** from being applied to the images. For now leave it unchecked.



Now is the time to get busy with imaging our Deep Sky Object since the preliminary work is done. So, remove the Lens Cap from the Telescope, or Lens Cover from the SkyRaider.

Hopefully, your telescope is mostly polar aligned, and you are ready to visit your first **DSO**, and produce an image to impress one friends, neighbors, and spouse (so you can justify spending all of your hard-earned money on those extra pieces of equipment that you just had to have for imaging).

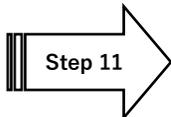


Step 10

Focus your Telescope

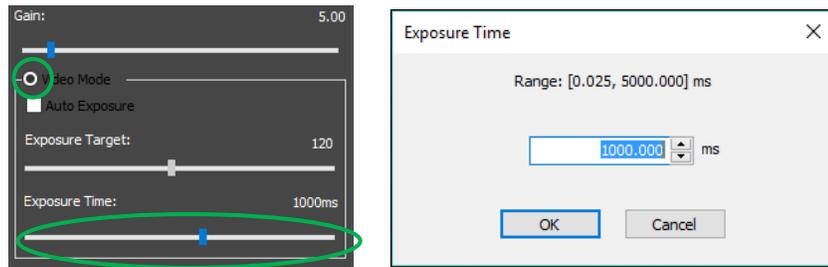
The first thing we need to align and verify focus of our Telescope. To do that we only need a short duration exposure (under 5 seconds), so we will use **Video Mode**.

Open the **Capture and Resolution Tab** and ensure that the **Auto Exposure** box is **unchecked**. Move the **Gain** slider to about the same value you set in the **Dark Field**, say **5**.



Step 11

Now Select the **Video Mode** Radial indicator button, then either use the **Slider** or **Click** on the **Current Exposure Time Value** to open the **Exposure Time Window**. Enter in **1 second (1000 ms)** in this window and **Click** the **OK** button to accept.



We will use a small exposure, so we can verify that the object is someplace in the field of view (if in using **1 second** the star or object is too dim, increase exposure to **2 seconds** or increase the **Gain**). This is a great time to check your focus as the images will be updated very quickly. You can use the **Crosshair's** Icon at the top of the MallincamSky Window to assist in centering you object (or focus a star). **Click** on the Crosshair to activate, and again **Click** on the **Crosshair** to deactivate it.

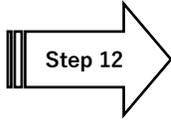


Again, ff the image is too dim, try increasing either the **Exposure** or the **Gain**.

Now, you have your Deep Sky Object (or a least a dim version of it, centered in your screen. It is time to crank-up-volume. Well, for us, time to increase the exposure time.

If the **Capture and Resolution Tab** is not open, then **Click** on it to expand its Window.

When imaging Deep Sky Objects, we will need to use an exposure over **5 seconds (5000ms)**, this is where the **Trigger Mode** comes in, on the SkyRaider DS432 TEC.



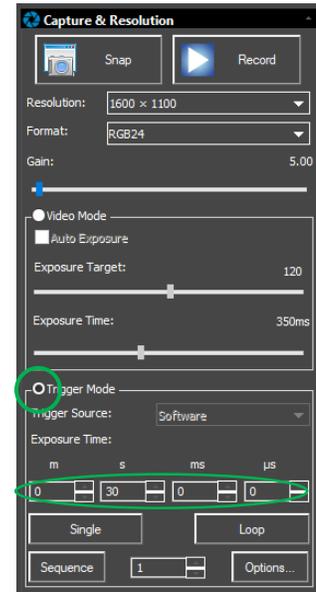
Step 12

Image your object

Click on the **Trigger Mode Radial** selection button to activate **Trigger Mode**.

Set your exposure to a large value, say **30s** as a starting point (we are using **30 seconds**, but the actual exposure amount depends upon the f/ratio, size of telescope, filters, seeing conditions, ...). You can adjust the exposure using one of the two methods below:

- You can **Click** in the **Time Units Box** and enter in an amount (**30 seconds**) using your Keyboard.
- You can **Click** on the **up** or **down** arrow in the **Time Unit Box** of choice to move the exposure time to your required value (**30 seconds**).



Click on the **Single Button** to take a single exposure to see if the image of the object is close to the brightness you need.

If you are satisfied with the single image, then **Click** on the **Loop Button** to have the SkyRaider **DS432 TEC** continuously take images (at 30 seconds in our example).



Since we have chosen **30 seconds**, MallincamSky will continuously display the **exposure time** and the **current amount of time captured** in the exposure info box located on the Bottom of the MallincamSky Window (MallincamSky does this automatically for any exposure over 3 seconds).



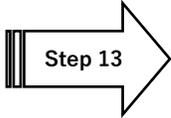
The example on the left is telling us that we have exposed **24 seconds** of our **30 second** exposure.



Now, we are heading into the “Art” of video imaging. You can **decrease** the **Exposure Time**, as long as you **increase** the **Gain**. But, by increasing the **Gain**, you also **increase any noise** that is present. Use your own judgment in what you are willing to accept on your image.

The DS432 TEC will continuously refresh the image based on the exposure time, and any adjustment you make will not be visible until the next refresh. This includes if you move your telescope; you may see streaks until the next complete refresh of the image.

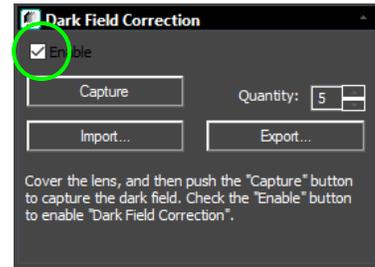
Now, that we have an image that we are happy with, it is time to enable **Dark Field** subtraction (if you took Dark Field Images).



Step 13

Apply Dark Fields

Click on the **Enable CheckBox** in the **Dark Field Correction** Tab. Dark Fields will be automatically applied during the next image refresh, so in our example you may have to wait up to 30 seconds before the Dark fields are applied.



M57, 20 Seconds exposure, VRC 6", F/4.5 with MallinCam 0.5X focal reducer, NO Dark Field Correction. No processing, as seen live on monitor. Single frame.



M57, 20 Seconds exposure, VRC 6", F/4.5 with MallinCam 0.5X focal reducer, One Single DARK FIELD CORRECTION APPLIED LIVE, No processing, as seen live on monitor, Single frame.

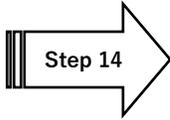
You can deactivate the dark field correction at any time by **unchecking** the **enable** box in the **Dark Field Correction** Tab.



Do not forget to read the section on how to make and save Dark Fields to improve your imaging results.

Obtaining an Image of our First Deep Sky Object is enough for most to start the celebration process (again most of us will call for our spouse to have a look at the amazing image we have just produced, again trying to justify the money used in buying those extra pieces of hardware).

Next, we want to fine tune our image to perfection (at least that is what you will tell yourself), but this is a great time to get familiar with some of the adjustment options available in MallincamSky.



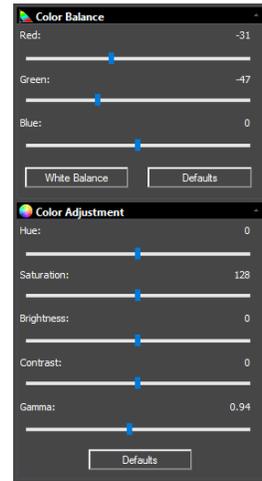
Step 14

Adjust the Parameters

Now is the time to adjust the **White Balance** and **Color Adjustment** (Contrast, Gamma, ...) to your required preferences.

Located in the **Left SideBar** are the **White Balance** and **Color Adjustment** Tabs. Clicking on the Tab Title will expand the Tab displaying the controls you can adjust. **Left-Click-Hold and Drag** the sliders to tweak your image.

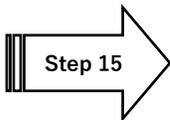
If you get lost by making too many wrong adjustments, just click on the Defaults button to reset the image back to its original parameters.



You can adjust the **Gamma, Brightness, Contrast, ...** in real time, but it will not appear on the Video Window until the SkyRaider has done its next refresh (which depends upon the current exposure time).



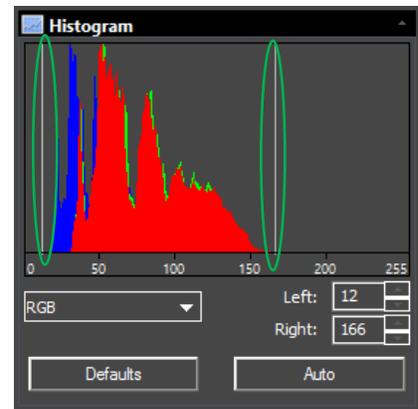
Read the appropriate sections in the **User Manual** (it is great reading, if I do say so myself) to obtain more information as to what each setting does in the **White Balance** and **Color Adjustment** Tabs in MallincamSky. There is no precise value for every user, as we all use different equipment, so this is a great time to **'play'** with the settings to see what value work best for you. Just have fun. The best part is if you mess up, there is always the **Defaults Button** to bring you image back to the way it was.



Step 15

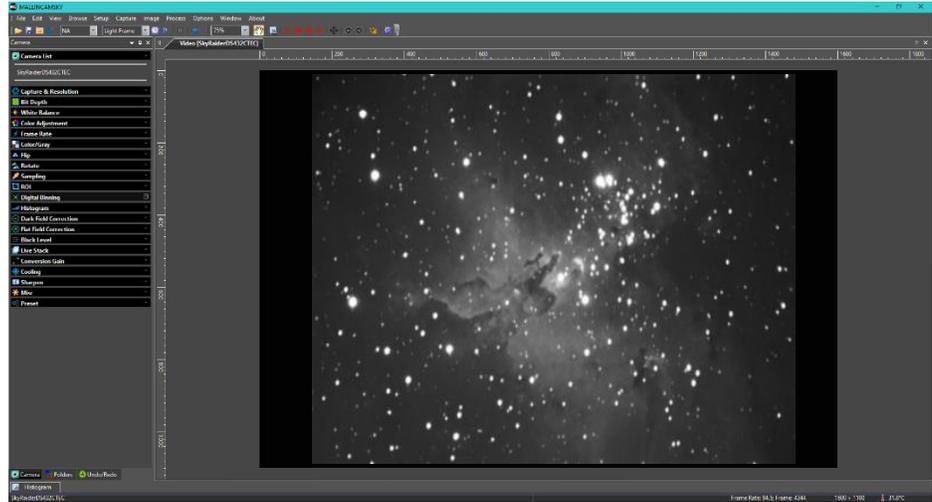
Histogram

To finely adjust the image characteristics, open the **Histogram Tab**, and either enter in the **Left** and **Right** values, or **Left-Click-Hold and Drag** the two **Vertical Bars** so that you are not clipping data, on either side of the window. These adjustments will help improve the image on the screen. The **Histogram Tab** will take a bit of practice to become comfortable with it. For more detailed information on how to use the **Histogram Tab**, locate that section in the User Manual. Set the exposure so that the peak of the Histogram is someplace between **50** and **100**.



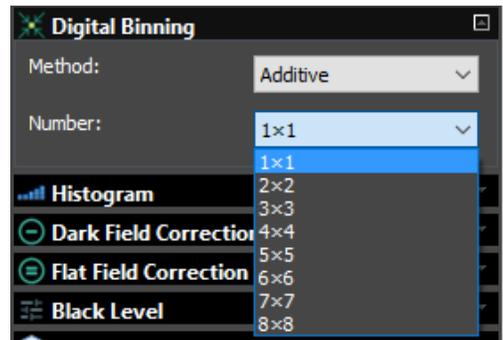
You cannot adjust **Exposure** or **Gain**, when the SkyRaider is in **loop** mode. You will need to stop the **looping**, adjust the **exposure** or **gain**, then restart the **looping**.

This is where you must take over in adjusting the parameters, as each telescope, night-sky, seeing conditions are different from user to user. So, have fun and experiment with the settings and see how they affect your image. Remember, these are your images and you decide what is best for you.



Step 16 **Digital Binning**

To shorten the exposure (also reduces the resolution), you have the option of selecting **Digital Binning**. You can choose no Binning (1) all the way to **4 x 4 Binning**. Note, you will need to re-adjust appropriate histograms, contract, ... after choosing a different binning number. You will also notice the **Video Screen** image size is reduced to match the “digital resolution” of the Mallincam Camera when the **Digital Binning** is applied. You need only increase the **Zoom** factor to increase the size of the window.

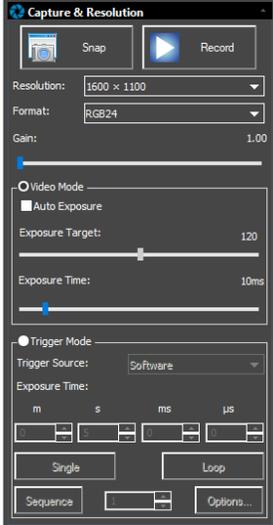
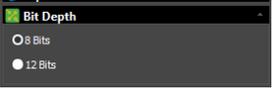


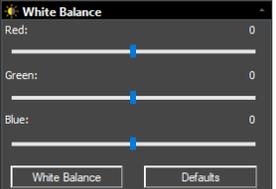
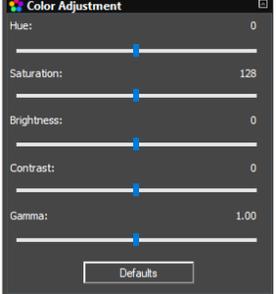
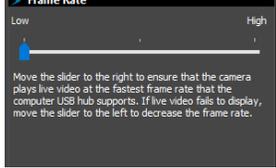
You can only adjust the **Digital Billing** when the SkyRaider is not **looping**, so stop the looping, adjust the **Digital Binning**, restart **looping**.

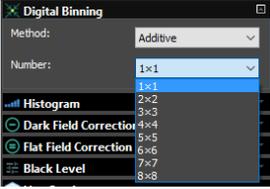
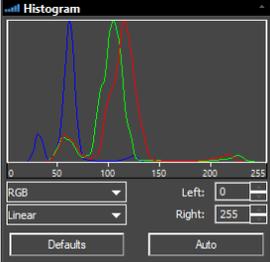


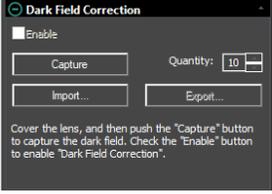
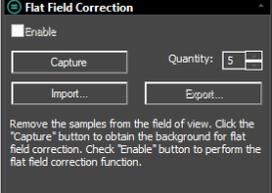
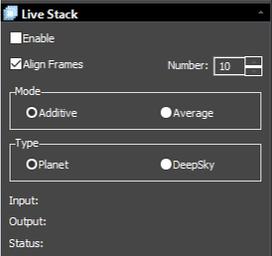
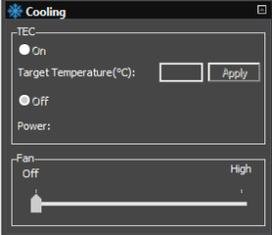
C3: Quick Overview of the Left Sidebar

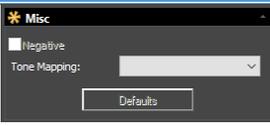
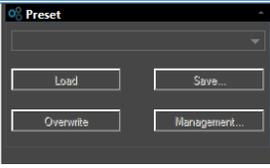
To expand the control just click on the down-arrow symbol that is located on the right of the control. The control will expand providing you with its options. You can expand as many controls as necessary, but you may need to use the slider (which automatically appears if the control information is larger than the MallincamSky Window). To close the control, just click on the little up-arrow symbol located on the right side of the control.

	<p>The Camera List contains the list of attached Mallincam Cameras. If a USB 3.0 camera is attached to a USB 2.0 port, then (USB 2.0) will be appended to the name. Clicking on the camera name will activate the camera and display its image in the Video Window.</p>
	<p>Snap take a picture of what is currently being displayed in the Video Window and places that image in its own tab with default name 0001*.</p> <p>Record starts recording a video of what is being imaged. The recording will stop when you click on the recording button again.</p> <p>Resolution contains the current resolution of the camera.</p> <p>Format of the camera RGB24, RGB48, or RAW.</p> <p>Gain adjusts the amplification of the signal from the camera.</p> <p>Video Mode display the image in Video Window in real-time</p> <p>Auto Exposure has MallincamSky choose best exposure for you when checked.</p> <p>Exposure Target give Auto Exposure some value to aim for.</p> <p>Exposure Time allows you to set an exact exposure from 0 s to 5 s.</p> <p>Trigger Mode displays long exposure images from 0.100 ms to 1 h in the Video Window. Activated by the Loop control.</p> <p>Exposure Time allows you to set the Exposure time.</p> <p>Single allows you take a single exposure.</p> <p>Loop allows MallincamSky to repeatedly take exposure</p> <p>Sequence allow you to set up a sequence of looped exposures</p> <p>Number determine the number of exposures in sequence</p> <p>Options... allows you to set the destination and format of the video sequences.</p>
	<p>Bit Depth sets the number of bits the camera assigned to the image for Windows display. When set to 8 bits you have 256 available colors. When set to 12 bits you have 4096 available colors. The larger the bit depth the larger its size is and the more load it places on the cpu.</p>

	<p>White Balance allows you to select a region of the Video image via a red box and do a white balance correction by clicking on the White Balance button.</p> <p>The Red slider allows you to manually adjust the red level in the video image.</p> <p>The Green slider allows you to manually adjust the green level in the video image.</p> <p>The Blue slider allows you to manually adjust the blue level in the video image.</p> <p>The White Balance button allows you to activate red box as the White Balance template and MallincamSky will adjust the Red, Green, and Blue values.</p> <p>The Defaults button resets the White balance to red=0, green=0, and blue=0.</p>
	<p>Color Adjustment allows you to adjust is real-time various components of the video image.</p> <p>Hue – the slider allows you to modify the indicator of dominant color.</p> <p>Saturation – the slider allows you to modify the intensity of color in the video image.</p> <p>Brightness – the slider allows you to modify the brightness of the video image.</p> <p>Contrast – the slider allows you to modify the difference in brightness of the elements in the image.</p> <p>Gamma – the slider allows you to modify the captured brightness to the perceived brightness.</p> <p>The Defaults button returns all the Color Adjustments to their default value.</p>
	<p>The Frame Rate control allows you via the slider to adjust the rate at which the SkyRaider camera streams its data through the USB port. If your video window does not display an image, then move the slider toward the Low end of the Bar, as your computer cannot handle the rate at which the data is being pushed.</p>
	<p>The Color/Gray command allows you to determine if you would like to view the video image in color or in shades of grey. Select by clicking in the appropriate radial button.</p>
	<p>The Flip command allows you to flip the video image in the Horizontal, Vertical, or Both. Flip in the required direction by checking the appropriate checkmark box. The flip command can be used to match the orientation of the image to your needs.</p>

	<p>The Rotate command allows you to rotate the image clockwise in four set angles: 0°, 90°, 180°, and 270°. Click in the required radial button to rotate the image.</p>
	<p>The Sampling command, which the DS432TEC does not use, allows you to select a sampling style.</p> <ul style="list-style-type: none"> -Bin refers to the method of combining (averaging) pixels of a block of neighboring same color pixels to resize the video to a lower resolution (can increase video frames/second). -Skip (also known as decimation) means that a certain number of pixels is not read out but skipped (horizontally, vertically or in both axes). This reduces resolution of the resulting video but introduces subsampling artifacts.
	<p>The ROI (Region of Interest) command presents a selectable and draggable Blue box which you can adjust with your mouse. Enclosing a region of your image and clicking on the Apply button will make the Video Window only contain what was enclosed within the Blue box. To return to the full Video Window click on the Defaults button.</p>
	<p>The Digital Binning command will allow you to Bin your displayed video image to either increase the sensitivity of the camera or improve the quality of the image.</p> <ul style="list-style-type: none"> Method selects style of binning <ul style="list-style-type: none"> Additive: add pixels together (based on the number selected) to increase sensitivity. Average: adds pixels together (based on the number selected) to increase quality of image. Number determines the amount of binning selected. <ul style="list-style-type: none"> 1: No binning 2: 2 x 2 binning 3: 3 x 3 binning 4: 4 x 4 binning 5: 5 x 5 binning 6: 6 x 6 binning 7: 7 x 7 binning 8: 8 x 8 binning
	<p>The Histogram command displays the relationship of the distribution comparing the number of pixels at a specific color level. This Realtime graph allows you to adjust the dark and light endpoints to stretch the image to reveal more detail in the shaded areas.</p> <ul style="list-style-type: none"> RGB: allows you to select a color channel. Linear: displays the distribution using either a linear or logarithmic scale. Left: lets you manually enter the starting dark region. Right: lets you manually enter the ending light region. Defaults: returns the Left and Right to their default values (0, and 255). Auto: lets MallincamSky select what it feels is the best values for Left and Right.

	<p>The Dark Field Correction command will allow you to take and apply Dark Fields.</p> <p>Enable: once checked will apply the previously taken Dark Fields to you video image in Realtime.</p> <p>Capture: will take (ensure camera is covered) the Quantity number of Dark Fields.</p> <p>Quantity: the number of Dark Field images to take.</p> <p>Import...: allows you to load previously taken Dark Fields.</p> <p>Export...: will allow you to save currently taken Dark Fields.</p>
	<p>The Flat Field Correction command will allow you to take and apply Flat Fields.</p> <p>Enable: once checked will apply the previously taken Flat Fields to you video image in Realtime.</p> <p>Capture: will take (ensure camera is covered) the Quantity number of Flat Fields.</p> <p>Quantity: the number of Flat Field images to take.</p> <p>Import...: allows you to load previously taken Flat Fields.</p> <p>Export...: will allow you to save currently taken Flat Fields.</p>
	<p>The Dark Level command allows you to adjust the range of the blackness in the video image. The left end (0) is the darkest, while the right end (496) is the highest.</p>
	<p>The Live Stack control allow you to combine numerous images together in Realtime.</p> <p>Enable: activates the stacking process.</p> <p>Align Frames: when checked will align the frames before stacking</p> <p>Number: contains the number of rolling frames that will be stacked</p> <p>Mode: determines the type of stacking that will be performed. You have a choice of Additive (produces brighter image), or Average (produces better quality image).</p> <p>Type: Allows you to choose the type of object you are imaging, so to improve the Alignment algorithms. Choices are Planet or DeepSky.</p> <p>Input: number of images accepted into algorithm</p> <p>Output: number of Stacked images produced</p> <p>Status: if alignment is successful</p>
	<p>The Conversion Gain control will allow you to choose what Gain algorithm that MallincamSky should use.</p> <p>HCG: High Conversion Gain produces a brighter image in the specific time, but more noise.</p> <p>LCG: Low Conversion Gain produces a dimmer image in the specific time, but less noise.</p> <p>HDR: High Dynamic Range is not available for DS432TEC.</p>
	<p>The Cooling control will allow you to set a target temperature and activate the internal cooling mechanism. This control also allows you to activate the camera's internal fan (ac adapter must be powered on).</p> <p>TEC: allows you to activate with the On radial button, or deactivate with the Off radial button. Once activated you can select a Target temperature and apply it.</p> <p>Fan: via the slider, you can allow activate the internal fan in the camera.</p>

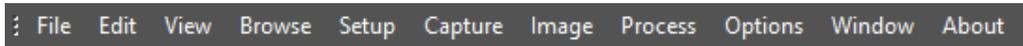
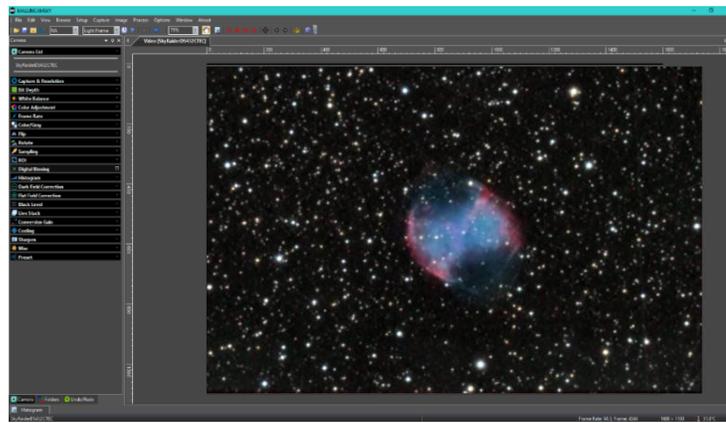
	<p>The Sharpen control allow you to tweak the sharpening of the finer details of the Realtime video image. The slider gives a range of 0% (which is off) to 500% (all the way to the right).</p>
	<p>The Misc control allows you to produce an inverse or negative of the Realtime video image by checking in the checkbox.</p> <p>Tone mapping is not available for this camera.</p>
	<p>The Preset control allows you to save and load previous control settings that you have used to image of previous sessions. A drop-down list displays the names of previously saved presets including a Factor Reset for the settings.</p> <p>Load: loads in the settings form the drop-down list Save: saves the current control settings in a name of your choice Overwrite: resaves any current setting changes using the same name Management: allows you to import or export settings from other users</p>

Chapter
4



C4: Detailed Description of MallincamSky Controls

This Chapter of the User Manual will describe in exact detail what each control on both the **Top Line Menu** and the **Icon Toolbar** does. This Chapter is best read on a rainy day or can be used to jump to the specific section that describes how to use a particular control.

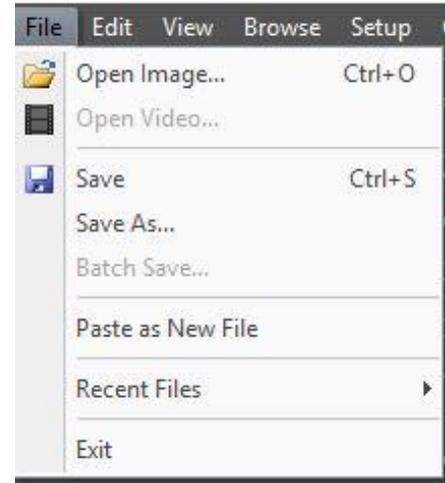


Top Line Menu



File

This **Drop-Down Menu** will allow you to **Load** and **Save** images, play video files that are stored on your computer, and examine recent videos or images that you have view using MallincamSky.



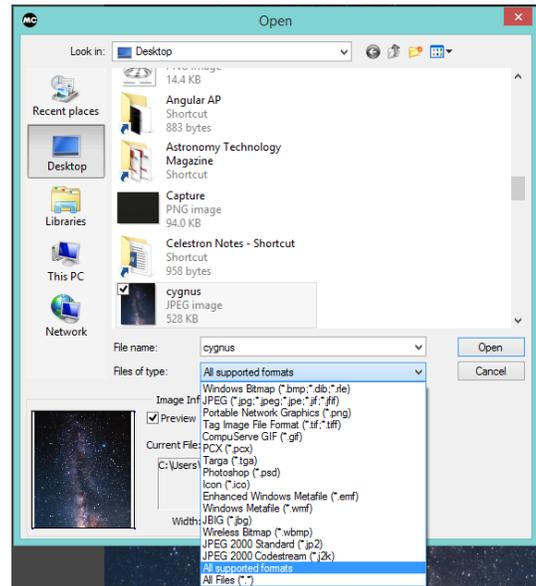
Open Image



The **Open Image** command is used to open an existing image file. This command can also be used to preview an image in small size, or to view its statistics and information without opening the image itself. You can use this command to quickly locate a image on your computer. **MallincamSky** supports and can open a variety of image formats. These are identified in the **Files of type** list box.

MallincamSky can open more than one image simultaneously by:

- **Ctrl + Left Mouse Click** on each required File, then **Left-Click** on **Open**
- **Shift + Left Mouse Click** method to highlight the files to be opened, then **Left-Click** on **Open**



When an image is opened, **MallincamSky** places it into a new image window and that image window then becomes the active image.



Use the **Open Video Command** to open an existing video on your computer. The **Open Video** command is only enabled when no **SkyRaider** Camera is activated when **MallincamSky** is running. Only a single video can be opened at a time.



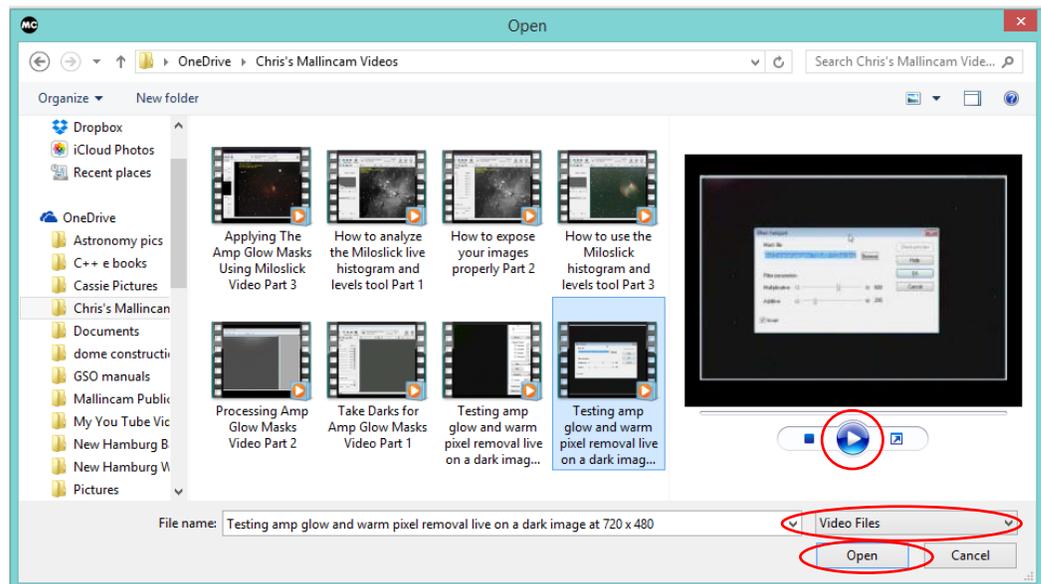
Right-Click on **Video [SkyRaiderDS432 TEC]** Title in **Video Window**, then choose **Close**. This will shut-down the video stream and allow you use the **File>Open Video** command.



Select the name of the file you want to open. If the file does not appear, select the option for showing all files from the **Video Files Drop-Down Button**. The video file type can be **wmv**, **asf**, or **avi** format.

You can preview the Video by **Left-Clicking** on the **Play Button** on the **Preview Window** on the right side of the **Open Window**.

Click on the **Open** Button to open a video file, this will create a **New Video Window** and begin to start playing the video stream. The video window will be associated a name called "Video [XXX.XXX]" (i.e., its title bar will display "Video [XXX.XXX]", here, XXX.XXX is the video file name). **No sound will be heard** when playing the video stream.





The **Save** command allows you to save a snapshot of the **image** (not live Video recording) onto your computer. The command opens a folder box for you to choose a name, location, and format for the image.

If you are looking at a **snapshot** of an image which you have already saved (and thus named), then the **Save** command is disabled. You will need to use the **Save As** Command to resave the image. The default "**Save as type**" will be "Window Bitmap (*.bmp,*.dib,*.rle)".

The **File>Save** command can be used to save the most recent image changes to disk (unless you have already saved and named the image, then you must use **File>Save As**). It is often performed as a precautionary measure during lengthy or involved processes to reduce the amount of reprocessing that might be required in the event of a system failure or operational error.

When an image is being closed (**Right-Click** on Image title) and you have chosen **not to save its changes** from the Popup Window, **MallincamSky** discards all changes made since the last **File>Save** operation.



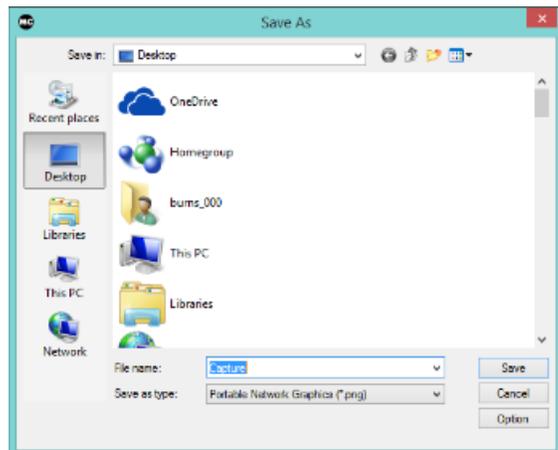
The **File>Save** command saves the contents of the entire window, unless if there was an **ROI** (Region of Interest) defined on it, in which case it will save the **ROI** contents. The **File>Save** command will be disabled if the file is not changed or the changes have been saved.



The **Save As** command allows you to save an image onto your computer with a specified file format. At the end of a **File>Save As** operation, the image window will be associated with the new file and the new format (i.e., its title bar will display the new file name).

MallincamSky supports the following file formats:

- Window Bitmap (*.bmp,*.dib,*.rle)
- JPEG (*.jpg,*.jpeg,*.jpe,*.jif,*.jfif)
- Portable Network Graphics (*.png)
- Tag Image File Format (*.tif,*.tiff)
- PCX(*.pcx)
- Targa (*.tga)
- JPEG 2000 Standard (*.jp2)
- JPEG 2000 Codestream (*.j2k)
- MallincamSky File Type (*.tft)
- FITS (*.fit,*.fits)



The **Save As** command has several important uses beyond simply saving an image to a new file name. **Left-Click** on the **Option** button to select the different parameters to encode the file (based on selected **Save as Type**).



For Bitmap (*.bmp), PCX (*.pcx), Targa (*.tga); There is no Option choices.



JPEG

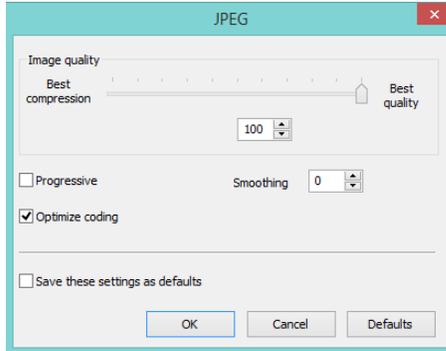
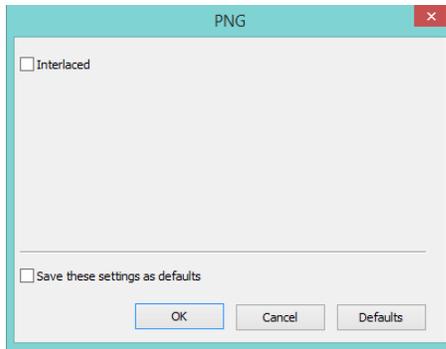


Image quality	If you save an image in JPEG format (*.jpg), you may adjust image quality in the edit box. The values range from 0 to 100. Default value is 75.
Progressive	The default is unchecked.
Optimize Huffman codes	The default is unchecked.
Smoothing	The values range between 0 and 100. The default value is 0.
Save these setting as defaults	When saving a file, the current settings will be saved as defaults for the next file save operation.

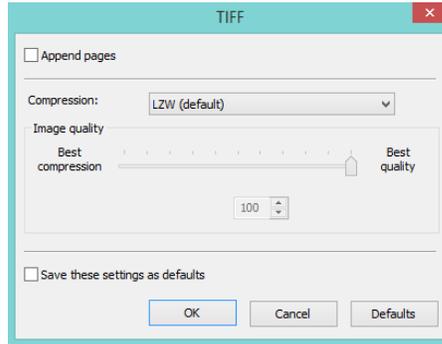


PNG



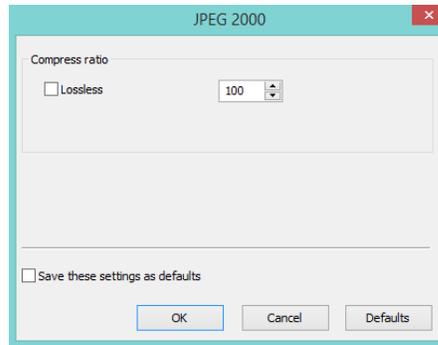
Interlaced	The default is unchecked.
Save these setting as defaults	When saving a file, the current settings will be saved as defaults for the next file save operation.

⇒ TIFF



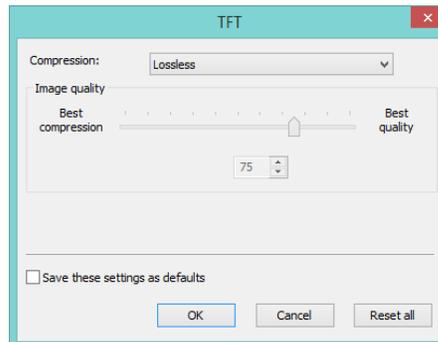
Appended Pages	Determine whether the current image will be saved in multiple pages' style or not.
Compression	Specifies a method for compressing the composite image data. For saving a 32-bit TIFF file, one can specify that the file be saved with predictor compression.
Image Quality	If choosing Compressions as "JPEG", the Image quality can be adjusted by the slider bar. The values range between 0 and 100. The Default value is 75.
Save these setting as defaults	When saving a file, the current settings will be saved as defaults for the next file save operation.

⇒ JPEG 2000



Compress Ratio	If choosing Compressions as "JPEG 2000", the Image quality can be adjusted by the slider bar. The values range between 0 and 100. The Default value is 0.
Save these setting as defaults	When saving a file, the current settings will be saved as defaults for the next file save operation.

⇒ TFT



Compression	Choose Lossless or JPG (Lossy)
Image Quality	If choosing Compressions as "JPEG", the Image quality can be adjusted by the slider bar. The values range between 0 and 100. The Default value is 75.
Save these setting as defaults	When saving a file, the current settings will be saved as defaults for the next file save operation.

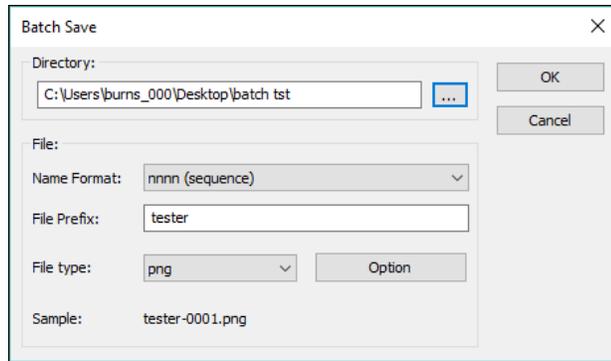


The **File>Batch Save...** command will be enabled when:

- a) An image is opened.
- b) Image(s) are captured from the camera using **Snap**.
- c) An image window is created by choosing the **File>Paste as New File** command.
- d) An image window is created copied from the **Undo/Redo** Sidebar.

To start the **File>Batch Save...** command, you must:

1. Choose the **File>Batch Save ...** command which will bring up a Batch Save dialog:



⇒ **Directory:** Enter the name of the drive and directory where your captured images will be saved. You may either type the path information or use the **Browse** button to locate it from the standard Windows **Browse Folder** dialog.

⇒ **Name Format:** The year, month, date, hour, minute and second or a number **nnnn** (sequence) are used as part of the filename. If more files are saved within a second when using a time format, a (xx) suffix is attached to the end of Name Format to avoid the possible name conflict. For the **nnnn** (sequence) "Name Format", no suffix is needed.

⇒ **File Prefix:** Enter a file name prefix for **Batch Save** when generating files names for a series of images. This prefix will be combined with **Name Format** to form a final file name naming paradigm.

⇒ **File Type:** In this combo box, select the format in which you want the image to be saved (can be BMP, JPG, PNG, TIF). **Click the Option Button** to set the different parameters for encoding the file (For BMP format, the Option will be disabled. See **File>Save As ...** command about the details of the format encoding methods).

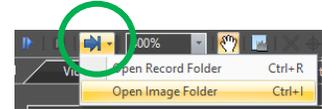
⇒ **Sample:** The final file name is shown at the right of the Sample label for quick reference to see if you like it.

2. Once the settings are made, **Left-Click** the **OK** button to begin the file batch save process or **Cancel** to cancel the **File>Batch Save ●●●** command and return to the application.

 When the **File>Batch Save●●●** command has finished, the **Title** on the **Image Tab** or **Image Window** will be modified with the file name formed in the **Batch Save dialog**.

The **File>Batch Save●●●** will perform no saving operation if the file is not modified.

To view the folder where Batch Saved images are stored, use the **open folder** icon and chose the **open image folder** option.



The **File>Paste as New File** command will be enabled when there is valid image data on the Windows clipboard. (see the **Edit>Copy** command). If there is no image data on the clipboard, the **File>Paste as New File** command will be disabled.

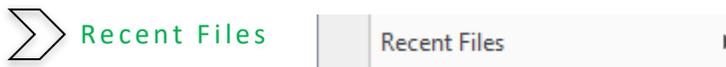
Choose the **File>Paste as New File** command to place the contents of the clipboard image into a new image window, which becomes the active image.

The new image type will be the same as that of the original image.

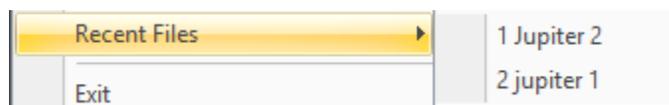
This is useful for bringing in a previously saved image (that you have selected via the operating systems **copy command**) into the **MallincamSky Image Window**. You can modify the image properties via the **Image Menu** choice (see **Image** section in user Manual).

MallincamSky will accept image data from other applications via the clipboard as long as it is in Windows Bitmap (DIB) format.

 **MallincamSky** will automatically assign a digit to the **Paste as New File** command in the created image window **Title Bar**.



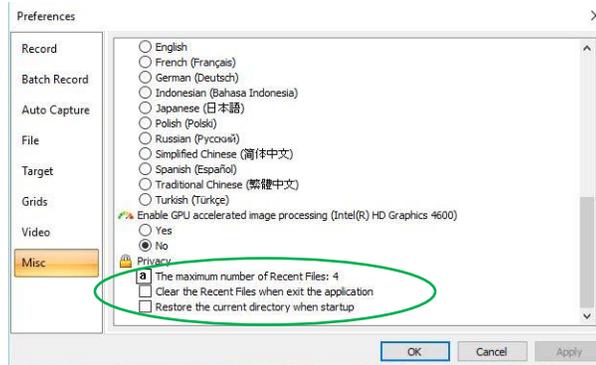
MallincamSky maintains 4 (default) of the most recently opened document files under the **Recent Files** command. Choosing one of these submenus will reopen that file immediately.



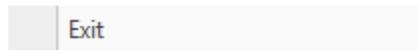


The maximum number of **Recent Files** can be modified by choosing the **Options>Preferences** command and clicking the **Misc** selection. Here, clicking the **4** (default) edit box will allow you to enter the number of the Recent Files Submenu that you want. The value ranges from **0** to **8**, the default is **4**.

One can also check the **Clear the Recent Files when exit the application** to clear the Recent Files after exiting the **MallincamSky** application.



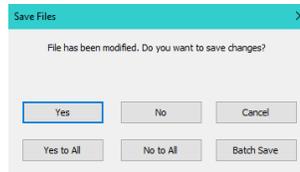
Exit



Choosing the **File>Exit** command will close the video window along with all of the image and browse windows. After all the windows are closed, **MallincamSky** will end itself.



If an image has been modified before attempting to **Exit**, **MallincamSky** will issue a warning to ask if user wants to save the images or not.

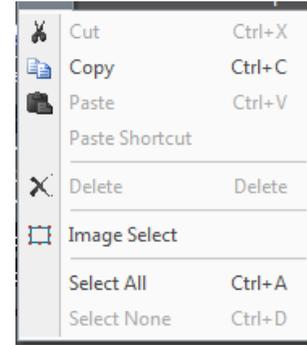


You then have an option of saving an image, or saving all images, or discarding an image or all images.

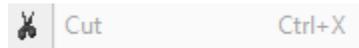


Edit

This **Drop-Down Menu** will allow you to **Cut**, **Copy** and **Paste Layers** over your images. From the **Edit Menu** you can also select a **Region of Interest (ROI)** from your **image** and copy it to the **Windows Clipboard**, or even **de-select** the **ROI** if you have changed your mind.



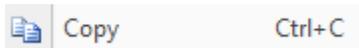
Cut



This command is or future implementation (I cannot find a use for this command).



Copy

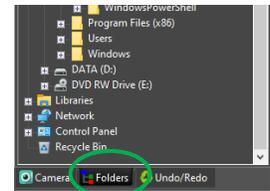


This **Edit>Copy** command can be used to copy a selected part of your image (see **Select Image** command) to the **Windows Clipboard**. Then you can use another software's **Paste Command** to place this selected image inside that software, or **File>Paste as New File** to paste into a new MallincamSky Window.

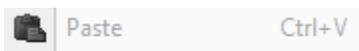


Using the **Select Image** command, you can select a region of your currently live image (using the **Left-click Hold and Drag technique**) then choose **Edit>Copy** (or **Ctrl+C**). Now you can **Paste** that selected image into another document (such as **Microsoft Word**, or **Microsoft Paint**) for later use.

The next 3 commands are used with files and folders **only** when you have the **Folders Tab** selected from the **Left Windows Tab**.



Paste



This control allows you to place a **Copied File** (you have previously selected the **File** and then used **Edit>Copy**) into your currently selected folder. Remember to use **File>Paste as New File** to paste image into a new MallincamSky Window.



Paste Shortcut



This control allows you to place a **copied File Shortcut** (you have previously selected the **File** and then have used **Edit>Copy**) into your currently selected folder.



This control allows you to **delete** a selected file from your currently selected folder.



You can select a **Region of Interest** on your **Image Tab** (live or static) by using the **Left-Click Hold and Drag** technique. Once selected then you can **Copy (Ctrl+C)** the selected region and then **Paste** it into another software program.



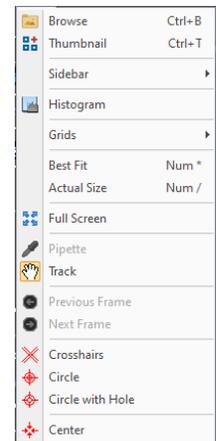
You use this command to select the **Whole Video Image Window** (live or static). Once selected, then you can **Copy (Ctrl+C)** the selected region and then **Paste** it into another software program or **File>Paste as New File** to paste image into a new MallincamSky Window.

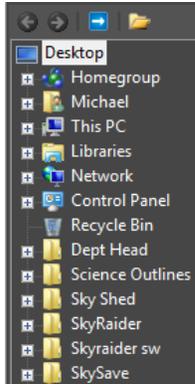
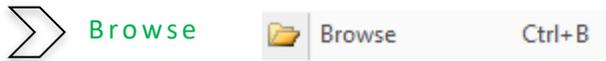


This command can be used to **De-Select** the image that was selected using either the **Image Select** or the **Select All** commands.

View

This **Drop-Down Menu** will allow you to **Browse** folders, **Display** or **Remove Tabs** from the **Sidebar**, **Activate Grids** or **Reticles** on the **Video Window**, Change the **Video Window Size** to match your computer real-estate, and Allow you to **move** the image around in your **Video Window**.





The **View>Browse** command from the **View Menu** (or the **Browse Icon** on the **Icon Tool Bar**) is used to browse images under the specified directory in the **Folders Sidebar**.

The **Browse Window** resembles the **Windows Explorer**. **Left-Clicking** on the **+** will expand a folder so that you can examine its contents in the MallincamSky Video Window under the Tab name **Browse**.

You can **Right-Click** on a **Folder** (or file) and the actual Windows controls will pop as in **Windows Explorer**.



As you get deeper into the **Browse Window**, you can **Back-Out** or **Move Deeper** via the **Green Left** or **Right Arrow** in the **Browse Window**.

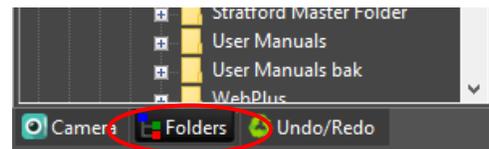


The **Blue Right Arrow** will take you to your computer's **Root Directory**.

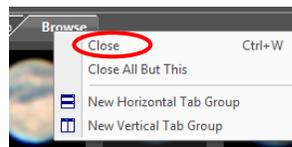
Left-Double Clicking on a **Folder** will open a **Window Tab** in the **Video Window** (this **Window** will be labeled **Browse**). This **Tab** will display all the graphic files inside that Folder. If you **Left-Double Click** on a **Graphics File** inside the **Video Window**, it would open up that **Graphics File** in a new **Tab** in the **Video Window**.



To close the **Folders Tab** on the sidebar and get access to the camera controls, simply **Left-Click** on the **Camera Tab** heading on the bottom of the sidebar.



You can close the **Browse Tab** in the **Video Window** by **Right-Clicking** on the **Tab's Title (Browse)**, then choosing **Close**.

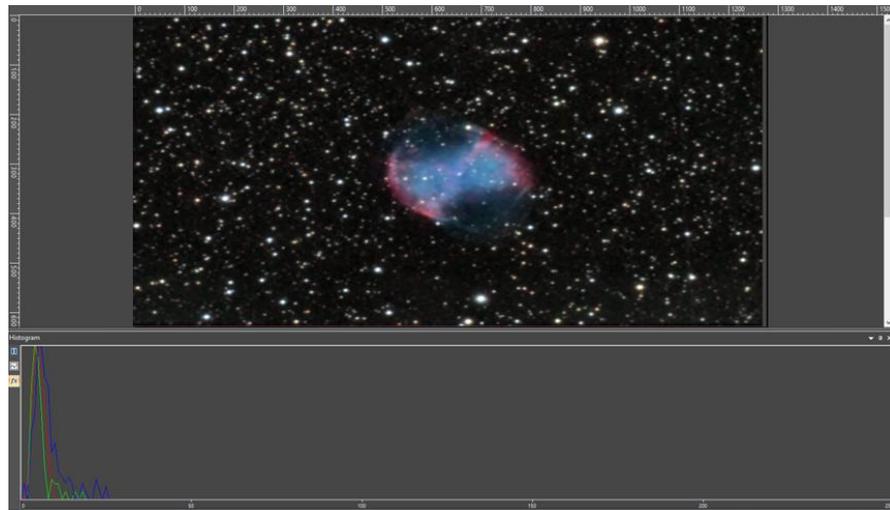


The **Folder** you chose to browse to will become the default folder when you **Save** a snapshot.

Histogram Histogram

Selecting the **Histogram Control** splits the image screen with your live image on the top half and a live Histogram on the bottom half. You have an option to view the Histogram data as linear or logarithmic. **Clicking** on the **Histogram Control** again, closed the Histogram window.

We will discuss how to use the **Histogram** later in the User Manual, but for those of you familiar with **Histograms**, this graph represents the current **red**, **green**, and **blue** values of the current image being displayed. This Histogram in an informative window you cannot adjust any of the **Histogram** settings from this display.



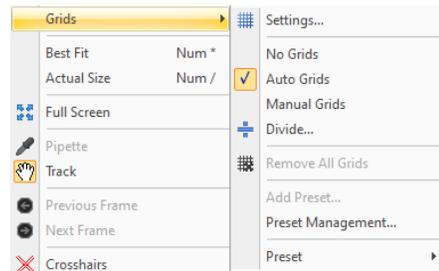
The icons on the upper right of the **Histogram Window**, will float, lock, and close the **Histogram Window**. Experiment with the icons.



Grids Grids

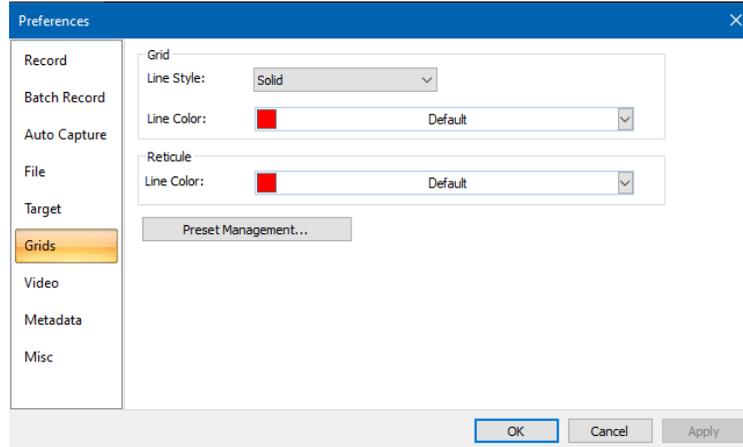
The **View>Grids** control has the ability to display a grid overlay on top of your **Video Window**. You can use the **Auto Grid** style of create your own grid format.

Left-Click on the choice you require (No Grids, Auto Grids, or Manual Grids) to activate.





This command will pop-up the **Preferences Window**.



With the Grid Button selected, you can adjust the **Style** (No Grid, Auto Grid, and Manual Grid), **Line Style** (Solid, Dash, Dot, or Dash-Dot) and **Color** that you are interested in, and the color of the reticule. You can save these selections as preferences and recall them at a later date.

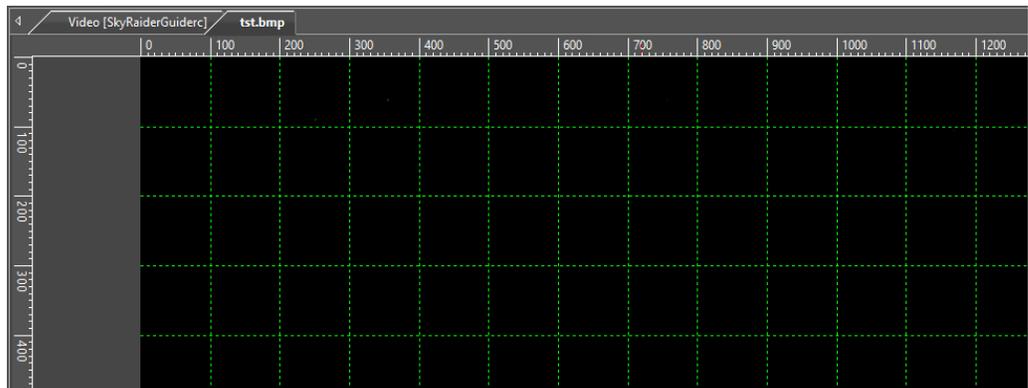
⇒ **No Grids**

The **No Grids** control can be used to **remove** the grid overlay from the **video/Image**.

If you re-select **Manual Grids**, your previous designed **Grid Lines** will re-appear.

⇒ **Auto Grids**

Clicking on this control will display the grids with color and style you had set up in **the Settings Control**.



➔ **Manual Grids**

Choosing this control will display two small **Right Arrow** and **Down Arrows** overlaid on the top of the **Vertical Ruler** and on the left of the **Horizontal Ruler** as shown below:



Use the **Left-Click Hold and Drag** technique to move the **Down Arrow** along the **Horizontal Ruler** to wherever you want. When it is dragging over the video/image, there will be a **Vertical Line** (in the **Color** and **Style** chosen by you) aiding you in judging where to release this line on the video/image. You can drag as many lines as you require to overlay them on the video/image.

Similarly, you can drag down as many **Vertical Lines** as you like to create **Vertical Grids**.



You can at any time, grab and move the **Arrows** to adjust the locations of the **Horizontal** and **Vertical Grid Lines**.



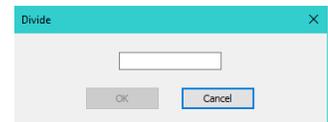
If you re-select **Manual Grids**, your previous designed **Grid Lines** will re-appear.



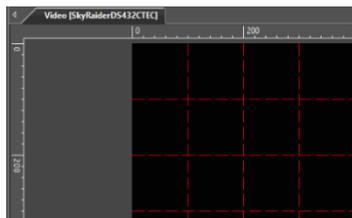
Divide

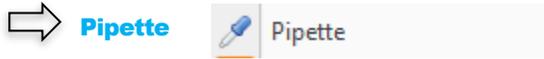


This command will draw grids on the image window with each grid being a specific distance away from the next. A popup window will appear asking you for the number each grid will be from the next.



For example, if you require each grid to be 100 points from the next grid you would enter 100 into the **Divide** box and **Left-Click** on the **OK** button.





This command has future applications only in the image aspect of MallincamSky's Window displays.



If the **video/image's** actual size is larger than the **video/image Window**, then this control will allow you to position the parts of the **video/image** within in the **video/image Window**. This control is activated automatically when necessary.

Its function is like the scroll bars. It is an alternative to using the arrows on the scroll bars for positioning the **video/image** within the window. Position the mouse (make sure to choose a location outside a **Region of Interest** rectangle. You may need to close the **ROI** rectangle if necessary) on the actual **video/image**.

Left-Click and Hold (the **Open Hand** will change to a **Closed Hand**). Now drag the image around inside the video/image Window

If the **video/image** size is smaller than the **video/image Window** size, then the track operation will be disabled.



These controls are for when you have loaded in a video and need to view the **Next** or **Previous** frame in this video. Note: SkyRaider Image window needs to be closed for this to work.

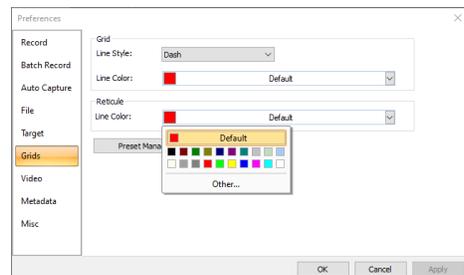


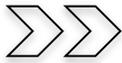
MallincamSky provides three Reticles (or crosshairs) styles to aid in aligning your telescope to a star (or another stellar object).

You can change the **color** of the Reticle via the **Option>Preferences** control in the **Top Menu Line** or the **View>Grids>Settings** command.



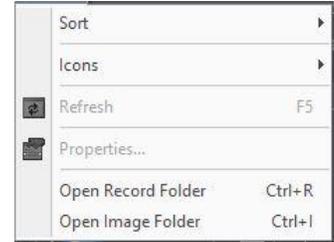
Left-Click on Reticle icon to Activate and **Left-Click** again on Reticle icon to **De-Activate**.



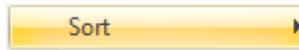


Browse

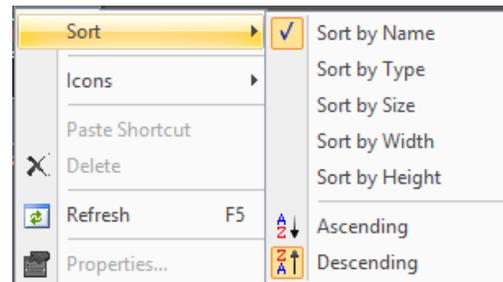
This Command Tab is used to determine how **MallincamSky** should display the graphic files when you are **viewing the Folders**. This control will allow you to change the size of the image icons, determine how to sort the files, add shortcuts to the folders, delete files, refresh the folders, and even determine the properties of the image file all without having to perform these tasks thru **the Windows Environment**.



Sort



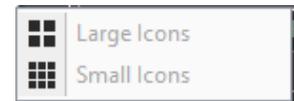
This control allows you the option of rearranging the image files via a variety of choices (**Name, Type, size, Width, and Height**. All in either **Ascending** or **Descending** order.). Just **Left-Click** on the choice that best suits your needs and **MallincamSky** will automatically rearrange the files.



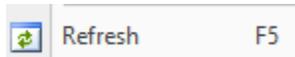
Icons



This control allows you to display the **Graphic Files** as either **Large** or **Small** Icons. Simply **Left-Click** to make your Selection.



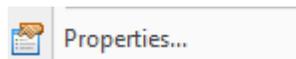
Refresh



This control allows you to **refresh** the contents of the currently selected folder. It is useful if you are using another program to move files around while also running **MallincamSky**.



Properties



This control will display the current File **properties** for the **Graphics File** that you have selected (This is identical to **Right Clicking** on a File while using **Windows Explorer**).



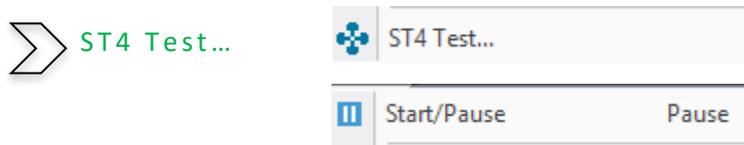
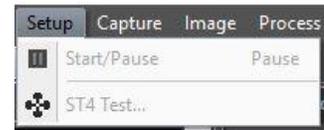
This control will display the current **Video Record Folder** (the default Video Record Folder is selected thru the **Options->Preference** Command).



This control will display the current **Image Folder** (the default Image Folder is chosen by using the **Options->Preference** Command).

Setup

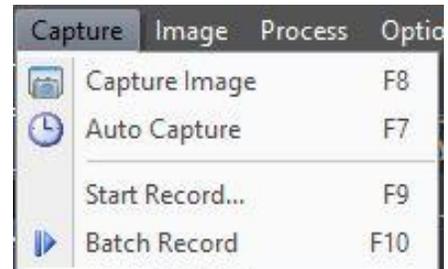
This **Top Menu Line Command** is used to provide you information about the SkyRaider **DS432 TEC Camera** activated thru **MallincamSky**, as well as test the ST4 port on the camera. You can also pause the Video image on the Video Window from here.



The **SkyRaider DS432 TEC series** of cameras do not have a **ST4** port, so it cannot be used to **Auto Guide**, using ST4, your telescope mount using these commands. But, since it has a the **DS432 TEC** has an **ASCOM** driver, PHD2 can use this camera as a guide camera using **pulse** guiding.

Capture

This **Top Menu Line** command allows you a more in-depth capture routine of either a **still image** or a **video stream**.





During the **video preview**, you can always choose the **Capture>Image Capture** command to capture a still picture of the video image. After the image is captured, the captured image (**still image**) will be placed the current active window with an automated title (0001*).

 The **Snap Button** on the **Camera SideBar** can continuously shoot the image more easily. **Left-Click** this **Snap** button on the **Camera Sidebar** to a capture an image.

 You can also just hit the **F8 key** on your keyboard to take a snapshot.



This function can capture a sequence of pictures when using either **Video Mode** or **Trigger Mode**.

 First you must set up the **Location**, **File Format**, Prefix, and the **Number of Exposures** required in the **Options>Preferences Tab** (see **OPTIONS->Preferences->Auto Capture Tab** for more details on how to setup for **Auto Capture**).

To start the capturing process, just **Click** on this Tab or press the **F7** Function key or  click on the **Auto Capture** Icon.

Note: **Auto Capture** name will change to **Stop Capture**, so **Click** on it to stop the process.

You will see a counter on the bottom left of the screen indicating the capture process i.e. **05/20** (this says taking the 5th image of the required 20).



 First you must set up the location, **File Format**, **Prefix**, and **Duration** required for the video in the **Options>Preferences Tab** (see **OPTIONS->Preferences->Record Tab** for more details on how to setup for **Recording** Videos).

 To start the capturing process, just **Click** on this **Tab** or press the **F9** Function key. **Note:** The **Start Record** name will change to **Stop Capture**, so **Click** on it to stop the process.

A dialog box will open at the bottom left of the MallincamSky Window providing you real time information about the recording process.

Record: Time=00:03; Frame=11; File=12.2M; Free=17.0G

Follow instructions in **User Manual** on using the **Record Button on Left Side Panel**, to record video in **Trigger Mode** as this command is identical.

The only way to view saved Videos, using **MallincamSky** is to **Right-Click on Video Tab to Close** the Video Window, then you will be able open a video using the **File>Open Video** command.

When capturing a Video, you will notice that in the **Capture & Resolution Tab** in the left window sidebar that the **Blue Arrow Record** icon has now changed to a **Red Stop** icon. **Left-Clicking** on this Button will stop the video capture process.

Use **Windows Explorer** to View your saved videos by using any Video viewing software of your choice.



This command will allow you to save a sequence of video onto your computer.

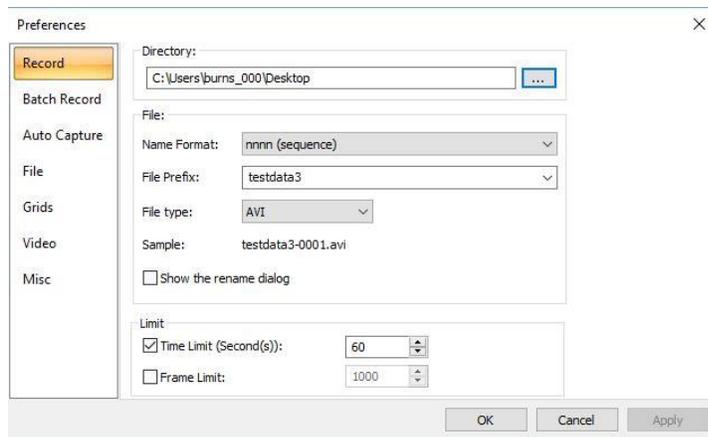


You will need to have already chosen the location and format using the **Option->Preferences->Record Tab**, and the number and duration of the videos in the **Option->Preferences->Batch Record Tab**.

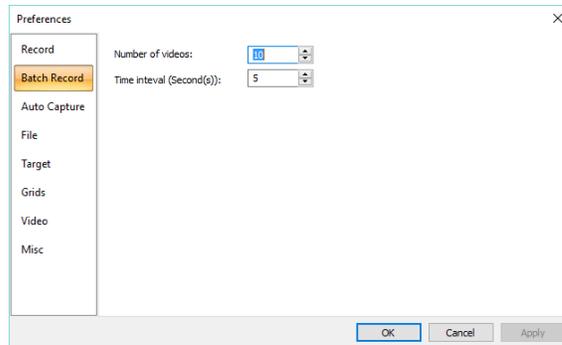
See **Options->Preferences...** Tab for more detailed information on setting up the parameters for Batch Record, but below is a quick walk-through.



In the **Record Tab** in **Options->Preferences...**, choose the **location** and file type and **duration** for recorded Video Files



⇒ In the **Batch Record Tab** in **Options->Preferences...**, chose the number of Videos to be recorded, plus the **Time Interval** **between** each Video (as you have set the duration of each video in the Record Tab).



⇒ Once these have been set, all you need to do is **Click** on the **Batch Record Tab (F10)** in the **Capture Tab**.

MallincamSky will automatically start the recording process and the **Record Button** on the **Left-Sidebar** turns to a **Red STOP** symbol.

⇒ By **Clicking** on the **Batch Record Tab** again, MallincamSky will then abort the whole capturing process.

☞ By **Clicking** on the **Red STOP** symbol in the **Left Sidebar**, MallincamSky will only abort the current Video sequence, but will continue with the next sequence.

MallincamSky will also provide you in a status on how the recording are going by displaying a Status Information line on the bottom of its window.

It will provide you the real time status of the Recording process

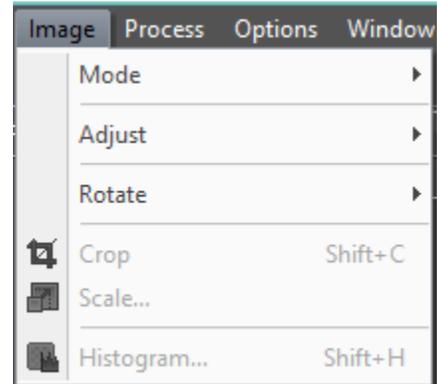
Batch Record: 1/10; Time=06/10; Frame= 128; File=281.3M; Free=767.9G

And the real time status of the Pause between each Recording.

Batch Record: 4/10; Time=02/05; Free= 766.6G

Image

The **Image Menu** will allow you to adjust the properties of any captured still image in an active Image Tab in MallincamSky video/image window. This is quite a powerful set of commands and can tweak your snapshots for amazing results. Not quite at the level of dedicated image adjusting software but may be more than sufficient for your needs.

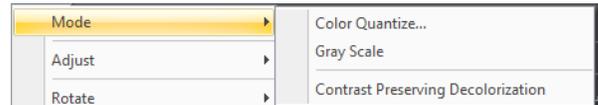


You can use the **SideBar's Undo/Redo Tab** to revert any correction you made back to a previous state.

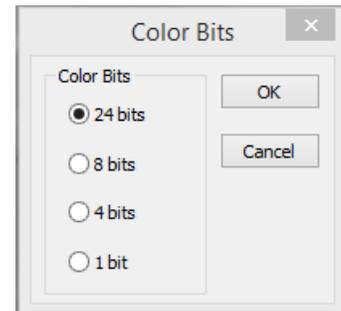


Mode

The Mode Control will give you the ability **Color Quantize**, **Gray Scale**, and **Decolorize** the selected **still image**.



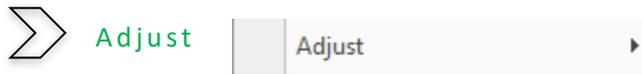
➔ The **Color Quantize** command is widely used to change the image bit. **MallincamSky** supports the mutual changes among 24-bit, 8-bit, 4-bit or 1-bit images. When the **Colour Bits** dialog is opened, the default checked color bit is the current image's color bit. Check the desired bit and click **OK** to end the command. The image will be converted to the selected color bits in the image window.



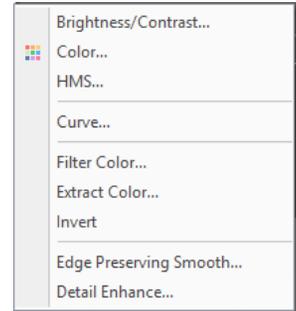
☞ The next two controls require that you have Color Quantized your image.

➔ The **Gray Scale** command to convert a color image (true color image or index color image) to a gray scale image. If the original image is 24-bit, the new image is 8-bit. Otherwise the bit of the image will not be modified.

➔ The **Contrast Preserving Decolorization** command to convert a color image (true color image or index color image) to a gray scale image with a unique algorithm to preserved as much of the color contrast for each channel into Monochrome image. If the original image is 24-bit, the new image is 8-bit. Otherwise, the bit of the image will not be modified.

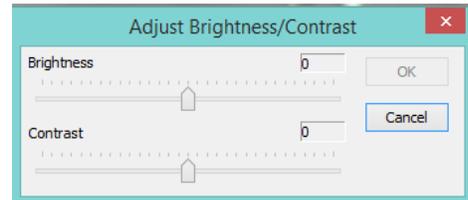


The Adjust menu will allow you to adjust the **Brightness** and **Contrast** of the image. You will be able to modify the RGB Color balance, as well as the **High Lights**, **MidTones** and **Shadows** values. Color Curves and Filtering algorithms are also in the menu control. You will have the ability to Invert the image as well as perform some Detail Enhancement procedures on the image.



⇒ Adjust Brightness/Contrast

The **Image>Adjust>Brightness/Contrast...** command offers simple adjustments to the tonal range of an image. This command makes the same adjustment to every pixel in the image. The **Brightness/Contrast** command does not work with individual channels and is not recommended for high-end output because it can result in the loss of details about the image.



Brightness: Dragging the slider bar to the left decreases the level and dragging it to the right increases the level. The numbers on the right of the slider bar displays the Brightness value. Values can range from **-150** to **+150**. The **Default** value is **0**.

Contrast: Dragging the slider bar to the left decreases the level and dragging it to the right increases the level. The numbers on the right of the slider bar displays the Contrast value. Values can range from **-150** to **+150**. The **Default** value is **0**.

Make your adjustments to the **Brightness** and **Contrast** values and **Left-Click** on **OK** to accept.

⇒ Color

Choose the **Image>Adjust>Color...** command to modify the overall mixture of the colors in an image.

There are **four** color modules that are supported by **MallincamSky**:

RBG, CMYK, HIS, HLS





RGB

MallincamSky uses the **RGB** model. It assigns an intensity value to each pixel ranging from 0 (black) to 255 (white) for each of the **RGB** components in a color image.

For example, a bright red color might have an **R** value of 246, a **G** value of 20, and a **B** value of 50. When the values of all three components are equal, the result is a shade of neutral gray. When the value of all components is 255, the result is pure white; when the value is 0, pure black.

RGB images use three channels to reproduce up to 16.7 million colors on-screen. In addition to be the default mode for new Mallincam images, the **RGB** mode is used by computer monitors to display colors. This means that when working in color modes other than **RGB**, such as **CMYK**, **MallincamSky** uses **RGB** mode for display on-screen.

Although **RGB** is a standard color mode, the exact range of colors represented can vary, depending on the application or display device.



CMYK

The **CMYK** mode is based on the light-absorbing quality of ink printed on papers. As white light strikes translucent inks, certain visible wavelengths are absorbed while others are reflected back to the eyes.

In theory, pure cyan (**C**), magenta (**M**), and yellow (**Y**) pigments should combine to absorb all light and produce black. For this reason, these colors are called subtractive colors. Because all printing inks contain some impurities, these three inks produce a muddy brown and must be combined with black (**K**) ink to produce a true black. (**K** is used instead of **B** to avoid confusion with blue.) Combining these inks to reproduce color is called four-color process printing.

The subtractive (**CMY**) and additive (**RGB**) colors are complementary colors. Each pair of subtractive colors creates an additive color, and vice versa.



HIS

Based on the human perception of color, the **HIS** model describes three fundamental characteristics of colors:

Hue is the color reflected from or transmitted through an object. It is measured as a location on the standard color wheel, expressed as a degree between 0° and 360°. In common use, Hue is identified by the name of the color such as red, orange, or green.

Intensity is the relative lightness or darkness of the color, usually measured as a percentage from 0% (black) to 100% (white).

Saturation, sometimes called Chroma, is the strength or purity of the color. Saturation represents the amount of gray in proportion to the hue, measured as a percentage from 0% (gray) to 100% (fully saturated). On the standard color wheel, Saturation increases from the center to the edge.

✦ HSI

The **HLS** model is remarkably similar to the **HSI** color model. The main difference between them is the calculation used to produce the brightness value. In the HLS model, a pixel's brightness (**L**) is derived from its three (R, G and B) color values. That is, a pixel's brightness (**L**) is determined by the minimum and maximum values of its three-color values.



The values beside the slider bar show the color changes in various color channels.

- The **RGB** channel values can range from -100 to +100. The Default values are 0.
- The **CMYK** channel values, they can range from -100 to +100. The Default values are 0.
- In the **HSI** channel, the **H** value can range from -180 to 180, the **S** value can range from -275 to 275, and the **I** value can range from -442 to 442. The Default value are 0.
- In the **HLS** channel values, the **H** value can range from -180 to 180, the **L** value can range from -100 to 100, and the **S** value can range from -100 to 100. The Default values are 0.

➔ HMS

Select the Image>Adjust>HMS••• command to adjust the **HL** (Highlight), **M** (Midtone), and **S** (Shadow) parts of the image.

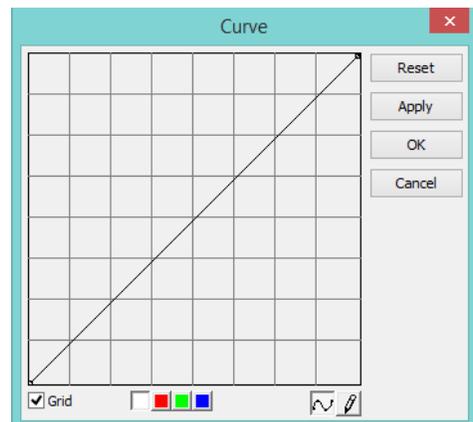
Each part's value ranges from -100 to 100. This command is only available for 24-bit true color image.



➔ Curve

Sometimes you may desire more precise control, or more unusual, nonlinear effects. The Curves tool in MallincamSky provides more arbitrary remapping of the color channels; it is the color-correction tool of choice among many print and photographic professionals.

Using Curves, the input-output mapping of color channels can be defined by an arbitrary cubic spline or can be drawn freehand. This flexibility provides extreme generality.

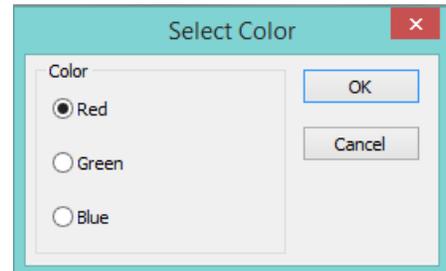


It is worth the effort to review how color curves work in such graphics programs such as Photoshop (tons of information about curves on the internet).

⇒ Filter Color

Select the **Image>Adjust>Filter Color** command to filter out a special color channel from a color image. Check either **Red**, **Green**, or **Blue** color to filter.

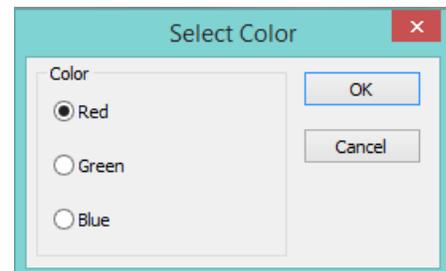
For Example, if **Red** color is checked, then only information about the **Red** channel will be discarded. The **Green** and **Blue** information will remain there.



⇒ Extract Color

Select the **Image>Adjust>Filter Color** command to retain a special color channel from a color image. Check either **Red**, **Green**, or **Blue** color to filter.

For Example, if **Red** color is checked, then only information about the **Red** channel will be retained. The **Green** and **Blue** information will be discarded.

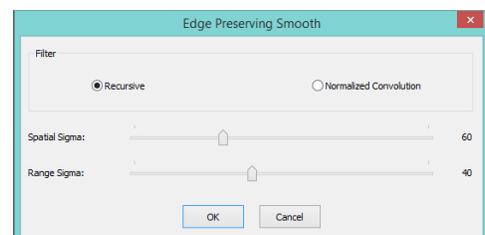


⇒ Invert

Select the **Image>Adjust>Invert** command to reverse the pixel values of the active image.

⇒ Edge Preserving Smooth

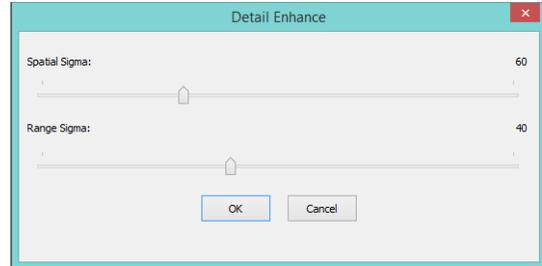
This control looks for the most homogeneous neighborhood area around each point in a picture, and then gives each point the average gray level of the selected neighborhood area. It removes noise in a flat region without blurring sharp edges, nor destroying the details of the boundary of a region. This smoothing also can sharpen blurred edges.



Choose either a **Recursive** or the **Normalized Convolution**. By adjusting the **Spatial Sigma** (like the domain) and the **Range Sigma**, you can affect how many pixels the algorithm uses when applying the smoothing.

⇒ **Detail Enhance**

This filter works by identifying sharp edge boundaries in the image, such as the edge between a subject and a background of a contrasting color and increasing the image contrast in the area immediately around the edge. This has the effect of creating subtle bright and dark highlights on either side of any edges in the image, called **overshoot** and **undershoot**, leading the edge to look more defined when viewed from a typical viewing distance.



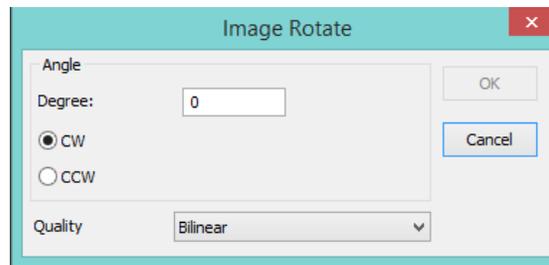
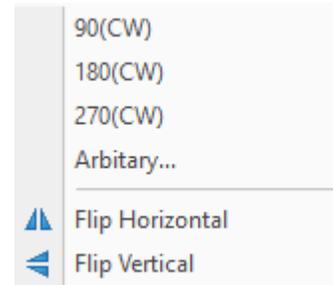
Choose either a **Recursive** or the **Normalized Convolution**. By adjusting the **Spatial Sigma** (like the domain) and the **Range Sigma**, you can affect how many pixels the algorithm uses when applying the smoothing.

⇒ **Rotate** Rotate

This control allows you to rotate and or flip your image across an axis.

Your options include:

- Rotate the image 90 degrees Clockwise (CW)
- Rotate the image 180 degrees Clockwise (CW)
- Rotate the image 270 degrees Clockwise (CW)
- Rotate the image an Arbitrary amount



To **Rotate** the image a specified amount (in **degrees**) in a chosen direction (**clockwise** or **counterclockwise**), **Left-Click** on the **Arbitrary** control. When this option is selected, the **Image Rotate Window** will popup, where you can enter in the required values. You also have two redrawing algorithm choice for it to use when rotating the image (**Bilinear** or **Bicubic**). **Bicubic** seems to be better for images, but it is your choice that counts.



This control also allows you to flip your image **Horizontally** or **Vertically**.

Flip Horizontal reverses the image in the application area so that the top right corner of the original image is now the top left, and the top left corner of the original image is now the top right corner.

Flip Vertical reverses the image in the application area so that the top right corner of the original image is now the bottom right corner, and the top left corner of the original image is now the bottom left corner.



Choose the **Image>Crop** command to remove the portions of an image that does not want so that the focus is on the part of the image that is left.

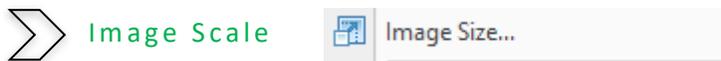
First select **Edit>Image Select** (the mouse cursor will change into cross hairs) from the **Top Menu Line**. Next use the **Left-Click Hold and Drag** technique to draw a rectangle around the portion of the image you would like to keep. Finally select **Image>Crop** and your **image window** will now only contain the portion of the original image that was inside the **Image Select's Rectangle**.



When you create an **Image Select Rectangle**, you can **Left-Click Hold and Drag** the rectangle around your full image to move it to a different location.



You can also resize the **Image Select Rectangle** by grabbing one of the little boxes around the rectangle and dragging the mouse to increase, decrease, or change dimensions of the rectangle.



Select the **Image>Scale** command to change the image to a specified size. This process changes spatial resolution by adding (replicating) or removing (decimating) pixels to achieve the specified dimensions.



Width and Height:

When choosing the **Image Scale** command; the dialog box displays the dimensions of the original image in pixels. The **Width** and the **Height** can be set on the new image by adding or removing pixels. If **Constrain Proportions** is checked, the **Width** and **Height** will stay proportionate to each other. If the **Constrain Proportions** is unchecked, the **Width** and the **Height** can be set independently, but this will distort the image.

Reset:

Resets the image’s **Width** and **Height** to the original settings.

Constrain Proportions:

To maintain the current proportions of pixel **Width** and **Height**, **check** **Constrain Proportions**. This option automatically updates the **Width** as the **Height** is modified, and vice versa. Otherwise, **uncheck** the **Constrain Proportions** button.

Scale method:

There are 2 options for the algorithm that the **Scale method** uses to resize the image. They are: **Bilinear**, and **Bicubic**. The default scaling method is **Bilinear**.

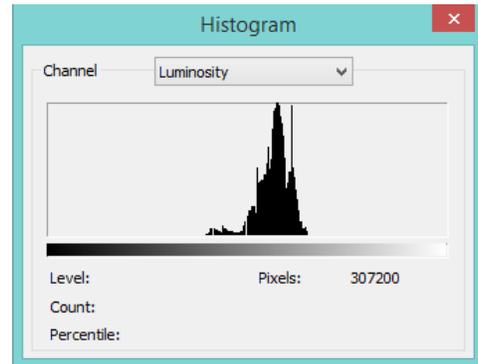
Once you have selected your parameters, **Left-Click** on **OK** to make the new **Image Scale** final.



Histogram



A **Histogram** illustrates how pixels in an image are distributed by graphing the number of pixels at each color intensity level. The **Histogram** shows detail in the shadows (shown in the left part of the histogram), mid-tones (shown in the middle), and highlights (shown in the right part).



A **Histogram** can help you determine whether an image has enough detail to make a good correction.

A histogram is a mathematical graph that shows you the current **tonal range** of an **image**. This way you can evaluate it and, if necessary, correct it.



Tonal range refers to the range of brightness levels in the image. A histogram shows us how much of the image is currently pure black, how much is currently pure white, and how much of it falls somewhere in between.

It is especially important to note that even though we are talking about brightness levels, we’re **not** just talking about black and white (grayscale) images, but Histograms work equally well, and are just as important, with full color images.

This is because, even though we do not always think of color as being anything but color; yet every color in your image has its own brightness level.

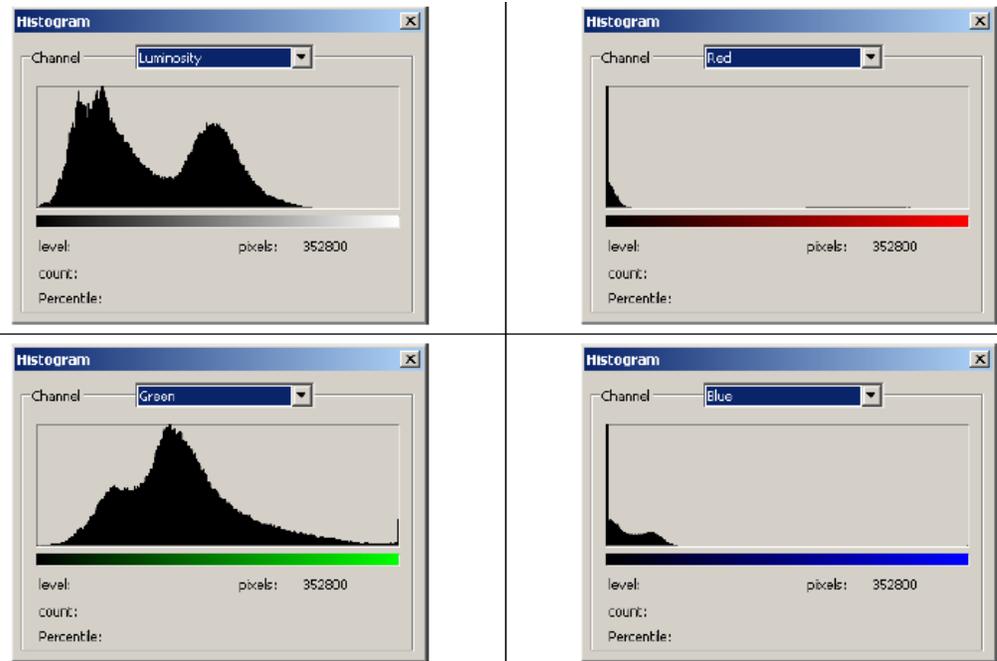
Orange, for example, are typically exceptionally light, while blues and reds are much darker. These differences in brightness values mean that color can have a huge impact on the tonal range of your image.

Do a Google Search on **How to Read and Understand Image Histograms in Photoshop** to find out more information on how to use Histograms to improve your images.

Choose the **Image>Histogram** command to open the **Histogram Window**. Depending on the image's color mode, choose **R, G and B**, or **Luminosity** to view a composite Histogram of all the channels.

If the image is **RGB true color**, choose **Luminosity** to display a Histogram representing the luminance or intensity values of the composite channel.

If the image is **RGB true color**, choose **R, G and B** to display a composite Histogram of the individual color channels in color.



Do one of the following:

- To view information about a specific pixel value, **place the mouse pointer in the Histogram.**
- To view information about a range of values, click down **the Left-Click hold and Drag** the mouse into the Histogram to **highlight the range.**

The Histogram Window displays the following statistical information below the Histogram:

Pixels: Represents the total number of pixels used to calculate the Histogram.

Level: Displays the intensity level of the area underneath the pointer.

Count: Shows the total number of pixels corresponding to the intensity level underneath the pointer.

Percentile: Displays the cumulative number of pixels at or below the level underneath the pointer. This value is expressed as a percentage of all of the pixels in the image, from 0% at the far left to 100% at the far right.



The Histogram from **Image>Histogram** (still images) provides different information about the video/image window than the **SideBar's Histogram** (live video capture). This Control does not allow you to adjust the Histogram, but rather provides detailed information about the image.

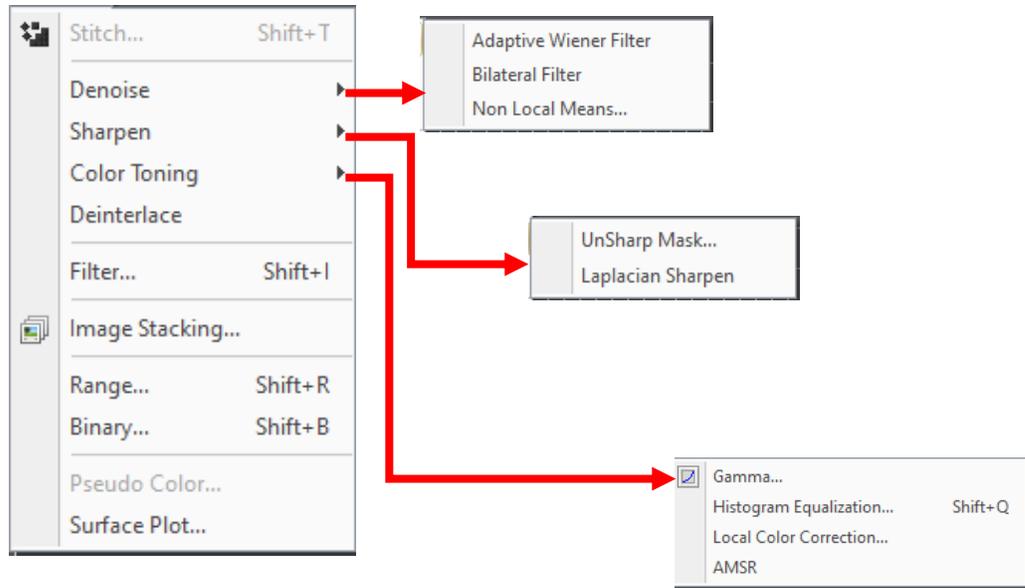
Process

MallincamSky provides some very advance image processing tools. You can apply these tools to your image to tweak the final output. It would take a novel to explain each of these standard graphical enhancement tools. So, I will leave it up to you to Google Search the enhancement type to see if it is something you could use.



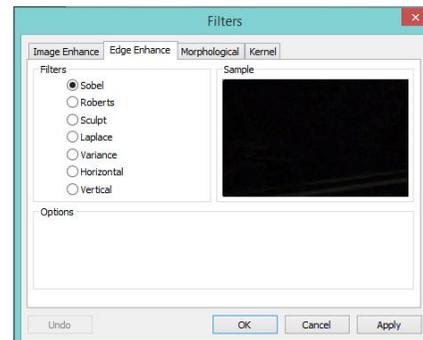
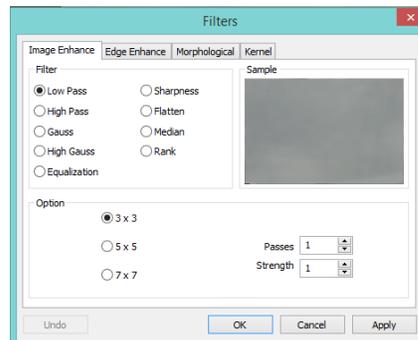
You must **Color Quantize** your images before complete access to the Process controls. (**Image>Mode>Color Quantize**)

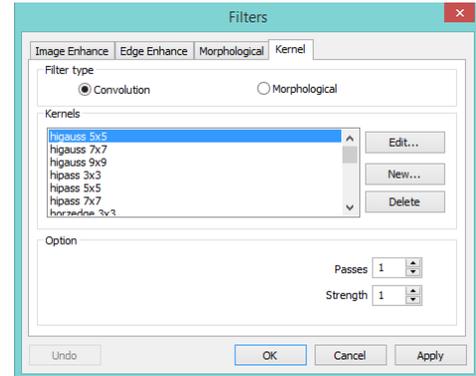
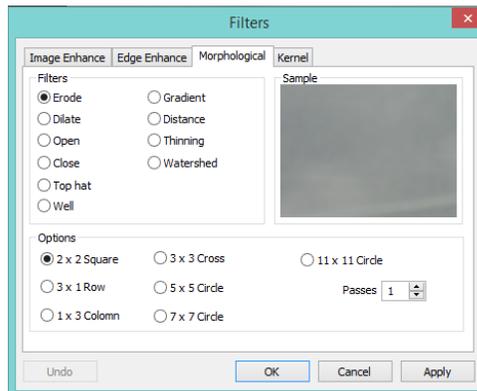
You can use the **SideBar's Undo/Redo Tab** to revert any correction back to a previous state.



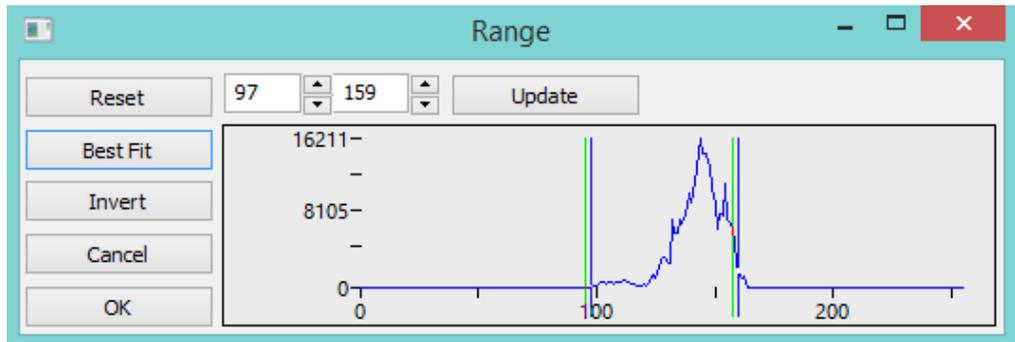
Stitch: See Stitch section later in the manual

You can find **Denoise Tools**, **Sharpen Tools**, **Color Correction Tools** and **Enhancement Filters** inside the **Process** command to sharpen your image.

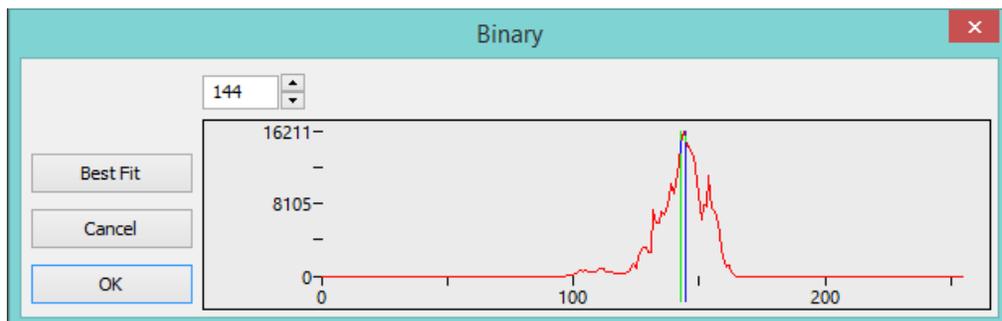




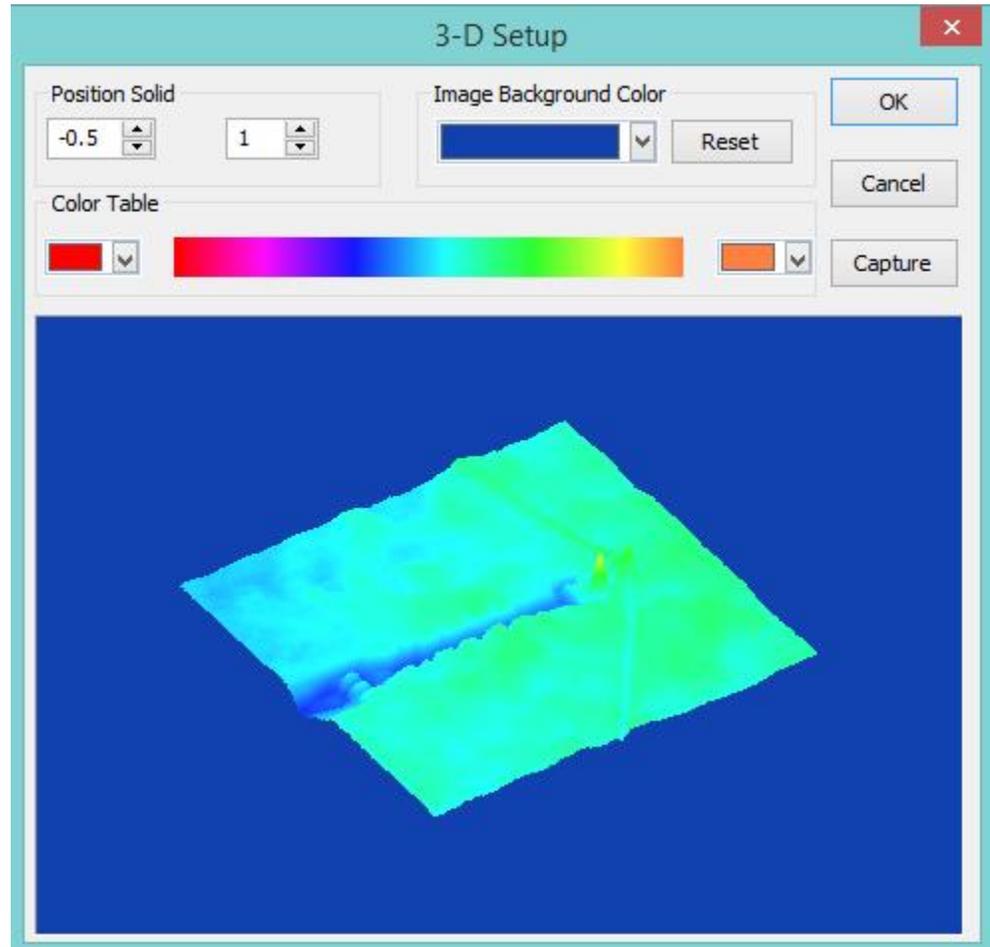
You can modify the color effectiveness range with the **Range** control to color sharpen your image.



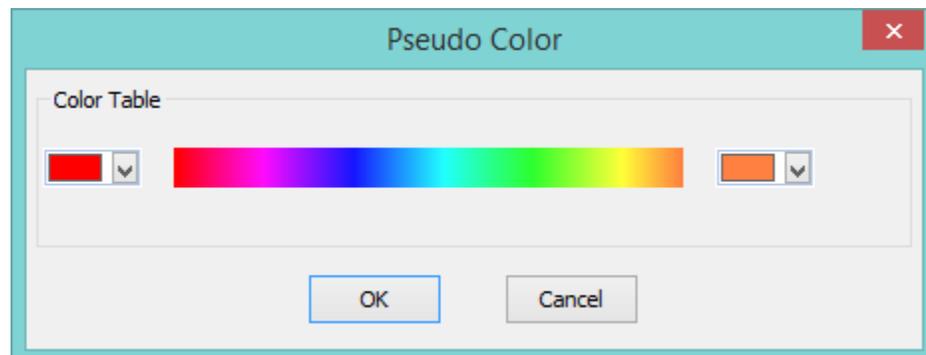
You can modify the image the **pixel/no pixel** count with the **Binary** control



You can examine the image as a 3-D color contour map with the **3-D setup** control



You can apply the **Pseudo Color** application tools to turn a Black and White image into color tones.



But one cool tool that is built in to MallincamSky, is simple stacking of you video frames to produce an improved image.

➤ Image Stacking

Image Stacking control will allow you to select a saved video file, then it will do an elementary stacking process on the file.

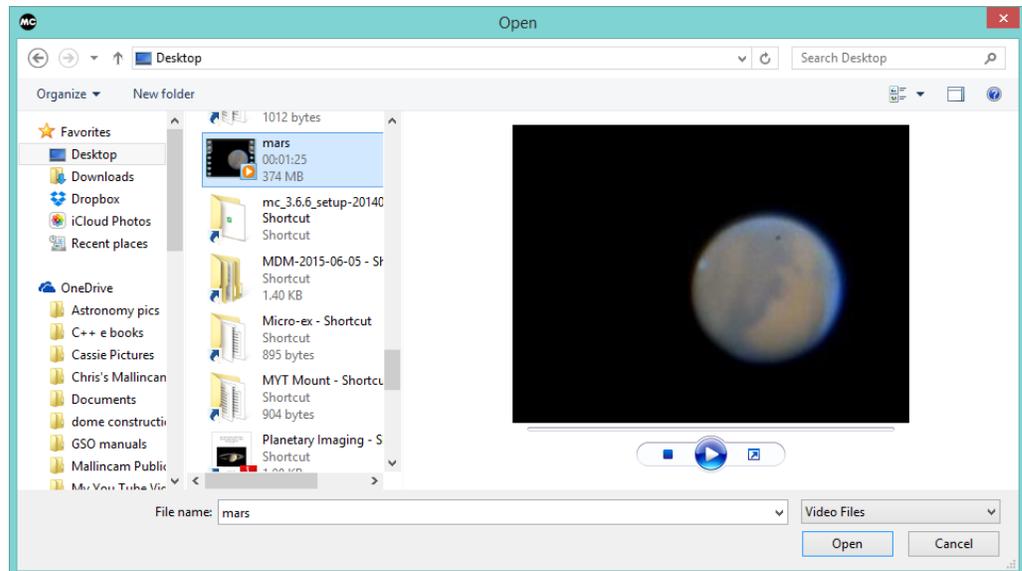
In the Image Stacking process, **MallincamSky** takes the first frame as the reference image, this means the first frame is very important and should be assure the first frame to be the right image scene and the subsequent frames have a greater overlap region with the first frame.

The stacked image signal to noise ratio is greatly improved. The stacked image may have had some black edges, this is because the images in the video has moved and in the stacking process, **MallincamSky** will added black to the image area that has no corresponding pixel in the reference image.

This Image Stacking process will not align the video images, so this control may be better suited for Deep Sky objects than for planets.



Left-Click on the **Image Stacking** control and **MallincamSky** will open a **Dialog Window**.

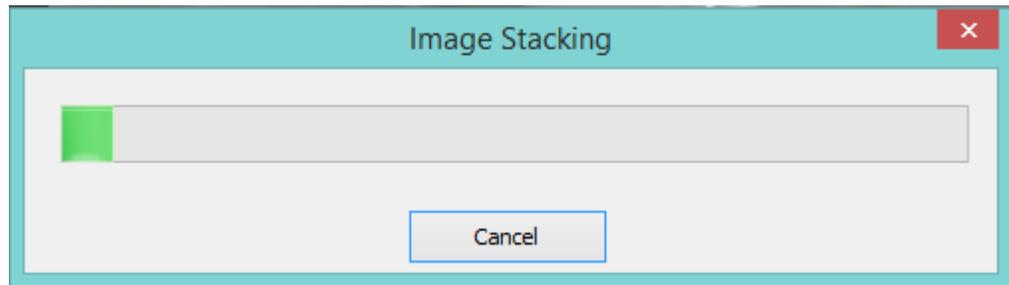


Using the **Open Dialog Window** move to the directory and **Left-Click** on the File you would like to apply the Stacking process to, then **Left-Click** on Open.

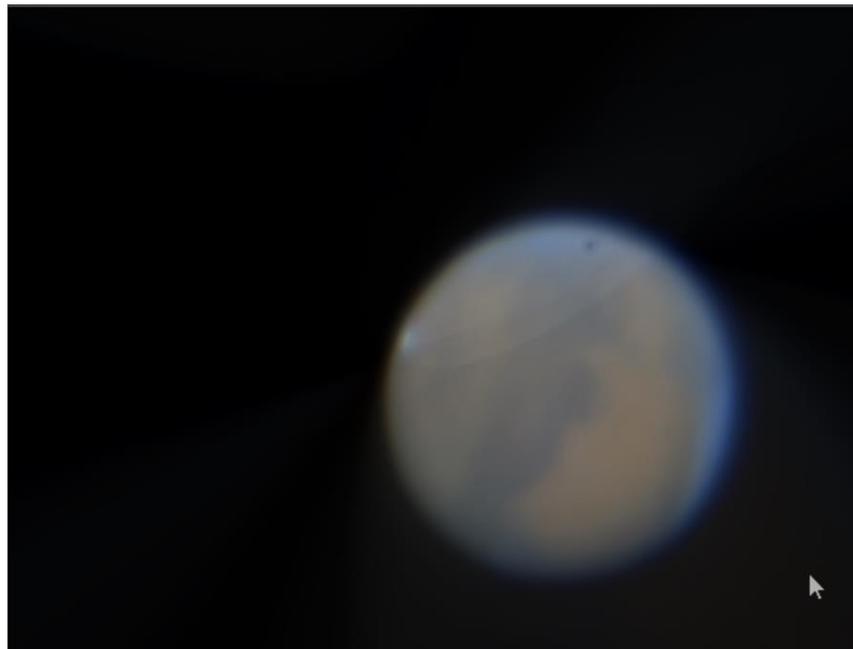


MallincamSky supports the following video formats for the **Image Stacking** process: wmv, asf, avi, mp4, m4v, 3gp, 3g2, 3gp2, 3gpp, mov, mkv, flv, rm, and rmvb.

MallincamSky will Open an Image Stacking Progress Bar to inform you of the process.

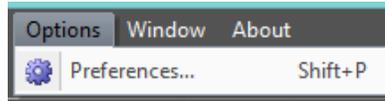


Once completed, the stacked image will appear in the Video/Image window. You can now apply other processing techniques to this image which as a bonus will now have a larger signal to noise ratio.





Options



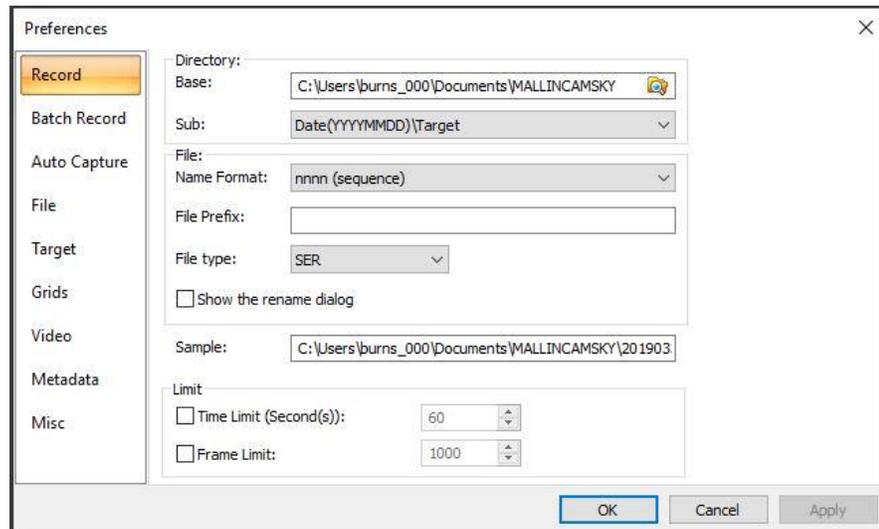
The **Options>Preferences...** Menu provides 9 Tabs, they are: **Record, Batch Record, Auto Capture, File, Target, Grids, Video, Metadata** and **Misc.**



Record



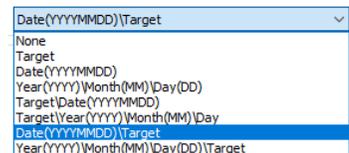
The **Options/Preference/Record** tab will allow you to set the default location, File Format, File Prefix, File Type, duration, or Frame Limit for the Video recording of the current SkyRaider camera.



Directory:

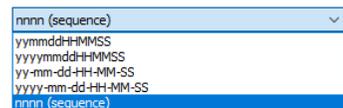
The file **Directory** can be select by **Left- Clicking** on the symbol in the **Base:** selector.

You can also have MallincamSky create a Sub-directory to the Primary Directory, by selecting one of the pulldown choices in the **Sub:** heading.



File:

The **File Name** allows you to select, from a pull-down list, an automatically generated name.



You can add a **Prefix** to the name, as well as chose the **File Type** (**avi, MP4, or ser** format) the video will be recorded in.





The **Sample:** box will show a location preview of where and the chosen naming convention of the video file.

Sample:

e:\Documents\MALLINCAMSKY\20190904\Moon\0001.avi



Limit:

You can either choose to capture a **specific number of seconds** (from **0** seconds to **36,000** seconds) or a **specific number of frames** (from **1** frame to **1,000,000** frames).

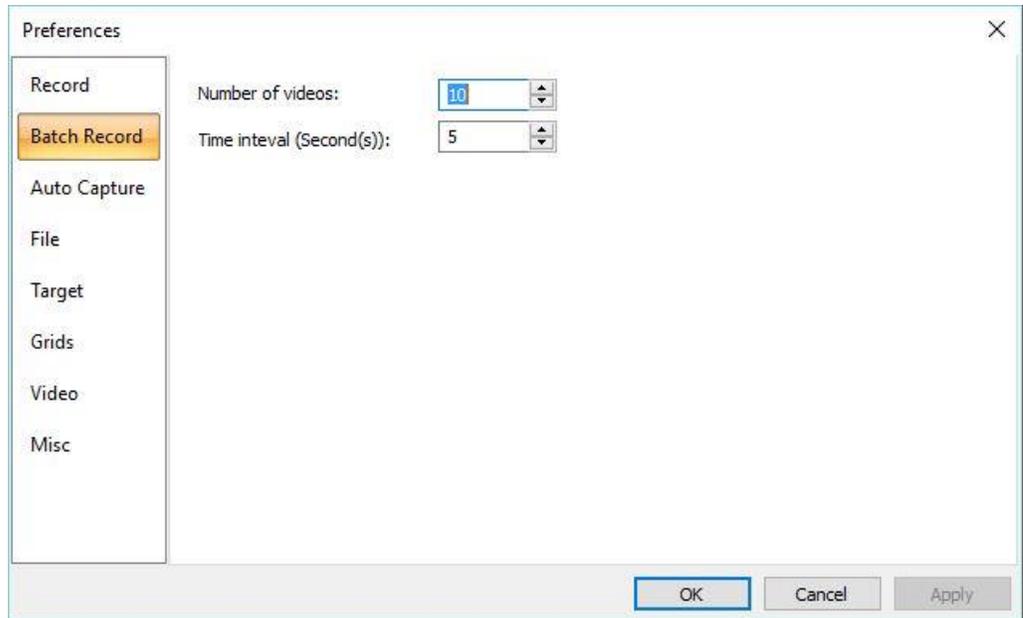
Just **Check** the box under limit and enter the required amount. If none is checked, **MallincamSky** will record until you **Stop** the recording by **Clicking** on the Red **Stop Recording** button on the **Left Side Bar** in the Screen (only available when recording is activated).



Batch Record

Batch Record

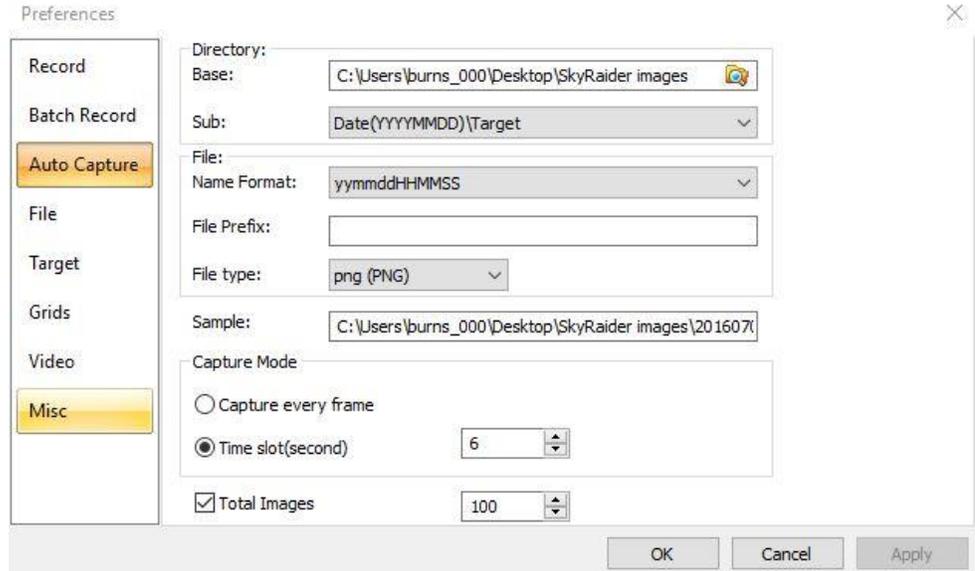
The **Options->Preferences...->Batch Record** tab will allow you to set the number of Video recordings in the batch, plus the time interval **between** each separate recording.



Clicking on **OK** accepts the settings.

➤ **Auto Capture** Auto Capture

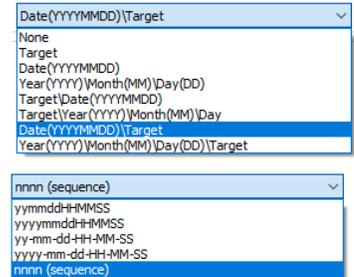
The **Options->Preferences...->Auto Capture** tab will allow you to set the **location, file format, type, interval,** and **number** of required still images for the **Auto Capture (F7)** function of MallincamSky.



➔ **Directory:**

The file **Directory** can be select by **Left- Clicking** on the  symbol in the **Base:** selector.

You can also have MallincamSky create a **Sub-directory** to the Primary Directory, by selecting one of the pulldown choices in the **Sub:** heading.



➔ **File:**

The **File Name** allows you to select, from a pull-down list, an automatically generated name.

You can add a **Prefix** to the name, as well as chose the **File Type (bmp, jpg, png, tif or fit** format) the image will be captured in.



The **Sample:** box will show a location preview of where and the chosen naming convention of the image file.

Sample: :s\MALLINCAMSKY\20190904\Moon\190904092118.png

⇒ **Capture Mode:**

You can either choose to Capture every frame or select a Time interval between each capture.

✦ **Capture every frame:**

If Capture every frame is chosen, then **MallincamSky** will capture the number of images indicated by the **Total Images** count (**do not leave unchecked**).

✦ **Time Slot:**

This Time slot (in Seconds from **2 s** to **3600 s**) is the time that **MallincamSky** waits before capturing another image (**5s** would indicate waiting another **5** seconds before capturing another image).

⇒ **Total Images:**

Selecting the **Total Images** checkbox will enable its number selection box. You can then enter the Total Images (from **1** to **9999**) to be captured. **MallincamSky** will stop the **Time-lapse capture** process automatically when the **Total Images** are reached.

If **Total Images** is **unchecked**, **MallincamSky** will capture the images continuously until you Click the **Capture>Stop Auto capture** command to stop the **Time-Lapse capture**.

Clicking on the **OK Button** accepts the capturing settings.



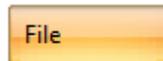
To activate the Capturing process use **Capture->Auto Capture (F7)** or **Click on the Auto Capture Icon** located on the top of the screen.



After the Time-lapse capture is started, the **Capture>Start Auto Capture●●●** menu will be changed to the **Capture>Stop Auto capture** menu. Choosing this command, or again **Clicking** on the **Auto Capture Icon** will stop the Time-lapse capture.



File



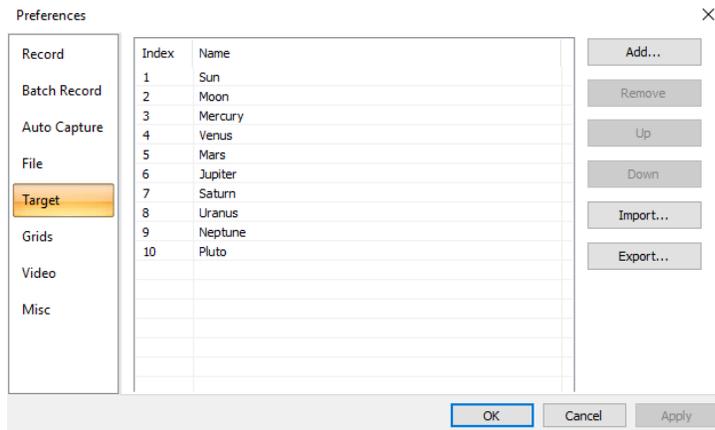
One can select various File Extensions via a checkmark for the specified file Format, to determine whether it will be displayed in the **Browse** window or not (The checked Format can be displayed in the Browse window).

Extension	Format	Abbr.	Browse
bmp	Windows Bitmap	BMP	<input checked="" type="checkbox"/>
dib	Windows Bitmap	BMP	<input checked="" type="checkbox"/>
rlc	Windows Bitmap	BMP	<input checked="" type="checkbox"/>
jpg	JPEG	JPEG	<input checked="" type="checkbox"/>
jpeg	JPEG	JPEG	<input checked="" type="checkbox"/>
jpe	JPEG	JPEG	<input checked="" type="checkbox"/>
jif	JPEG	JPEG	<input checked="" type="checkbox"/>
jfff	JPEG	JPEG	<input checked="" type="checkbox"/>
png	Portable Network Graphics	PNG	<input checked="" type="checkbox"/>
tif	Tag Image File Format	TIFF	<input checked="" type="checkbox"/>
tiff	Tag Image File Format	TIFF	<input checked="" type="checkbox"/>
gif	CompuServe GIF	GIF	<input checked="" type="checkbox"/>
pcx	PCX	PCX	<input checked="" type="checkbox"/>
tga	Targa	TGA	<input checked="" type="checkbox"/>

➤ **Target** 

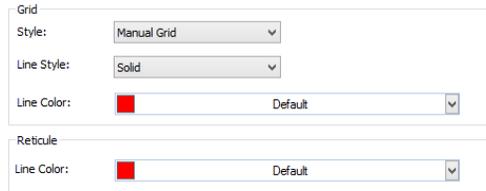
The **Target Tab** allows you to label the target that you are currently shooting. The 10 solar system objects are set as the defaults in the pull-down list, but you may change the names of the objects, rearrange the order of the objects, add new objects, export, or import list from others from this Tab.

The target list appears in the drop-down list located with the other **Top Line** icons.



➤ **Grids** 

The **Grids Tab** allows you to determine if you would like a **Grid** displayed on the Video Window, and if so, how should it be drawn. The Grids Control can also be used to define the color of the **Reticule** that can also be drawn over the image.



Grid Style: The **Grid Style** can be No Grid, Auto Grid or Manual Grid. Default is No Grid.

Grid Line Style: The **Line Style** for the grid can be Solid, Dash, Dot or DashDot. The Default is Solid.

Grid Line Color: The color of the **Grid Line**. The Default color is Red (255,0, 0).

Reticule Color: The color of the **Reticule**. The Default color is Red (255,0, 0)



Video



You can overlay the Date and Time on the VIDEO Window (With a location and color of your choice). You can also have MallincamSky display the Clarity Factor (can assist in focusing) on the image. These overlays are updated in Real-time.

Position: Background:

Font Size: Font Weight:

Date Time
Type:

Color:

Clarity Factor
 Show
Color:



For Example:

The settings on the Right will overlay the video stream with the following in the top left corner of the Video Window.



Position: Background:

Font Size: Font Weight:

Date Time
Type:

Color:

Clarity Factor
 Show
Color:



Metadata



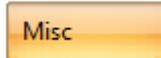
This control allows you to determine what data is embedded inside the FITS and EXIF files when they are saved. File viewers that read FITS or EXIF (Tiff) images can then display details about how that image was taken, equipment and telescope used.

Record	FITS	EXIF	Enable	Value	
Batch Record	INSTRUME	Model	<input checked="" type="checkbox"/>	[Auto]	Ca
		SerialNumber	<input checked="" type="checkbox"/>	[Auto]	Ca
Auto Capture	DATE-OBS	ImageUniqueID	<input checked="" type="checkbox"/>	[Auto]	Im
	DATE	DateTimeOriginal	<input checked="" type="checkbox"/>	[Auto]	da
File	EXPTIME	DateTimeDigitized	<input checked="" type="checkbox"/>	[Auto]	
		ExposureTime	<input checked="" type="checkbox"/>	[Auto]	Ex
Target		Copyright	<input checked="" type="checkbox"/>		
		OBSERVER	Artist	<input checked="" type="checkbox"/>	Ob
Grids		COMMENT	UserComment	<input checked="" type="checkbox"/>	Co
		NOTES	ImageDescription	<input checked="" type="checkbox"/>	De
Metadata					
Misc					

This property sheet is used to set the property values of different file formats, including FITS files and EXIF files (including jpg, png, tiff, etc.). Blank item in EXIF column means EXIF file doesn't support this information, which is the same as the FITS column. [Auto] in value column means the software will fill the information automatically. For the other items that value column is not [Auto], you can double click the items and set the value.



Misc



The Misc Tab is mainly used for the control of the MallincamSky's User Interface. It mainly includes:

1. MallincamSky's special file format warning information.
2. Sidebars.
3. User Interface Style
4. Language.
5. Graphics accelerator
6. Privacy.

Preferences

Show the splash screen on startup

Prevent screensaver when video preview / capture

Auto Exposure
 Policy

Exposure Only
 Exposure Preferred (Default)

Gain Only
 Gain Preferred

Maximum Exposure Time (Range:[10, 5000], Default:350ms): 350

Maximum Gain (Range:[100, 5000], Default:500%): 500

Threshold (Range:[5, 25], Default:5): 5

Timestamp
 If the camera hardware supports the feature of timestamp, the timestamp is automatically logged

Units of temperature
 Celsius (°C)

Fahrenheit (°F)

Sidebars
 Automatically activate the folders sidebar when opening the browse window

Just Left-Click in a checkbox to choose your required Option.



Window

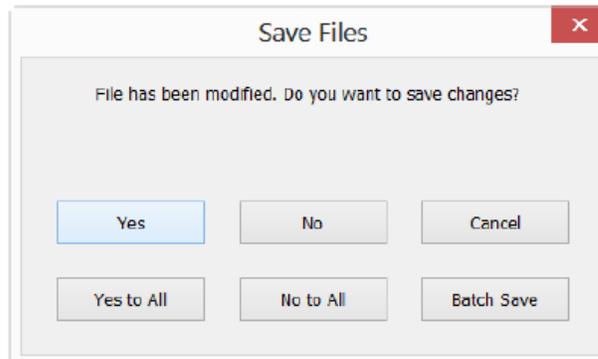
The menu control will close all open windows (Tabs) and it can reset the lays back to its default settings.



Close All



Selecting the **Closes All** command will close all the picture windows opened or captured inside **MallincamSky's** frame. If you have made any modifications to the pictures or if you have captured some pictures from the camera, choosing the **Close All** will pop-up a window that will let you finish the saving operations quickly.



The **Close All** will also close down the live **Video Stream** window. You can now use the **File>Open Video** to view a saved video. **Left-Click** on camera will again activate the **Video Stream** window.



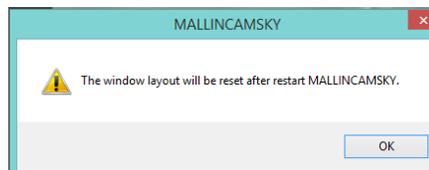
Reset Window Layout



Choosing this command will **reset** the **MallincamSky** window layout to the original default.



The reset will be effective after restart.

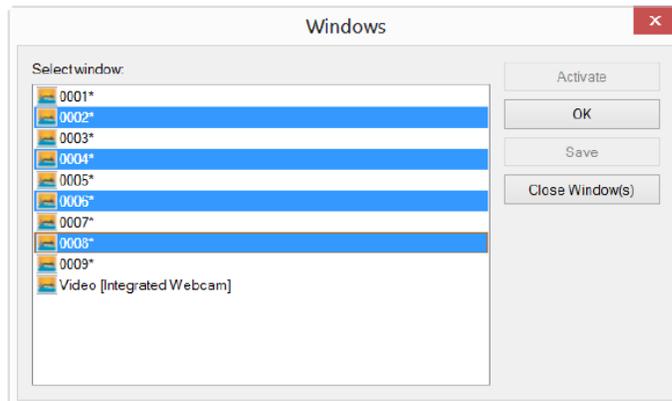




Choosing the **Windows>Windows...** control will open a dialog box that lets you manage the currently opened windows.

The dialog allows you to manage large lists of open windows by assigning them into groups. Let us say you have eight windows open but want to close four of them scattered through the list.

1. Choose the **Windows>Windows...** control.
2. Select the windows you want to close. Hold **Ctrl** or **Shift** key to select more than one at a time. Here, 4 windows are selected.

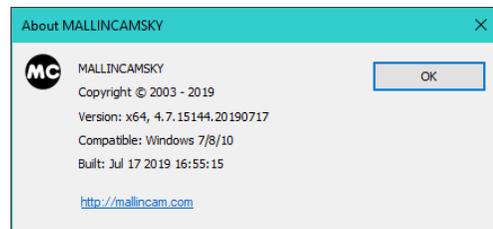
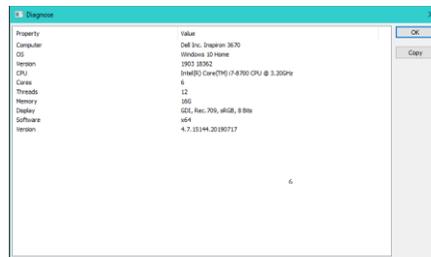


3. Click **Close Window(s)** button, those four selected windows will be closed, leaving the other files or captures available for editing.

You can use this command to switch and activate a selected window on a list by hitting **Activate**.



This control will pop-up a window that allows you to see detailed information **About** the current version of MallincamSky installed, and on the **Diagnose** Tab, detailed information about your computer system.



MallincamSky Toolbar



Open

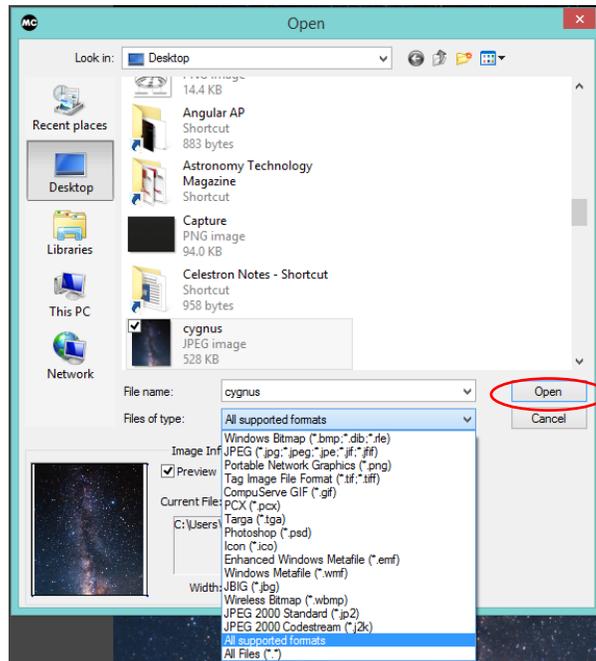
The **Open Image** command is used to open an existing image file. This command can also be used to preview an image in a preview size, or to view its statistics and information without opening the image itself. You can use this command to quickly locate an image.

MallincamSky supports a variety of image formats. These are identified in the **Files of type** list box.

MallincamSky can open more than one image simultaneously by:

- **Ctrl + Left Mouse Click** on each required file then **Left-Click** on **Open**
- **Shift + Left Mouse Click** method to highlight the files to be opened, then **Left-Click** on **Open**

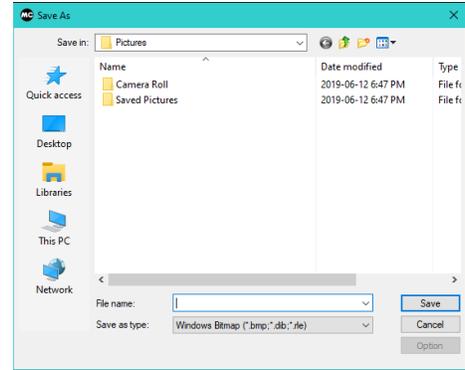
When an image is opened, **MallincamSky** places it into a new image window. It then becomes the active image.



MallincamSky maintains, at the **File>Recent Files** submenu, a list of the last opened files.



The **Save Icon** allows you to save an image (or a **snapshot** of the current video stream) onto your computer. The command immediately stores the current active video window image (or an active non-named snapshot) to the last activated folder location (the filename is listed on the window's **title bar**) while leaving the image still active in its window. The dialog box will provide you an opportunity to change the desired saving location, give a name to the image file, and choose a format.



If the image is untitled or titled with a digit, **MallincamSky** will issue the **File>Save As** dialog automatically. The default **“Save as type”** will be **“Window Bitmap (*.bmp;*.dib;*.rle)”**.

You can determine which **image tabs** can be saved, by noting if there is an asterisk, **“*”**, behind the name. If present, then that image can be saved.



The **Save Icon** can be used to save the most recent changes to disk. It is often performed as a precautionary measure during lengthy or involved processes to reduce the amount of reprocessing that might be required in the event of a system failure or operational error.

When an image is closed and told not to save its changes then **MallincamSky** discards all changes made since the last **Save** operation.



The **Save Icon** always saves the contents of the entire window, even if there is an **AOI** (Area of Interest) defined on it.



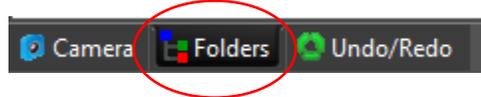
The **Save Icon** is an alternative way to save a **Snapshot** to the default File folder of an active **Video Stream** (it will ask you for a **File Name**).



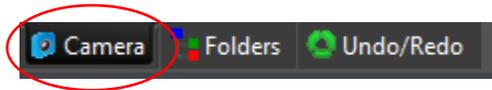
Browse

The **Browse Icon** from the **MallincamSky Tool Bar** is used to browse images under the specified directory in the **Folders Sidebar**.

This command is identical to hitting the **Folder's Tab** at the bottom of the screen.



To return to the **Camera Bar**, just **Click** on the **Camera Tab** located at the bottom of the screen.



The **Browse Window** resembles the **Windows Explorer**. **Left-Clicking** on the + will expand a folder so that you can examine its contents.

You can **Right-Click** on a **Folder** (or file) and the actual Windows controls will pop as in **Windows Explorer**.



As you get deeper into the **Browse Window**, you can **Back-Out** or Move Deeper into the File Folders via the **Green Left** or **Right Arrow** in the **Browse Window**.



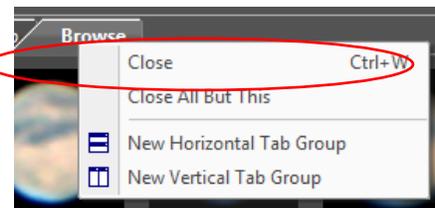
The **Blue Right Arrow** will take you to your computer's **Root Directory**.

Left-Double Clicking on a **Folder** will open a **Window Tab** in the **Video Window** (this **Window** will be labeled **Browse**).

This **Tab** will display all the graphic files inside that Folder. If you **Left-Double Click** on a **Graphics File** inside the **Video Window**, it would open that **Graphics File** in a new **Tab** in the **Video Window**.



You can close the **Tab** in the **Video Window** by **Right-Clicking** on the **Tab's Title (Browse)**, then choosing **Close**.

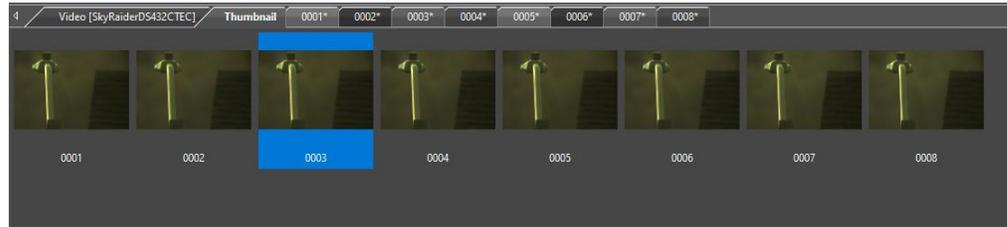




Thumbnail



This icon creates an image window that contains snapshots of all your current image tabs. You need only click on that image to have it open that image's window.



Target



This icon allows you to give a name to the current Target that you are imaging. You can add or change names in the **Options->Preferences...->Target** Tab. The Target name can automatically be used as a **suffix** for a file folder name when saving images or video captures.

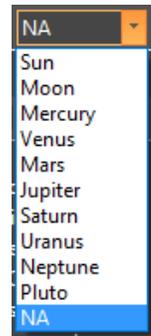
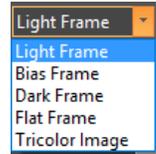


Image Type



This icon allows you to designate the type of image you are saving. This is only for your reference. Just select an image type from the drop-down list.



If you save an image in **FITS** format, then the **Image Type** will be included in the **Metadata** for that image.



Auto Capture



This icon activates the **Auto Capture** routine in MallincamSky.

You must have previously chosen the **File location**, **File Type/Number** of required images, and the **Time Interval** between each captured image from the **Options->Preferences...->Auto Capture** Tab (see **Options** for more information).



The **Auto Capture** Icon will remain highlighted until the capture process is completed. You can **Abort** the capture process at any time by again **Clicking** on the **Auto Capture** icon.

MallincamSky will indicate the status of the **Auto Capture** process on the lower left of the MallincamSky window.

Auto Capture: 1/4

 **Batch Record**

This icon activates the **Batch Record** routine in MallincamSky.

You must have previously chosen the **File location**, **File Type/Number** of required Videos, and the **Time Interval** between each captured video from the **Options->Preferences...-> Batch Record** Tab (see **Options** for more information).



The **Batch Record** Icon will remain highlighted until the capture process is completed. You can **Abort** the capture process at any time by again **Clicking** on the **Batch Record** icon.

MallincamSky will indicate the status of the **Batch Record** process on the lower left of the MallincamSky window.

Batch Record: 1/2; Time=04/10; Frame=77; File=507.6M; Free=781.0G

 **Pause Video Capture**

This icon Pauses the **Batch Record** routine in MallincamSky. It will highlight when you are able to pause a video capture.

 **Open Video Folder**

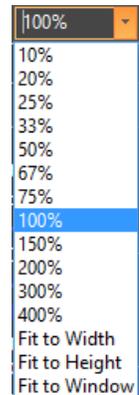
This icon will allow you to open and view either the default **Video Record** folder or the default **Image** folder. This way you can examine the results of the recording. The folders are assigned via the **Options->Preference** Tab

 **Zoom**

The Zoom Icon allows you to **Zoom-In** or **Zoom-Out** while viewing a Video/image window. The Drop-Down list will off you the zoom options. Just highlight the zoom option with your mouse and release the mouse button.



You can change the **Zoom** by rolling your **Mouse Wheel**, if your mouse has a wheel.





Track



If the **video/image's** actual size is larger than the **video/image Window**, then this control will allow you to position the actual **video/image** within in the **video/image Window**. This control is activated automatically when necessary.

Its function is like the scroll bars. It is an alternative to using the arrows on the scroll bars for positioning the **video/image** within the window. Position the mouse (make sure to choose a location outside a **Region of Interest** rectangle. You may need to close the **ROI** rectangle if necessary) on the actual **video/image**.

Left-Click and Hold (the **Open Hand** will change to a **Closed Hand**). Now drag the image around inside the **video/image Window**

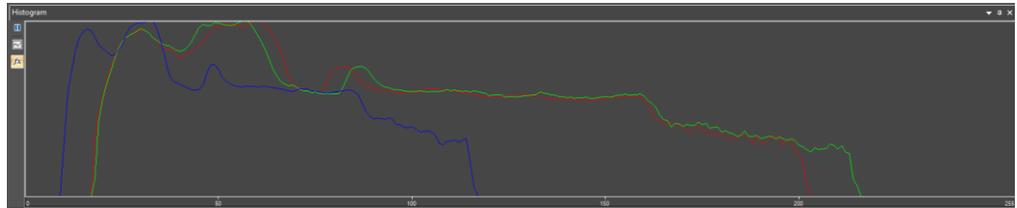
If the **video/image** size is smaller than the **video/image Window** size, then the track operation will be disabled.



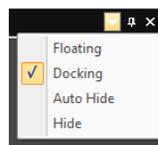
Histogram



This icon will display a real-time **Histogram** (for information purposes) beneath the Video window being displayed. **Clicking** on the icon again will remove the **Histogram**.



The three icons on the left of the **Histogram** allows you to **pause** or switch between the **linear** or **logarithmic** scale.



The Histogram window is movable and resizable via the **Left-Click and Hold** technique with your mouse. You can also have the Histogram window Minimize, resize, and **Auto Hide** by selecting this feature from the **pull-down arrow** on the upper right of the window.

Moving your cursor over the Histogram Tab now located underneath the **Left-Side Bar** on MallincamSky will re-display the Histogram if **Auto Hide** is selected.





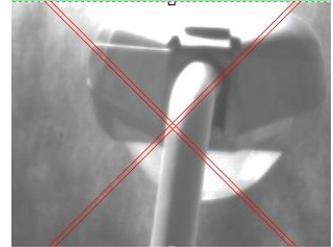
Reticle



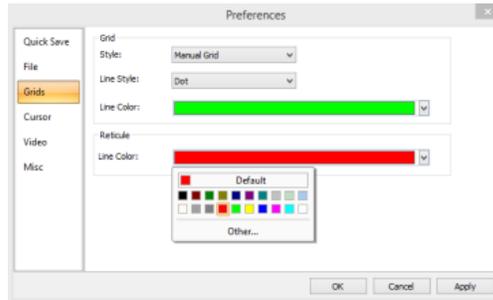
MallincamSky provides four **Reticles** (or crosshairs) to aid in aligning your telescope to a star (or another stellar object).

Left-Click on a **Reticle** Icon to activate it and **Left-Click** on it again to **De-Activate**.

You can **Left-Click and Drag** the location of the Reticle around the screen to center it on an object of interest



The  **Reticle-Icon** will automatically re-center the selected Reticle on your image.



You can change the **color** of the **Reticle** via the **Option>Preferences** control in the **Top Menu Line**.



ST4 Test



The DS432CTEC camera does not have an autoguider ST4 port, so this control is deactivated.



Advance/Reverse



These icons allow you to advance or reverse the current frame when viewing a opened Video in the **ser** format.



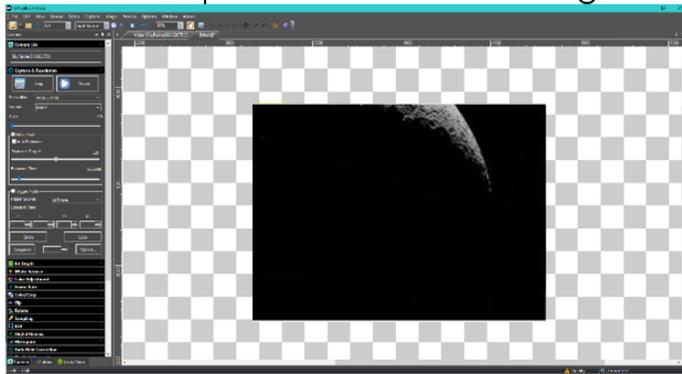
Recall: to load a video for examination and viewing first close the live camera window (this stops the camera). Then choose **File->Open Video** and select the **ser** format video to view. Theses icons will now become active and you can view the video frame by frame if required.

Stitch

There are two ways to use the Stich control in Mallincam Sky. One is an automated approach, while the other allows you to manually stitch together snapshots.

Automated

-  Have the telescope and Mallincam Camera pointing to the area of the sky you are interested in stitching together.
-  Once the area is visible in the Video Window, **Click** on the **Stich** icon and a **Stich* Window** will open which contains the real time active video inside the window frame. Using your telescope controls tweak the position of the object you are interested in.

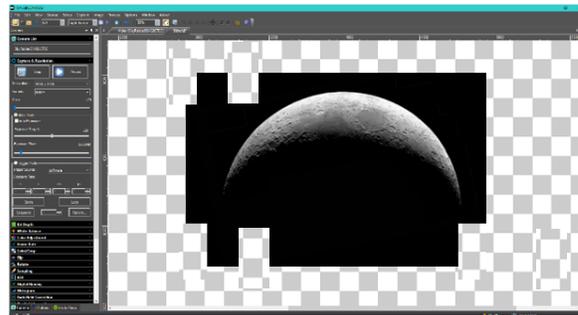


-  Now slowly move your telescope around in the location in the sky, and MallincamSky will **automatically** stitch together that image area of the sky.

 Don't move the telescope too fast, as the algorithm needs time to synchronize the common area of the image together, so to **stitch** together a larger image.

-  Once satisfied, **Left-Click** on the **Stich Icon** to signify you are finished and the **Stich*** will contain your final image.

The **Stitched Tab** contains your final image, ready to be saved.

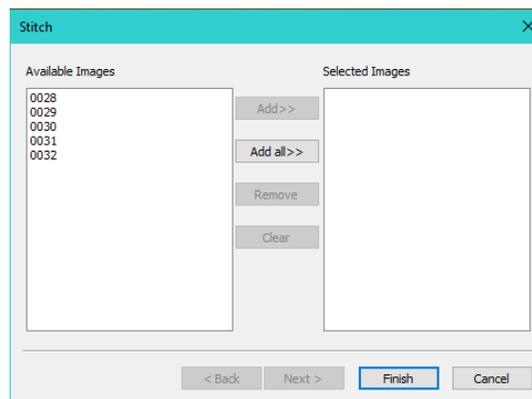




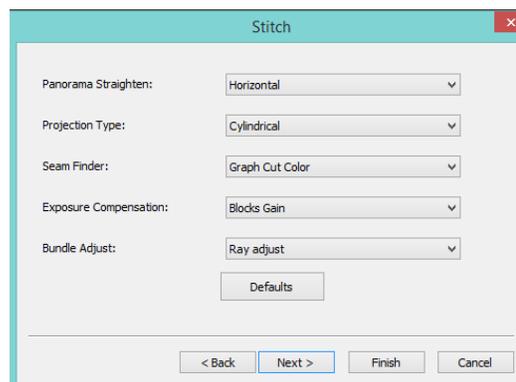
Manual

The purpose on this control is to stitch (glue) together images to create a panoramic view (image) so plan ahead with this control. Determine if you are going to create a horizontal panoramic image, or a vertical panoramic image.

- Have the camera imaging a specific location (or object), Now **Left-Click** on the **Snap** button. This will place a snapshot in the viewing box.
- Move the telescope so that you have some overlap in the image and **Left-Click** on the **Snap** button again.
- Repeat as needed.
- When you are completed taking the snaps, **Left-Click** on any of the Snapshots to make it active.
- **Left-Click** on the **Stitch Icon** and the following window will open.



- Move as many of the available images to the selected side as you need to be stitched together by using either the **Add>>** or **Add all>>** buttons
- **Click on Next** to move to the next step.



- Examine the options in this window and make the appropriate decisions on how you would like **MallincamSky** to Stitch the snapped images together (this is where the pre-planning comes in handy). You will still be experimenting with your decisions.

⇒ **Panorama Straighten:**

The image stitching direction can be **Horizontal**, **Vertical**, or **None** (try this if not sure).

⇒ **Projection Type:**

For image pieces that have been taken from the same location, stitched images can be arranged using one of following projection mappings: **Plane**, **Cylindrical**, **Spherical**, **Fisheye**, **Stereographic**, **Mercator** or **Transverse Mercator**.

⇒ **Seam Finder:**

MallincamSky provides four Sean Finding algorithms: **None**, **Voronoi Diagram**, **Graph Cut Color**, or **Graph Cut Color Grad**.

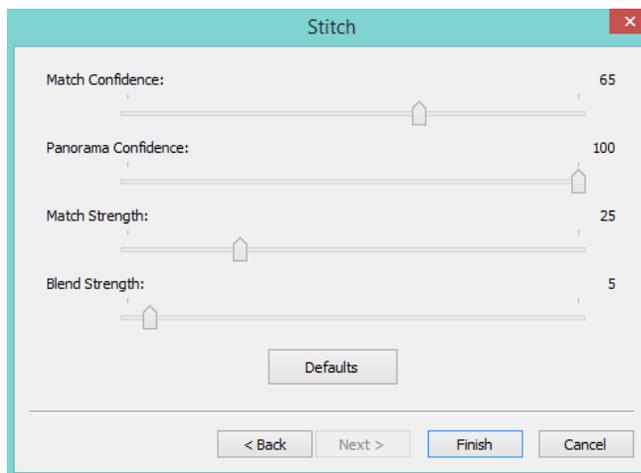
⇒ **Exposure Compensation:**

This is used to minimize the exposure differences between the stitched images. Compensation algorithms available are: **None**, **Gain**, and **Blocks Gain**.

⇒ **Bundle Adjust:**

This is the process of simultaneously refining the 3D coordinates that describe the geometry in accounting for the relative motion of the images. Two algorithms are available: **Ray Adjust** and **Reprojection Error**.

Once completed, **Left-Click** on **Next** to bring up the final **Stitch Window**.



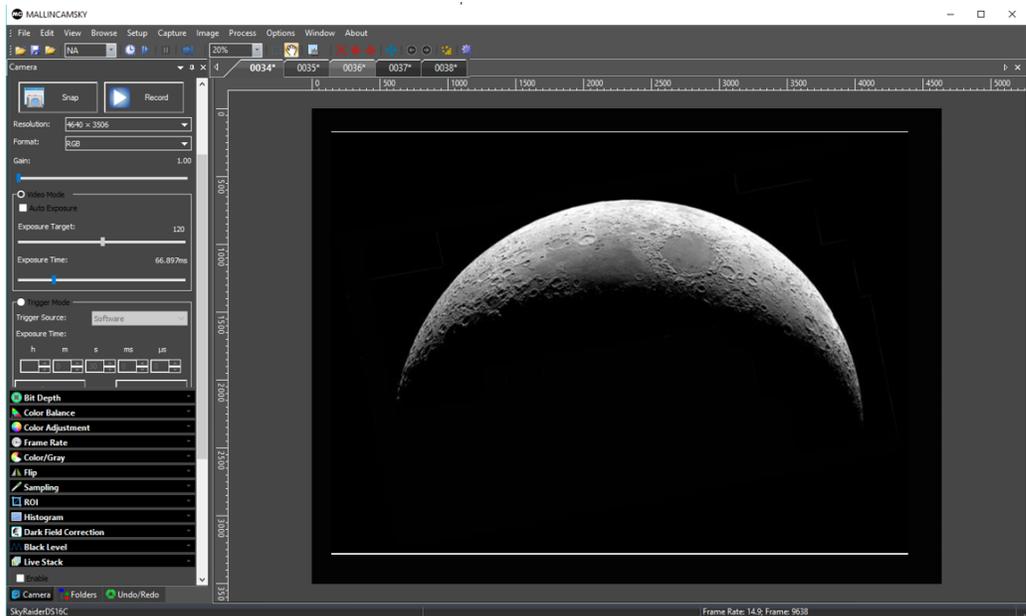
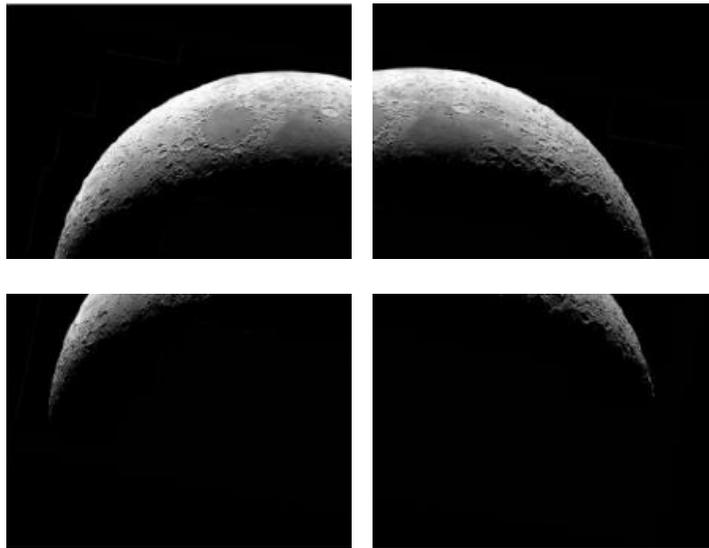
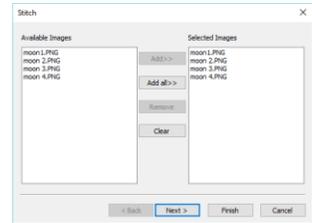
Again, make some logical guesses with the numbers on the sliders, and **Left-Click** on the **Finish** button when decisions have been made.

MallincamSky will work thru the **Snaps** (and apply the choices you have made) and will place the final result in new **image window** for your viewing pleasure.

You can try other **Stitching decision** by having the **Stitched imaged** active in your **Video Window** and **Left Clicking** on the **Stitch Icon** again. You will notice that your original snapped image is available for you to play with and combine in other ways.

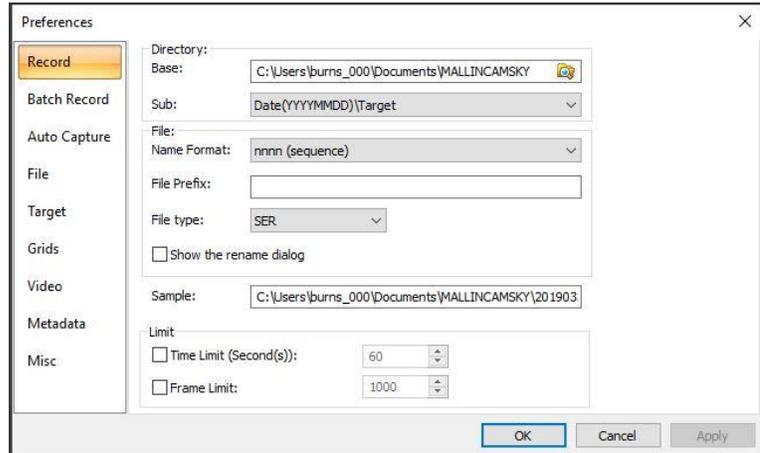


You can also load in previously saved images, via the **Open Icon**, and then make one of these images the active window. Now again selecting the **Stitch Icon**, you can combine these images into a final image.



Preferences

This icon opens the preferences window. This icon is identical to the **Main Tab** line **Options->Preferences....** See above in the **Options Tab**.



Customize

This control will allow you to customize what appears on the **Icon Bar**.

Left-Click on the **Customize** Icon to display the **Add or Remove Buttons** selector.

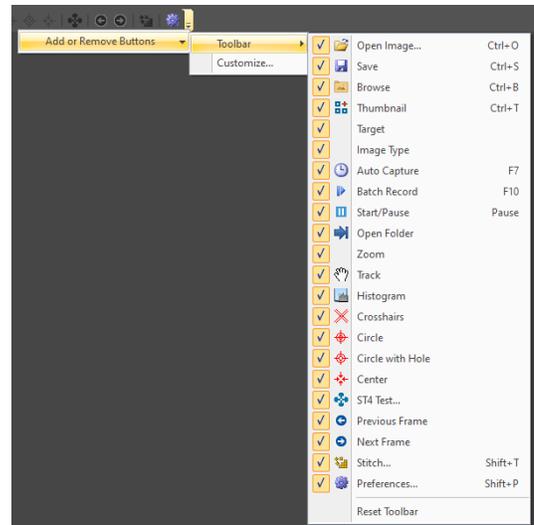
Toolbar

Then **Left-Click** on the down-triangle to expand and select **Toolbar**.

Left-Click on its triangle to expand the command to show the currently displayed icons.

Select which Icons you want displayed on the Icon Bar by **Left-Clicking** on the **checkmark** to add or remove that Icon.

You can reset the **Icon** bar to its default state by **Left-Clicking** on the **Reset Toolbar** button.

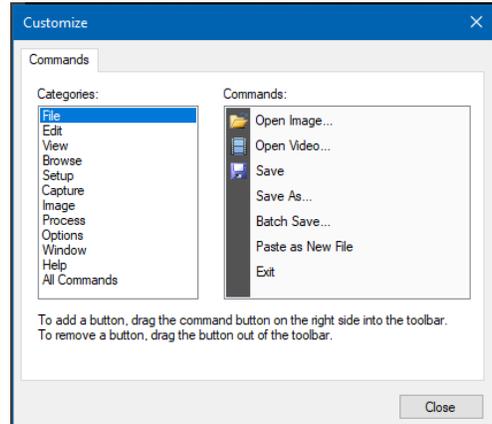


➤ **Customize**

This control will allow you to customize your **Icon Bar**, by providing a process of adding other control icons to its bar.

The left **Categories Window** contains the icons specific to that category.

The **All Commands** category contains all available icons.



⇒ Chose a Category

⇒ **Left-Click Hold and Drag** an icon from the **Commands Window** to the **Icon bar** (you will see a black marker bar appear when you move your cursor to the **Icon Bar** as position it where you would like to place the new icon.

⇒ Release the mouse button, and the icon will appear where your mouse was pointing.

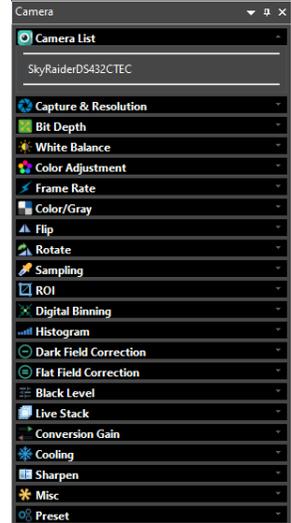


To remove an icon from the icon bar, just drag it off the icon bar.

Controlling the SkyRaider with Left Side Bar

Once you have a connection to the **SkyRaider Camera**, your next task will be to adjust the controls that make it possible to improve the image the **SkyRaider** is capturing. These controls are located on the **Left Side Bar Menu** on **MallincamSky**.

The Controls all have drop-down arrows; **Left-Clicking** on the **Down-Arrow** in the control heading will expand that control. Some controls will also display a coloured rectangular box on the **Video Window** to remind you that that control is in effect. You will be able to collapse the control window by **Left-Clicking** on the **Up-Arrow** on the control heading.



Camera List



The **Camera List** control lists the current **SkyRaider** cameras connected to the computer. **Left-Clicking** on the camera name (SkyRaiderDS432CTEC) will start the camera video window.



Once activated, you will see a tabbed frame (with **Video [SkyRaiderDS432CTEC]**) appear in the Video window after selecting the Camera from the list.



You can only access one **SkyRaider Camera** at a time even though you may have multiple cameras attached.



You can start another instance of MallincamSky and have this instance control a second SkyRaider camera at the same time as your original instance of MallincamSky controls the first SkyRaider camera.

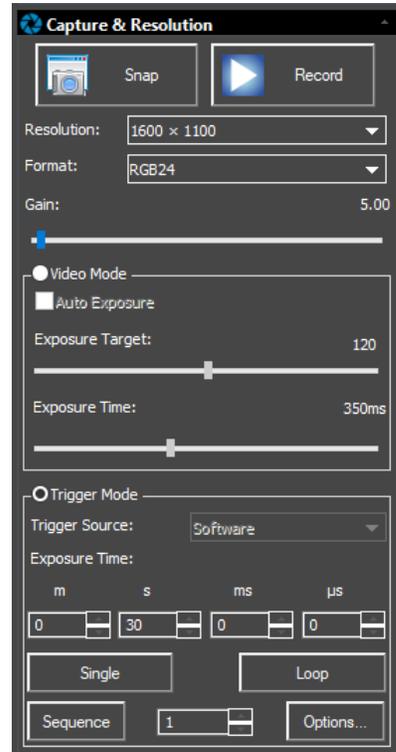
➤ **Capture and Resolution** 

The **Capture and Resolution Tab** allows you to adjust the resolution (the current **SkyRaider DS432TEC** has a fixed resolution of 1600 x 1100), modify the **Gain**, and choose the type of **Exposure Mode** that you require for the camera.

➔ **Resolution** 

Located at the top of this control is the **Resolution Command**. This command allows you to adjust both the display and capture resolution of the **SkyRaider Camera** (each model of the **SkyRaider Camera** will have its own resolution settings that will appear in the list). Once the resolution is set, this control will also allow you to either take a **Snapshot** of the image or save a video recording of what is currently being displayed.

Left-Click on the **Drop-Down list** on the **Resolution:** to see all the allowable resolutions available for your **SkyRaider**. The **SkyRaider DS432 TEC** has only one resolution of 1600 x 1100.



➔ **Snap** 

Left-Clicking on **Snap** will tell **MallincamSky** to display in a **New Tabbed Window** containing a **Snapshot** of the image that is currently being exposed by **SkyRaider Camera**. The image will appear in the **Video Display Window**, with a name which follows the naming convention **nnnn*** (for example 0001*).

Every time you **Left-Click** on **Snap**, another **Tabbed Window** with the name-number increased by one will appear in the Image Window. The image is **only displayed** in the **Video Window**; it is **not saved** on your computer.

 After clicking on the **Snap** button, the snapshot of the image will become the active window, you will need to **Click** on the **Video [SkyraiderDS432Tec]** Tab to return to live imaging.

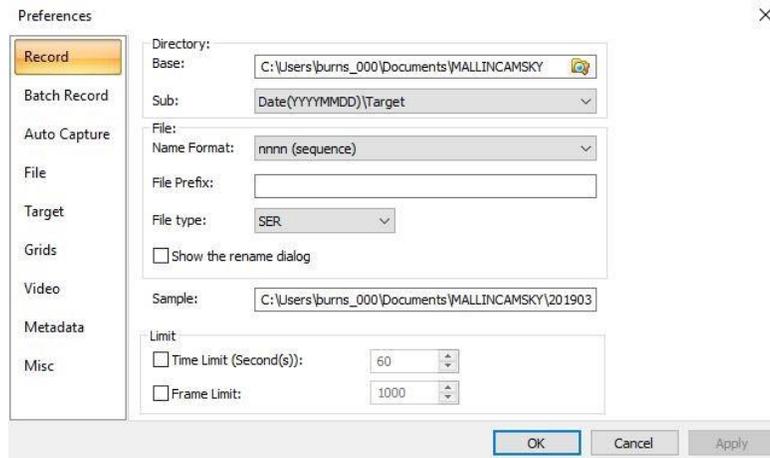
 You can save the image (and thus rename it), by using the **Save icon**, or **File>Save As...** command from the **Top Menu Line**.



This command is only available when the Mallincam SkyRaider is in **Video Mode**. See below for details on how to record video when in **Trigger Mode**.



Prior to pressing this icon, you should use the **Options->Preferences...** Tab to choose the default **location, name, format, and duration** of the video.



If in Video Mode

Make sure that **Video Mode** is selected, then **Left-Clicking** on the **Record Icon** will tell **MallincamSky** to start recording a video of what is currently being captured by the **SkyRaider** (you will now be able to see the image being recorded as the **Record Button** will activate the camera).

When the Mallincam SkyRaider is recording, the Icon will change to a **Red STOP** Symbol. By **Clicking** on the **Stop Icon**, MallincamSky will terminate the Video recording process, but the video imaging is still active.



If in Trigger Mode

Make sure that **Trigger Mode** is selected but **NOT Looping**. **Left-Clicking** on the **Record Icon** will tell automatically start the **Looping** in **Trigger Mode** and **MallincamSky** will also start recording a video of what is currently being captured by the **SkyRaider** (you will now be able to see the image being recorded as the **Record Button** will activate the camera).

When the Mallincam SkyRaider is recording, the **Record Icon** will change to a **Red STOP** Symbol. By **Clicking** on the **Stop Icon**, MallincamSky will terminate the Video recording process, and stop the **Looping** (camera is not imaging).





This control allows you to adjust the gain. **Gain** will brighten up the image (but it can also brighten up the artifacts). The higher the **Gain** value; the shorter the exposure that you will require. All you need to do is find the highest **Gain** value that provides you with the image you are satisfied with.

The **Gain Control Bar** has an indicator to provide you with the current Gain setting on the camera. Gain ranges from a low of 1 to a high of 250.

You can modify the **Gain** in two different ways:

- By **Left-Click-Hold and Drag** the marker bar to the required value.
- If you **Left-Click** on the **Slider Bar** (which selects it), you can use the **Left** and **Right Arrow Keys** of your keyboard to move the slider (this gives you more control).



Gain can be modified at any time while in **Video Mode**, and thus the result will immediately be apparent after each image refresh. But you must **STOP** the **Looping** in **Trigger Mode** to change the **Gain**, then restart **Looping** to see its affect.



For **Deep Sky Objects**, start the Gain at about **50**. For **Planetary Objects**, start the Gain at about **5**. A high Gain on Deep Sky Objects makes them appear very quickly at a lower exposure time.

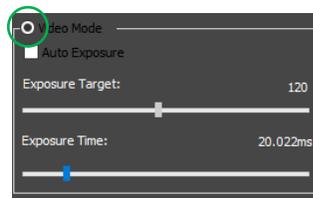
Exposures

The Mallincam **SkyRaider DS432 TEC** camera provides two different types of exposures. **Video Mode**, where exposures up to 5 seconds are taken, and **Trigger Mode** where exposures from 100 *us* to 1 hour can be taken.



Video Mode

This control allows the **SkyRaider DS432 TEC** to have an exposure up to 5 seconds (5000ms), this mode is ideal for focusing the telescope and imaging the Sun, Moon, and bright planetary objects. You can have MallincamSky automatically choose the exposure by checking the **Auto Exposure** check box, or you can set an exposure time yourself (recommended).



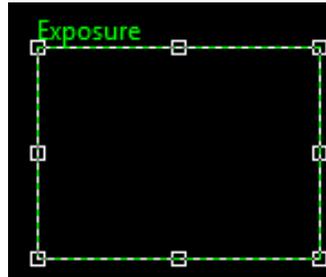
Video Mode is activated by **Left-Clicking** on the **Video Mode Radial Button**.

⇒ **Exposure Target**



MallincamSky uses the image contained in the **Green Rectangle** to aid in determining the best method to match the Exposure target number. To use **Exposure Target**, **Auto Exposure** must be checked. You can change the Exposure Target by **Left-Click-Hold and Drag** the marker bar to the required value. If you **Left-Click** on the **Slider Bar** (which selects it), you can use the **left** and **right** arrow keys of your keyboard to move the slider (this gives you more control).

When **Video Mode** and **Auto Exposure** is selected, you will see a **Green Rectangle** (labelled **Exposure**) will appear over your **Video Window**. This **Green Rectangle** is a marked region that is a reference region for judging if the image brightness has reached the **Exposure Target Value** (When **Auto Exposure** is selected). Dragging or Resizing the **Green Exposure Rectangle** to a dark area will increase the video brightness and **Dragging** it or **Resizing** it to a bright area will decrease the video brightness.



The **Green Exposure Rectangle** will be removed when you uncheck **Auto Exposure**. But if you need **Auto Exposure**, then I recommend that you enlarge the **Green Exposure Rectangle** to the full size of the **Video Window** (**Left-Click Hold and Drag**) or drag and reduce the green rectangle to a corner of the image window.

⇒ **Exposure Time**

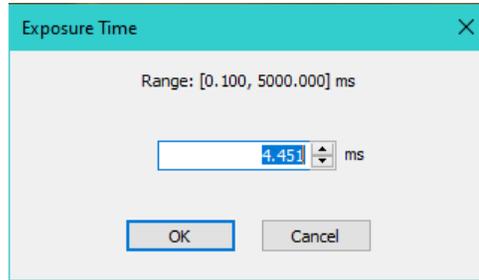


The current Exposure time is displayed above the Exposure Time slider. **MallincamSky** will display the exposure time in **ms**, from **0 ms** to **5000 ms**.

To use **Exposure Time**, **Auto Exposure** must be **unchecked**. You can modify the **Exposure Time** in three different ways:

- By **Left-Click-Hold and Drag** the marker bar to the required value.
- If you **Left-Click** on the **Slider Bar** (which selects it), you can use the **Left** and **Right Arrow Keys** of your keyboard to move the slider (this gives you more control).

- If you **Left-Click** on the **Current Exposure Time Value**, a window would open and you can enter in the exact exposure time you require. This window will also provide you the exposure limits the **SkyRaider Camera** can handle.



Do not forget to **Left-Click** on **OK** to have **MallincamSky** accept the entered exposure time.



For any exposure **over 3 seconds**, you can determine how long your camera's exposure time has left by looking at the bottom of the MallincamSky's Window. There it will indicate to you the current time used of the exposure time that you had previously set.



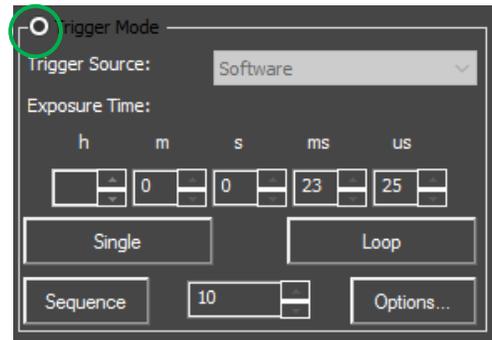
The **SkyRaider DS432 TEC** will use the following format to inform you of the current exposure condition: **Time Used/Exposure Time**

If you have enabled the **Dark Field Corrections** for this session (**Dark Fields** are stored directly in the **SkyRaider Camera** and will be deleted when the camera is turned off), the **SkyRaider** will automatically apply the best **Dark Field Correction** to your image when **Dark Field Correction** is enabled.



Trigger Mode

Trigger Mode is used mainly for exposures over 5 seconds (Deep Sky Objects). It is selected by checking the **Trigger Mode Radial Button**. This mode does not require the Green Rectangle for exposure control. But rather allows you to take a **Single** image, or to continuously **Loop** images from the **SkyRaider DS432 TEC** to check for exposure.



You have two methods of setting your exposure to a large value:

- You can **Click** in the **Time Unit Box** of choice and enter in an amount (i.e. **30 seconds**) using your Keyboard.

- You can **Click** on the **up** or **down** arrow in the **Time Unit Box** of choice to move the exposure time to your required value (**30** seconds).



Click on the **Single Button** to take a single exposure to see if the image of the object is close to the brightness you need.



If you are satisfied with the single image, then **Click** on the **Loop Button** to have the SkyRaider **DS432 TEC** continuously take images at the entered exposure value (it will change its name to **Stop**, so you can again **Click** on the button to stop the **Looping**).



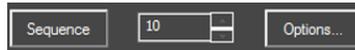
When using **Trigger Mode**, you **CANNOT** adjust the **Gain** on the fly. You must stop the **Loop**, adjust the **Gain**, check with a **Single** image, then choose **Loop** when satisfied. You **CAN** adjust **Gamma**, **Brightness**, **Contrast** on the fly in **Trigger Mode**.



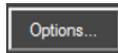
You cannot **Record** a Video sequence when **Trigger Mode** is activated and **Looping**. You must first **Stop** the **Trigger Mode**, then **Click** on the **Record** button (which will start **Looping** automatically). Once you **Stop** recording, via the Record **STOP** button, **Trigger Mode** will automatically Stop **Looping**.



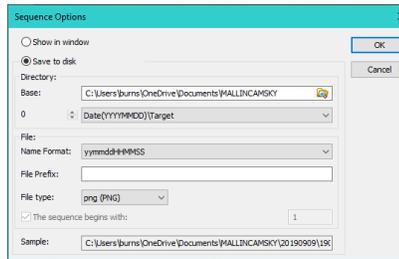
To capture a sequence of images using the Mallincam **SkyRaider DS432 TEC** in **Trigger Mode**, there is a series of command controls available for you.



Options



Clicking on the **Options** Button opens the **Sequence Options** Window.



This Window allows you to either display the sequence of automatic captures in a window on MallincamSky (not recommended... too many windows can appear) or **Save** the sequence images to a file. You have complete control, since you can choose **specific directory**, a **File Prefix**, a **numbering system**, and even a **file format** to match your preferences. See above in **Options>Preference>Record** for more details on how to use Directory, Naming, and Prefix conventions.



If **Name Format** is set to **nnnn (sequence)**, then **checkmark** the **The sequence begins with:** box, and choose the starting number.



Use this control to enter in the number of images you would like MallincamSky to save to your selected folder (from the **Options Command** above).

You will see the status of the Frame sequence by a counter located on the bottom of the Video window.



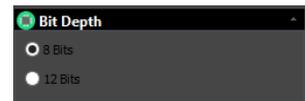
Clicking on the **Sequence Button** will start the sequence capturing process. Once Sequencing, the **Sequence Button's** name will change to **Stop**. **Clicking** on the **Stop Button** will abort the sequence process.



The SkyRaider camera **cannot be Looping** at the time you **Click** on the **Sequence Button**.



Pixel Bit Depth relates the number of bits assigned to produce a color (or shade of Gray). The larger the number of bits, the larger the number of assigned colors (or shades of Gray) that the camera can produce for Windows display.



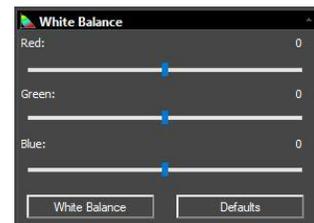
In an **8-bit** image; for each color channel (Red, Green, Blue), there are 8 bits assigned. That is, there are **256** (2^8) shades of Red, Green, and Blue available for Windows display.

In a **12-bit** image; for each color channel (Red, Green, Blue), there are 12 bits assigned. That is, there are **4096** (2^{12}) shades of Red, Green, and Blue available for Windows display.

The larger the **Bit Depth**, the larger the data, and the harder the CPU must work to produce image adjustments.



The **White Balance** control allows you to manually adjust the individual **Red**, **Green**, and **Blue** components of your image to better match your requirements. This command is available in real-time in both **Video** and **Trigger** Mode. Once this command is activated, a **Red White Balance** rectangle will appear on the screen.

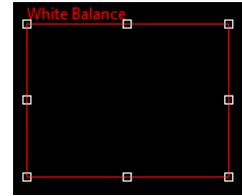


To adjust each specific colour use the **Left-Click-Hold** and **Drag** mouse technique.

Once this control is expanded, **MallincamSky** will draw A **Red Region of Interest Rectangle** on your **Video Window**. You can adjust the size and location of this rectangle by using **Left-Click-Hold and Drag** mouse techniques.



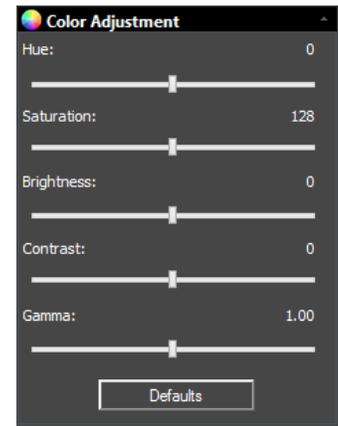
If your colors look “off”, the **White Balance** button is an automated way to adjust the colors to a more natural interpretation. **Drag** or **Resize** the **Red Rectangle** to a pure white area and **Left-Click** on the **White Balance Button** to establish the video **White Balance** for future video streaming process.



If you (or the **SkyRaider Camera**) ever get confused with what settings you have entered into the **Color Balance** control, you can reset these values back to their defaults by **Left-Clicking** on the **Default Button**.



The **Color Adjustment** control will allow you to adjust: The **Hue**, **Saturation**, **Brightness**, **Contrast**, and the **Gamma** of the object that the **SkyRaider DS432 TEC** is exposing. All elements of this command are active in real-time in both **Video** and **Trigger** Mode.



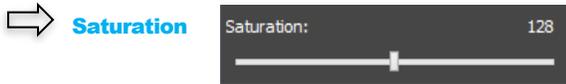
Any changes to these commands will only be display after the next camera refresh. (which for Deep Sky Objects can take a while, depending upon the exposure).

It is recommended as you become comfortable with these settings, you will determine what values are the best starting point so make a note of them so you can quickly get these values to a setting that works for you.



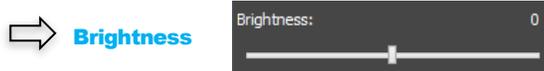
This command controls the **Hue** of the Video image. **Hue** is one of the main properties of color. By adjusting **Hue**, you are changing the balance of **Red**, **Green**, and **Blue** in the image.

You can either **use the Left-Click-Hold and Drag** technique to move the slider to the left or right, or just **Left-Click** on the **Hue’s** slider (this selects it), then use your **Left** and **Right** arrow keys on your Keyboard to adjust the value (small Hue adjustments are easier with this technique). The value of the **Hue** setting will be displayed above the slider.



This command controls the **Saturation** of the Video image. **Saturation** increases the separation of colors on a video image. It can **enhance** or **inhibit** the colors on the video image.

You can either **use the Left-Click-Hold and Drag** technique to move the slider to the left or right, or just **Left-Click** on the **Saturation's** slider (this selects it), then use your **Left** and **Right** arrow keys on your Keyboard to adjust the value (small Saturation adjustments are easier with this technique). The value of the **Saturation** setting will be displayed above the slider.



This command controls the **Brightness** of the Video image. **Brightness** makes the video image brighter or dimmer. This is a linear adjustment.

You can either **use the Left-Click-Hold and Drag** technique to move the slider to the left or right, or just **Left-Click** on the **Brightness's** slider (this selects it), then use your **Left** and **Right** arrow keys on your Keyboard to adjust the value (small Brightness adjustments are easier with this technique). The value of the **Brightness** setting will be displayed above the slider.



This command controls the **Contrast** of the Video image. **Contrast** is defined as the separation between the brightest and darkest areas on the video image. When you adjust the **Contrast**, you increase the separation between bright and dark.

You can either **use the Left-Click-Hold and Drag** technique to move the slider to the left or right, or just **Left-Click** on the **Contrast's** slider (this selects it), then use your **Left** and **Right** arrow keys on your Keyboard to adjust the value (small Contrast adjustments are easier with this technique). The value of the **Contrast** setting will be displayed above the slider.

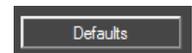


This command controls the **Gamma** of the Video image. **Gamma** adjusts the mid-tones in a non-linear manner. That is, rather than make the image look brighter; it can increase the brightness of the shadows and mid-tones, without affecting the highlights in the image (This control is like adjusting the mid-tone slider on a histogram).

You can either **use the Left-Click-Hold and Drag** technique to move the slider to the left or right, or just **Left-Click** on the **Gamma's** slider (this selects it), then use your **Left** and **Right** arrow keys on your Keyboard to adjust the value (small Gamma adjustments are easier with this technique). The value of the **Gamma** setting will be displayed above the slider.



If you (or the **SkyRaider Camera**) ever get confused with what settings you have entered into the **Color Adjustment** control, you can reset these values back to their defaults by **Left-Clicking** on the **Default Button**.



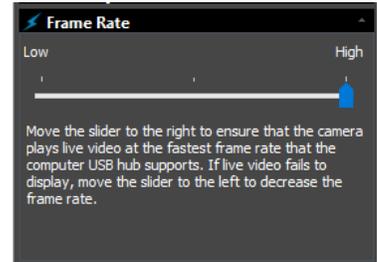


Frame Rate



The speed of the through-put on the USB 3.0 port on your computer can depend on many parameters that are specific to the processes running on your computer. This through-put can be affected by the current Windows environment, CPU, graphics cards.

Using the **Left-Click-Hold and Drag** technique, move the slider to the highest frame rate that your computer can support.



Start with the **Frame Rate** slider at the highest value, and only adjust lower if video image fails to appear. **Most** will find setting frame Rate towards the **Low** end of the scale better. If MallincamSky seems to freeze, lowering the Frame Rate can sometime resolve the problem.



Color/Gray



This control contains commands allow the SkyRaider DS432 TEC to display its displayed images in color (these colors can be adjusted using the commands seen above) or display the image in shades of grey. Some uses prefer the subtle contrast variations that a grey image provides, especially when imaging the Moon.



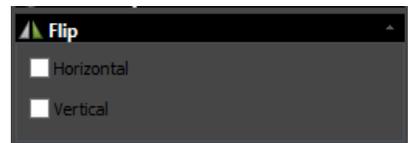
- If you require the color video to be displayed in **Color**, then **Left-Click** on the **Color** choice.
- If you require the color video to be displayed in shades of **Gray**, the **Left-Click** on the **Gray** choice.



Flip



This control allows you to **Flip** the orientation of the video image **Horizontally**, **Vertically**, or **Both**. This is a useful command, as it allows you to match the image orientation to that of the orientation of the actual object (which changes with the number of reflecting mirrors in your telescope).



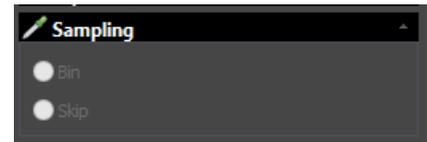
Left-Click to place a **check mark** in the **Horizontal**, and/or **Vertical** boxes to have the image immediately reflect your choices.



This control allows you to **rotate** the video image, **0°**, **90°**, **180°** or **270°**. Just click on the radial button that matches your desired rotation (**0°** is back to normal).



This control contains commands that are only enabled on those **SkyRaider Cameras** that support binning, currently the **DS432 TEC** does not support Binning.



If you require to **Bin** or **Skip** your video sampling rate from the **SkyRaider Camera**, then this control allows you to select and/or change the current setting.

Bin refers to the method of combining (averaging) pixels of block of neighboring same color pixels to resize the video to a lower resolution (can increase video frames/second).

Skip (also known as decimation) means that a certain number of pixels is not read out but skipped (horizontally, vertically or in both axes). This reduces resolution of the resulting video but introduces subsampling artifacts.

Left-Click on the required button to select the Sampling technique you need.



Not all SkyRaider cameras support this control.



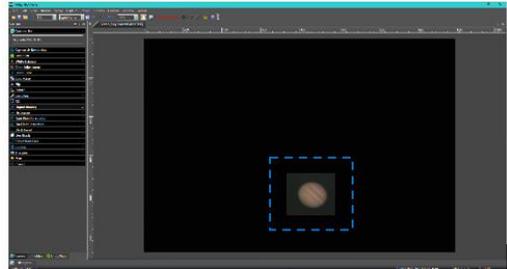
ROI or **Region Of Interest** allow you to isolate the rectangular portion of the video image that you may be interested in. You will lose you **Dark Field** using this control.

When you are recording video images of planetary objects, the size of the video can grow very quickly. The **ROI** allows you to instruct MallincamSky to only show and save a specific area of the screen (a smaller region that just contains the image of the planet as indicated by a blue rectangle). This has 2 benefits: smaller files sizes, and as a bonus will allow for a faster frame rate.

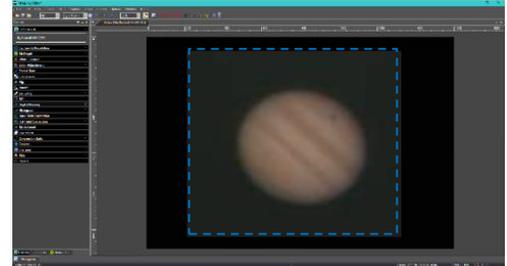


The **ROI** command only works in real-time while the **SkyRaider DS432 TEC** is in **Video Mode**. To set **ROI** in **Trigger Mode**, the **Looping** must be stopped. Then **ROI** can be adjusted and then **Applied**, then restart **Looping** to see the adjusted region.

When selected, a **Blue Rectangle** will appear over your **Video Window**. You can adjust it using the **Left-Click-Hold and Drag** technique or **Left-Click-Hold and Drag** to place it over a specific portion of your **Video Window**.



Once you have resized and placed the **Blue ROI Rectangle** on your **Video Window**, **Left-Click** on the **Apply Button** to selection this as the **New Video Window**. Then the **Next Refresh** will fill in the **ROI window**.

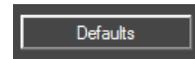


You can then resize the **New Video Window** by either the **Drop-Down Size** command in the **MallincamSky Tool Bar** or by scrolling the wheel on your mouse (if your mouse has a scroll wheel).

This command allows you to **Zoom** in on a specific area of your original Video image.



If you (or the **SkyRaider Camera**) ever get confused with what settings you have entered into the **ROI** control, you can reset the **ROI** to its full screen by **Left-Clicking** on the **Default Button**. You may need to set **Fit to Window** in the **Drop-Down Size** command in the **MallincamSky Tool Bar**.



If you are trying to improve the frame rate (frames per second) when viewing planetary objects. By selecting a **Region of Interest** around the planet will allow MallincamSky to only capture that **ROI** portion of the whole image. As a result, the frame rate will dramatically increase.

You can also manually set the size of the **ROI** by **clicking** on either the **horizontal** or **vertical** size indicator in the **ROI Tab**. A Window will open-up that allows you to manual select the Horizontal or Vertical size as determined by you.

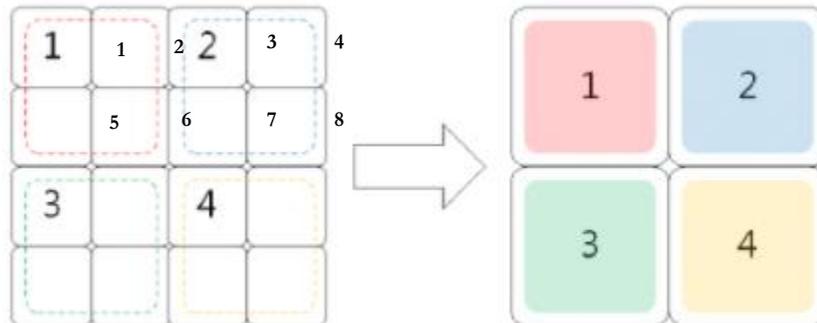




Digital Binning

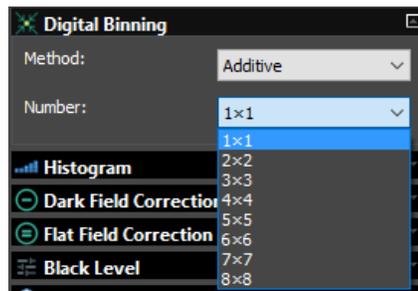


This process allows you to increase the sensitivity of the Mallincam Camera by providing you the option of combining sensor cells together to increase the photon capture area. For example, a 2 x 2 binning will link 4 cells (in a 2 by 2 array) together, so you have about 4 times the capture area than one cell. But remember nothing is free, it gives up the number of horizontal and vertical pixel resolution by that same factor. You can have the Mallincam either Average the pixels or Add the pixels. The supported Binning available is 1x1, 2x2, 3x3 and 4x4. As an added bonus, Digital Binning helps increase sensitivity and reduces noise to some extent by improving Signal to Noise Ratio.



As a user, you will decide as to what level of Digital Binning you will use. You can use a shorter exposure time to achieve an image, but the image will cover more space on the chip.

When you select the **Digital Binning** Tab, it opens to provide the following settings:



Method

You have two choices here, either **Additive** or **Average**. **Additive** will shorten the exposures as it adds the values of the combined pixels. **Average** will keep the exposure about the same, but it will average the combined pixels, so producing a sharper image for the resolution. For Deep sky objects you might choose **Additive** to produce an image quickly, and **Average** to produce a sharper image with more detail. For Planets and the moon, try **Average** to see if it improves your image's detail. Trial and error to see which is best for your environment.

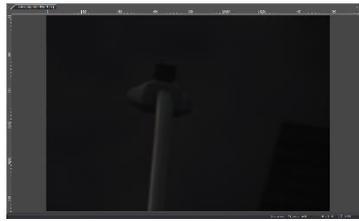
⇒ **Number**

You now have the choice of the type of resolution and binning to use:

Binning	1600 x 1100
1 x 1	1600 x 1100
2 x 2	800 x 550
3 x 3	532 x 366
4 x 4	400 x 274
5 x 5	320 x 220
6 x 6	266 x 182
7 x 7	228 x 156
8 x 8	200 x 136



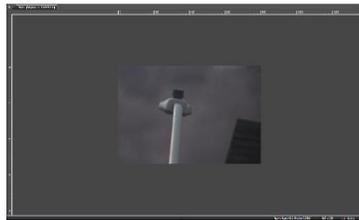
For each higher binning level you choose; the video screen window size will reduce (as you are combining more pixels as one), effectively lowering the number of pixels in the image resolution. You can use the Zoom controls to increase the image size to your needs.



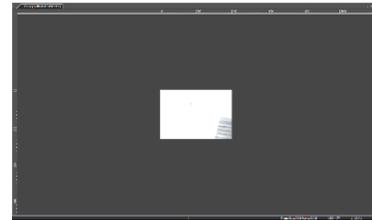
1 (additive)



2 (additive)



3 (additive)



4 (additive)

You will notice that the brightness of the image will dramatically increase with the larger binning number when **Additive** is chosen (resolution will decrease), so you will need to adjust the exposure setting accordingly.

Usage suggestion in digital binning.

Use the large value **4 x 4** or **3 x 3** to shorten the exposure time, so that you can quickly locate (and if necessary, focus) the deep sky image you are interested in. Then choose a smaller **2 x 2** or **1 x 1** binning to produce a more detailed (higher resolution) image.

The DS2.3, DS16, and DS10 cameras have large chips, so using binning setting will still provide enough resolution (and Size) to image most deep sky objects.

Dark Field subtraction in Digital Binning

You must make **Dark Fields** with the same **Digital Binning** settings as you image, or else weird looking effects will occur. We suggest saving a set of **Darks** for each of the binning modes.

Use a naming convention and/or a file location so that it is easy to not only choose the correct Darks for a binning setting, but with-in that binning setting a Dark that match your exposure and other settings.



If you find that the video window size doesn't want to return back to its **1 x 1** full screen, just select the **Video Mode**, then return back to **Tigger Mode**.



Histogram



A **Histogram** illustrates how pixels in an image are distributed by graphing the number of pixels at each color intensity level. The **Histogram** shows detail in the shadows (shown in the left part of the histogram), mid-tones (shown in the middle), and highlights (shown in the right part). See Appendix for more information on **Histograms**.

A **Histogram** can help you determine whether an image has enough detail to make a good correction.

The **Top Segment** in the expanded **Histogram Control** shows the **real-time Histogram** of current active video.



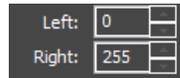
This **Histogram** control, as compared to the top line **Icon Histogram control** allows you to make real-time adjustments to the settings to improve the image.

Two vertical **line markers** (white) show the **upper** and **lower** limits of the intensity levels. These markers can be dragged with mouse (**Left-Click-Hold and Drag**), or you can enter in specific values (**left** and **right**) to place the vertical Line markers.

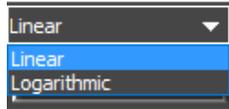
You use the **Histogram** to aid you in determining the best exposure value for your particular object. But try not to get too aggressive, as you can easily clip (remove) important data from your image. Since you are astro-imaging, the bump of the histogram should be about $\frac{1}{4}$ from the left as the image will contain a larger amount of black.



If you are looking at a color image, the **Histogram** will reflect the **RGB** (Red, **Green** and **Blue** channels histogram at the same time) values with shading of the same color. You can also use the **Pull-Down** to select the **Histogram** for just the **Red**, or just the **Green**, or just the **Blue** channel.



You can also directly enter the desired values in the **Left** or **Right** boxes below the **Histogram chart** for both **Left** and **Right** Histogram boundaries.



You can select how you would like the Histogram data displayed. You have a choice of either **Linear** or **Logarithmic**.



Left-Click on the **Defaults Button** to return the **Left** and **Right** Histogram boundaries to their original settings.



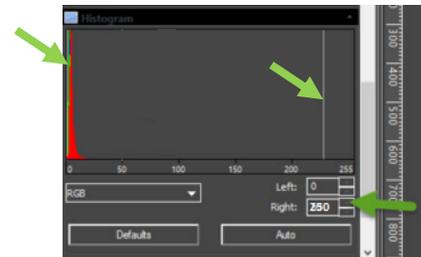
Left-Click on the **Auto Button** to automatically locate the **Left** and **Right** boundaries thus letting MallincamSky determine the best video quality.

Set the exposure so that the **Peak of the Histogram** is some place between **50** and **100**.

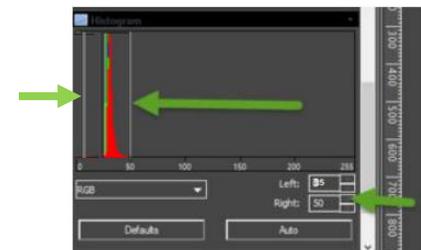
To illustrate what you can do with the Histogram, I have (thanks to **Jim Meadow's** amazing images) included some before and after pictures.

- **Increasing** the **Left Bar Darkens** the image
- **Decreasing** the **Right Bar Brightens** the image

The following **Before** image is a 3 second exposure with **Left at 0** and **Right at 250**



The following **After** image, same 3 second exposure, with the **Left at 25** and the **Right at 50**



Notice that in both Histograms, the data was **mostly** to the left. This tells we have some exposure room the play with. Do not forget **Gain** and **Brightness** also has a role as well.



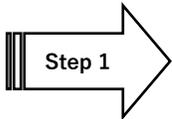
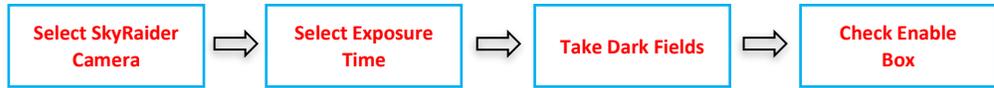
Dark Field Correction



What makes the **Mallincam SkyRaider** series of cameras unique is the built-in ability to take **Dark Fields**.

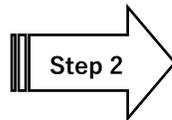
The best explanation of what a **Dark Field** is came from **Simon Hammer**. See Appendix for his explanation.

To have the **SkyRaider** camera to automatically apply **Dark Fields**, you need to follow the following procedures before imaging.



Step 1

Select the **SkyRaiderDS432 TEC** from the **Camera List** in the **Camera Tab**.



Step 2

Select an **Exposure Time** for **Dark Field Correction** and **Start Exposing**, at this point **Dark Fields** are not being created, it is just the DS432 taking timed images.

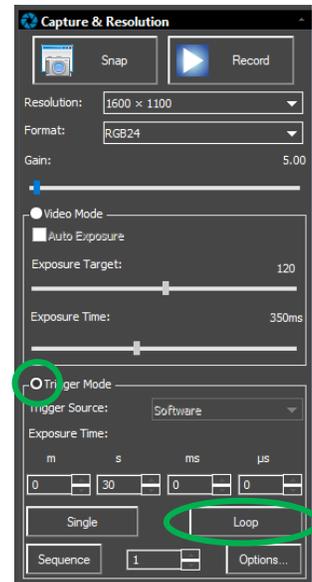
With the **Camera Tab** selected on the **Left SideBar**, **Left-Click** on the **Capture & Resolution**. The **Exposure & Gain Window** will expand allowing you to select the exposure time for the **Dark Field**.



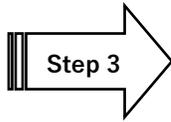
You must determine what you believe will be the maximum exposure for this session. As, you will create **Dark Field's** with this time (or close to it). Also, to want to try to match the other settings in the DS432 TEC in the **Dark Field** as you would have when imaging the Object.

If you are taking a maximum exposure under 5 seconds, then select **Video Mode**, but since most **Deep Sky Objects** will require an exposure of over 5 seconds, choose **Trigger Mode**.

Either enter in the time into the appropriate boxes or use the up and down arrows beside the chosen Exposure time unit to set your maximum time.



Start the SkyRaider DS432 TEC taking continuous exposures by **Left-Clicking** on the **Loop** button.

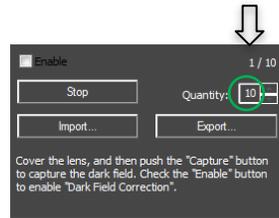
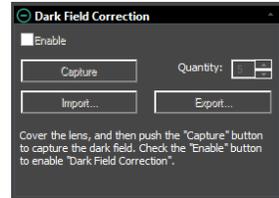


Step 3

Ensure that the cover is either on the **SkyRaider Camera** or the Telescope itself is covered, then **Left-Click** on the **Dark Field Correction Line**.

The **Dark Field Correction Line** will open allowing you to select the **Quantity** of **Dark Fields** and the option to start the **Dark Field Capture** process.

Select up to **99** (it is recommended to start from 5 to 10) for the **Quantity**, then **Left-Click** on the **Capture Button**. MallincamSky will now create the **Dark Fields**. The Software will display its progress above the selected **Quantity**. Remember, it is beneficial to set the **Dark Field** exposure time greater than the longest time you will be imaging at. The longer your intended exposure, the larger the suggested **Quantity** of **Dark Fields** you should take.



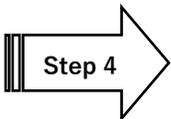
As the **Dark Fields** are being exposed, you can watch the **exposure counter** in the **Dark Field Correction Tab** go up, and on the bottom right side of the MallincamSky window, you will see a counter letting you know how long is left in that particular exposure.



Once you have finished taking your **Dark Fields**, don't forget to **remove the lens cap** on your camera (or Telescope), so that you can continue imaging your object (I won't mention any names...).



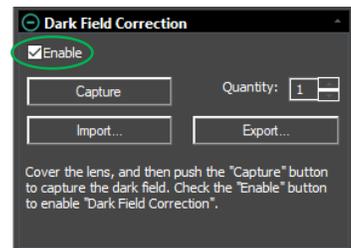
Once you have collected your **Dark Fields**, you can then **save** them with the **Export Button** (choose a location and File name that allows you to locate the correct **Dark Fields** in case you would like to reuse them. Name the folders so that it is easy to retrieve **Dark Fields** that match for current imaging plan (60 s times 5). You can load previously saved **Dark Fields** via the **Import Button**. Just browse to the folder where you saved them when you used the **Export Button**.



Step 4

To activate the **Dark Field's** just **Left-Click** in the **Enable check box** in the Dark Field Correction's box to have **Dark Fields** applied in real time to your images.

To image without using Dark Fields, just uncheck the **Enable checkbox**.



It is important that you try to match the **Dark Fields** with the same **resolution, gain, black level, gamma**,... as would with your image, else the results will not look as great as they could.



Flat Field Correction

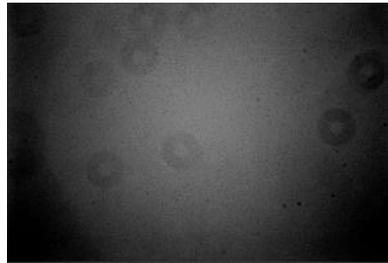
Flat Field Correction

Introduction:

When imaging using a CCD/CMOS device, and when trying to use those images for scientific purposes, it is essential to reduce the amount of unwanted signal and unwanted noise from each image frame. The optical path “noise” (some of which is actually signal), is such a problem that many astronomers had to suffer with. The resolution to this problem came from the use of Flats and applying those Flats to the images.

Optical Path Noise:

Telescopes, CCD/CMOS chips, filters, lenses all block light as well as transmit light. They also harbor dust, fingerprints, and other unwanted shadow producing things in the light path. The result of such optical path obscuration is an unevenly illuminated CCD/CMOS chip. These noise variations are usually caused either by variances in sensitivity from pixel to pixel, or by the telescope optics. Main causes due to the telescope are vignetting and out-of-focus dust on one of the lenses in the optical system. This is a real challenge for anyone doing real science or pushing their images to the highest level. Optical path vignetting, and other physical path obstructions will also cast large, non-discernable shadows onto your CCD/CMOS, causing poor even illumination across the image field. Flat fields are used to remove variations in the brightness of pixels across the CCD chip. The plan is to then “subtract” this consistent noise from the images being produced by the camera.



Taking Flats:

A Flat Field is an image taken of an evenly illuminated object like the dusk sky, or a special illuminated white card hanging on the wall of the observatory or even a white T-shirt placed over the telescope.



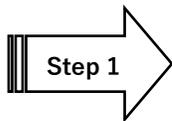
These images are ideally taken through the telescope:

- at the same temperature as your nightly images
- through the same filter/s as your nightly work.
- Do not change your imaging train (this include adding or subtracting filters, extenders, reducers, or even rotating the camera) after you have taken your flats.
- with integration times to allow the flat to produce an image that captures of “noise”, but Flat images should never bloom, but should also not be less than a second in integration time.

For precision work, 5 to 30 or more flats at an exposure of not greater than a couple of seconds. You want an image that shows the faults, not one that is over exposed. Practice, Practice, and yes, even more practice to get the flats correct. Each flat will then be averaged together to create a master flat which is then divided out of your light frame on a pixel by pixel basis.

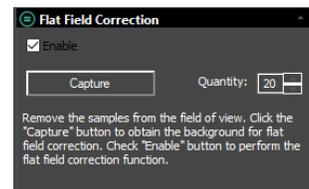
Visit the following site for before and after images when applying Flats:

<http://theworldofastronomy.blogspot.ca/2016/04/astrophoto-flat-field-illustration.html>

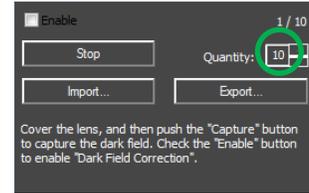


Ensure that you are pointing the telescope at your Flat Field source (dusk sky, white board), select an exposure time, then **Left-Click** on the **Flat Field Correction Line**.

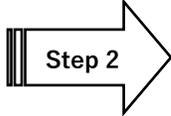
The **Flat Field Correction Line** will open allowing you to select the **Quantity of Flat Fields** and the option to start the **Flat Field Capture** process.



Select up to **99** for the **Quantity**, then **Left-Click** on the **Capture Button**. The Software will display its progress above the selected **Quantity**. Remember, the images you select the more averaged will be the Flat Field.

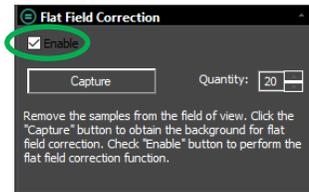


As the Flat Fields are being exposed, you can watch the **exposure counter** in the **Flat Field Correction Tab** go up, and on the bottom right side of the MallincamSky window, you will see a counter letting you know how long is left in that particular exposure.



Step 2

To activate the Flat Fields just **Left-Click** in the **Enable check box** in the Flat Field Correction's box. All subsequent images will have the Flats automatically removed.



To image without using Flat Fields, just uncheck the **Enable checkbox**. With the **Flat Field enabled**, any



Black Level



Black Level is defined as the level of brightness of the darkest (blackest) part of the image. In technical terms, the black level is the pixel level (in electrons, or volts) which corresponds to a pixel value of zero. The Black level adjustment on the MallincamSky allows you to adjust that value using the slider.



The slider provides you a range of subtle darkness adjustments from a starting point of **0** to an end point of **31**. In using this control, you can tweak your image to slightly "brighten" (towards level 31) or "dim" (towards level 0) the starting point for the image's blackest location.

Using this slider allows you to define what you believe (based on your current image) should be the optimum black. This control is most useful when you are experiencing a glow due to a bright object near the object you are imaging, and you want to tweak the darkness.

You can use the **Black Level** to shift the peak of your histogram towards the right, this way it moves the left most starting point away from the left side and thus you can avoid clipping the blacks from the image.

Since MallincamSky gives you the ability choose the **Black Level** for the camera, you can use this feature to assist in reducing the **amp glow** present in your image, You can also use the Black Level to create a well-balanced dark background against the stars in your image.

Just have fun and experiment, as every telescope and seeing conditions provide for a different environment for the SkyRaider.



Live Stack



MallincamSky comes with the ability to stack images to improve the signal to noise ratio. This feature will allow you to stack short exposures to produce an image that otherwise would have required a larger exposure time. Thus, you will obtain a brighter image that contains less noise. It also provides a technique of averaging images to reduce noise and improve overall final preview. This command allows users, whose equipment will not allow for long exposures (such as Alt-Az Mount), the ability to combine images on the fly (but can also be very beneficial to all mounts).

The following images captured live illustrate the advantages of Stacking:



M5, a **single** 5 second exposure using SkyRaider DS16CTEC on 10" VRC.



M5, **two** 5 second exposures stacked using SkyRaider DS16CTEC on 10" VRC.



M5, **three** 5 second exposures stacked using the SkyRaider DS16CTEC on a 10" VRC.



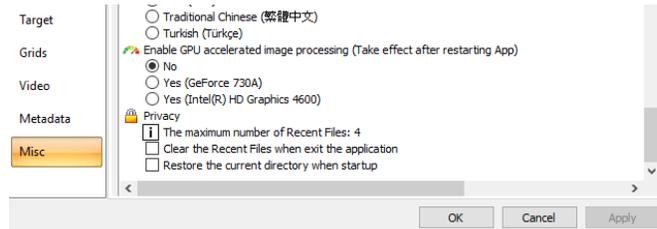
M5, **four** 5 second exposures stacked using the SkyRaider DS16CTEC on a 10" VRC.



M5, **five** 5 second exposures stacked using the SkyRaider DS16CTEC on a 10" VRC.

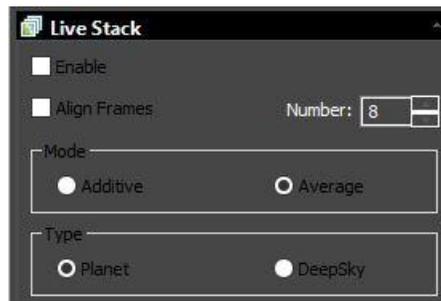


Live Stacking can task your CPU and USB port (plus other internal Windows OS stuff). If your computer has a **GPU** (Graphics Processing Unit), then you can tell MallincamSky to use it via the **Options>Preference>Misc** control.

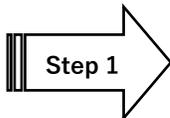


Left-Clicking on this command will open the **Live Stack Window**

We will see that there at two types of stacking (**Additive** and **Average**). You will use **Additive** to increase the image brightness, and you will use **Average** to decrease the noise (becomes less grainy).



Here you can activate the stacking by check-boxing the **Enable** and you can have MallincamSky **Align** the frames by checking the **Align Frames Box**. You can select the number of frames you would like stacked in the **Number Box**. You can tell MallincamSky if you would like the images **Added** (made brighter), or **Averaged** (made sharper), plus indicate is you are stacking **Planets** or **Deep Sky Objects**. This command will provide a live status of its stacking process in this Window.

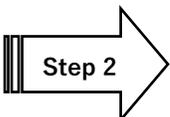


Step 1 First select the object Type (**Planet** or **DeepSky**)



Planet: Aligns on large objects in the image.

DeepSky: Aligns on the stars in the image. **We recommend using DeepSky**

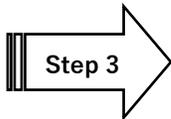


Step 2 Now select if you would like the images Stacked (**Additive**) or Averaged (**Average**) by making a selection in the **Mode Box**. We recommend using the **Average** setting since it will produce a smooth detailed image.

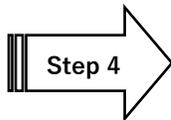


Additive: Adds the corresponding pixels. The more frames that are added, the fainter details then become more apparent and can very quickly increase the image brightness. (We recommend only using for outreach).

Average: Takes an average of the corresponding pixels to help reduce the grain and thus improve the images (noise) in the image. If this is selected, the Number command (see below) does not play a role. This command will continuously average the next image into the previous average images. After about 20 to 30 average stacked images, changes become hard to notice.



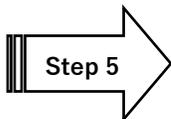
Next enter in the **Number of Frames** you would like stacked. You can stack from **1 to 99** Frames. This control only works with the Additive stacking command above.



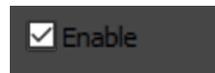
Now determine if you would like the Stacking process to **Align** the Frames. This will produce a better Image but will take a bit longer. The process examines the image and determines alignment stars for the process. If there are not enough alignment stars, then the command will indicate that there is a problem and you may need to increase the gain or exposure to produce more stars for the alignment routine.



We recommend aligning the frames, so check the **Align Frames Box**. (else you may obtain a Pink Floyd psychedelic effect for the image).



Start the Stacking by checking the **Enable Box**.



The stacking process will keep you informed with its status by indicating you what the current **input** stacking number is, what the current **output** (how many frames are stacked), and via the status, if there are any issues.

If you told MallincamSky to stack 5 images, then when the 6th image is taken, it will keep displaying just the last 5 images stacked (the first image will be removed, this is a rolling stack).



You can disable the Stacking process by just **unchecking** the **Enable Box**.



Do not be afraid to also turn on **Dark Field** Subtraction to help eliminate the background noise.



If the Status tells you it has an alignment failure (Not enough Stars), then just increase the gain. This should make more stars available to the alignment algorithm, so try again.



Conversion Gain



A **Higher Conversion Gain** means higher sensitivity, as one signal electron can be more easily detected. The high-CG sensor shows a noticeably clear responsivity advantage; however, the tradeoff is clearly seen in the much lower full-well capacity as the sensor's linear range ends at a much lower exposure.

- **Low Conversion Gain (LCG)** for large charge handling capacity in bright scenes.
- **High Conversion Gain (HCG)** mode with increased sensitivity and low read noise for lowlight scenes, providing tremendous benefit for real time imaging.

The LCG mode is comparable to the old NO GAIN, while the HCG mode was comparable to the 2x gain is HCG. The tradeoff is the effective-lower readout noise and doubling the signal output, while halving the dynamic range.

Use the appropriate mode to either push the sensitivity (decreases the dynamic range) or increase the dynamics range (decreases the sensitivity). The choice depends upon the object being images. Experiment.



HDR is not available in the **DS432 TEC** camera

The following images illustrate the benefits of using HCG. In both images the exposure time was the same. The left image had **LCG** checked, while the right image has the **HCG** checked.



LCG



HCG

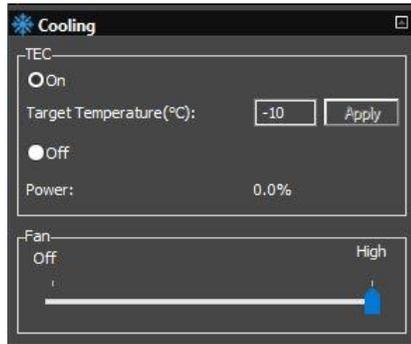
➤ Cooling 

The **12V power cable** must be attached to the **DS432 TEC** for the **FAN** and **TEC** features to be available.



The MallinCam **SkyRaider DS432 TEC** comes with both a **Fan**, that can aid in cooling the camera when conditions are getting warm, and a **TEC** (Thermoelectric Cooler).

The internal **TEC** unit is controlled with the MallinCamSky software, allowing you to set the temperature. The **SkyRaider DS432 TEC** is designed for consistent, reliable Deep-Sky imaging at up to about **-45°C** below the ambient temperature.



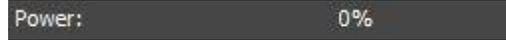
Activate **TEC** by clicking in the radial **On** button, then enter a **Target Temperature °C** value into the box (**0°C** is recommended, but some users are having the best success at **-10°C**). It is also recommended that the temperature value you enter in the box be no more than **45°C** cooler than the ambient temperature the **DS432CTEC** camera is sitting in.

The ideal temperature choice will of course depend upon many factors (ambient temperature, humidity, gain...), so you will need to experiment with your system. I was having best success at about **-10°C** with the gain set at 400.

So, if the temperature is **30°C** outside where the camera is located, then set the Target Temperature to **0°C** and then **left-click** on the **Apply** button to activate it (the **FAN** and **TEC** lights on the back of the camera will light up to indicate activation).



Once activated, it will take a few minutes for the temperature inside the SkyRaider **DS432CTEC** to stabilize. The power capacity that the **TEC** inside the camera is currently using is displayed inside the **TEC** box.



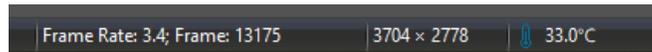
When the temperature is stabilized, this power reading should be well below 100%.



If the power continues to remain at 100%, then change the **Target Temperature's** value to a lower number (as too much effort is used to cool the camera).



MallincamSky displays the current temperature of the **SkyRaider DS432CTEC** on the bottom right corner of the screen.



If the **Fan** is turned **Off**, then **TEC** is automatically turned off, and the **Fan** automatically turns to **High** when **TEC** is activated. If you are finished using **TEC**, leave the fan **On** to allow sensor to climatize itself to the current temperature.



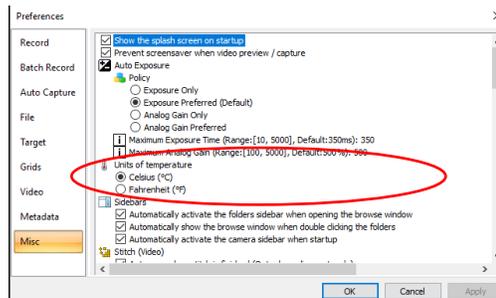
Remember that it is wise to create **Dark Frames** with **TEC** on if you are using **TEC** (this way you have a set **with TEC** and a set **without TEC**). Most expert imagers will even create a set of dark frames for specific range of temperatures. But, hey that is up to you and how much effort you need to put into the preparation for that perfect image.



If you save an image in **FITS** format, the temperature reading is included in the **FITS Header** for that image.

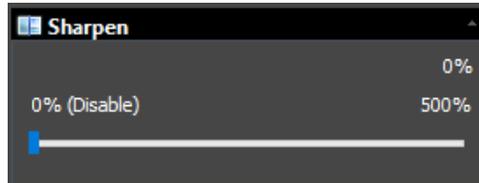


For our American friends, you can change the Temperature unit form **Celsius** to **Fahrenheit** in the **Options->Preference->Misc** location.

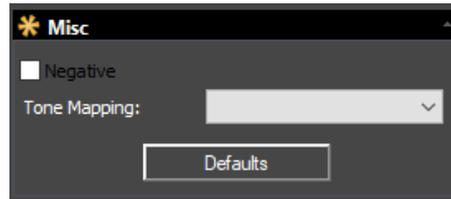




This control allows you to sharpen the image. Remember that being too aggressive will induce some rough edges around your images. Just use the slider to sharpen the image from none to 500%



Currently this control will allow you to display the image in its **inverse**. That is, white background with black stars. Just use the check box to activate and uncheck to return to normal image mode.



The **Preset** control allows you to:

Load a previous set of camera control parameters or **Save** the current camera control parameters for another session. The parameters include most of the settings in the **SideBar** including the **Rectangle Regions of Interest**.



The **Drop-Down** control provides a list of previous (if any) saved parameter settings. Just select the parameter session that you require from the list.

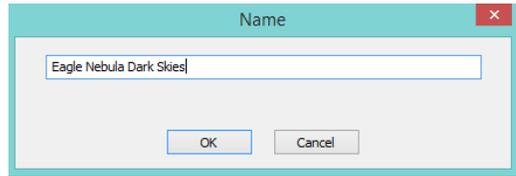


Left-Click on the **Load** command and it will load the control parameters from the above file in the **Drop-Down List**.



Left-Click on the **Save** command and **MallincamSky** will open a window that will allow you to give a name to the current sessions, and then will save the current camera parameters under that name (see **Management command** below).

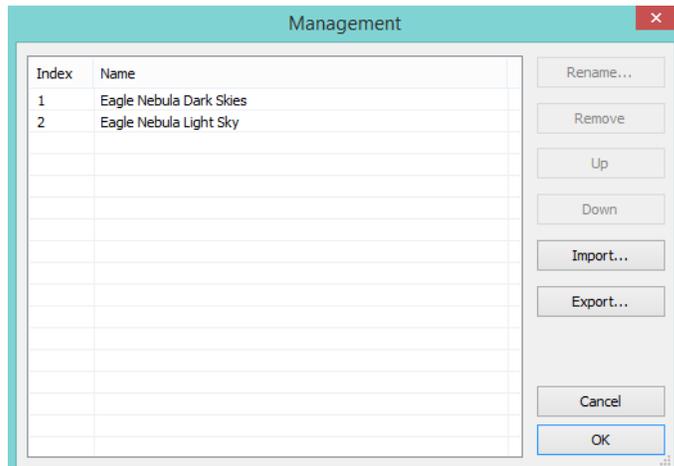
Give a **Name** that is easy to determine what the parameters in the file contain. That is, choosing a name like **Eagle Nebula Dark Skies**, would indicate that the parameters in the File are designed for the Eagle Nebula when you have great dark skies.



Left-Click on the **Overwrite** command and it will overwrite any setting changes you made to the current parameter file.



Left-Click on the **Management** command and a **Management Dialog Window** will open.



This **Dialog Window** will allow you to:

- **Rename** the **Preset File** name
- **Remove** the **Preset File** from the computer
- **Re-order** how the Parameter names appear in the list.

The **Management Dialog** will also allow you to export **all** the **Parameter Files** to a ***.pgt** file, so that you can send this ***.pgt** file (which contains **all** of your parameter files) to a colleague.

The **Management Dialog** will also allow you to import a friend's **set** of parameter files (single ***.pgt** file which contains **all** of their parameter files) into your MallincamSky folders.



When you import a set of parameter files into your system, **it will overwrite all of your Preset files**. So, use caution. See **Hint** below.



After you have created a list of parameter files that you are using. **Save** them in a **Preset File Folder** (pick a **location** and **name** for **This Folder** such as **Preset Files**) on your computer under a name that indicates that these files are yours (such as **Michael's SkyRaider-DS432CTEC Preset Files for New Hamburg**).

This way you can save a **another set** of Preset files for another **SkyRaider Camera** In the same folder (**Preset File Folder**) this way you can load Preset files for a specific camera. Also, you can also include other colleagues Preset files in the same Folder (**Anita's SkyRaider-DS432CTEC Preset Files for Toronto**). This allows you a method to reload your Preset files after trying colleagues (and not have them overwritten).

Preset File Folder

- Michael's SkyRaider-Dsc Presets File for New Hamburg
- Michael's SkyRaider-DS432CTEC Presets File for New Hamburg
- Michael's SkyRaider-Dsc Presets File for Mount Forest
- Michael's SkyRaider-DS16CTEC Presets File for Mount Forest
- Anita's SkyRaider-Dsc Presets File for Toronto
- Anita's SkyRaider-DS23CTEC Presets File for Toronto

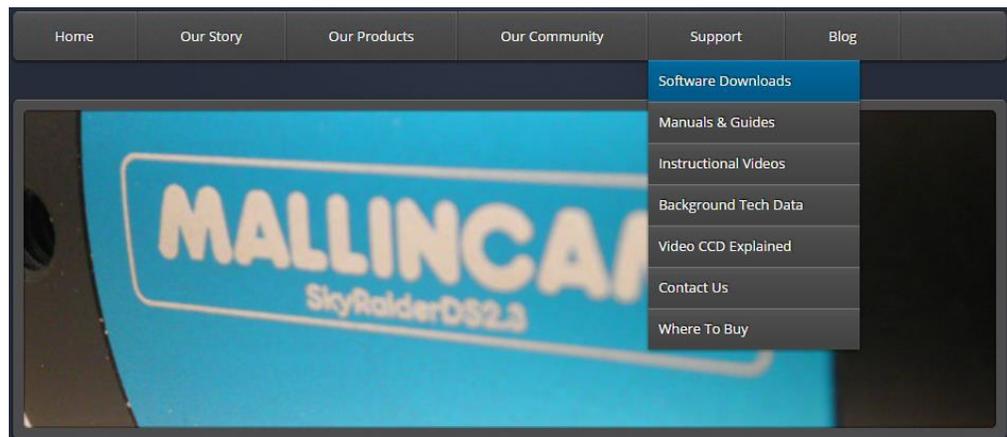
Michael's SkyRaider-DS432CTEC Preset File for New Hamburg

- Eagle Nebula Dark Skies
- Eagle nebula Light Skies
- Focus and Go to Parameter

C5: Installing Optional Software



Visit the **Software Downloads** Page in the Support Tab located on the website:
www.mallincam.net



Locate the latest version from the list and **Click** on the Blue **Click Here** Button to download the Drivers and MallincamSky Software for a Windows PC.

SkyRaider Series MALLINCAMSKY Complete Software Package November 26, 2019 [Click Here](#)



If you have a Mac, or Linux computer, there are drivers and software located in the downloaded zip file.

Your Browser should download a zipped file called mallincamsky2019mmdd (the last eight number may be different as they will change if software is updated)

Place your mouse on the zipped file, **Right-Click** to pop-up an **Action Window**, and choose **Extract All ...**

Just **Click** on the **Extract** button when the next Window pops-up. Windows should now open the actual folder that contains the software to install.

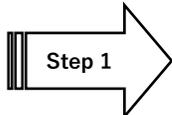


Double-Click on the extracted folder to open it up, revealing the main Driver and Software folder, **Double-Click** on this to open it up, revealing its contents.

Name	Date modified	Type	Size
ASCOM DRIVER	2018-05-05 11:32 ...	File folder	
DIRECTSHOW DRIVER	2018-05-05 11:32 ...	File folder	
LINUX SOFTWARE	2018-05-05 11:32 ...	File folder	
MAC SOFTWARE	2018-05-05 11:32 ...	File folder	
WINDOWS APPLICATION	2018-05-05 11:32 ...	File folder	

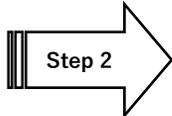
The **ASCOM DRIVER** folders contains the ASCOM Drivers for the camera
 The **DIRECTSHOW DRIVER** folder contains the Direct Show Drivers for the camera
 The **WINDOWS APPLICATION** folder contains the camera control software.

⇒ **Installing MallincamSky and its Driver**



Step 1

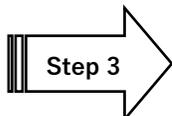
Double-Click on the **WINDOWS APPLICATION** folder to open it up.



Step 2

Double-Click on the **MALLINCAMSKYSetup** file and follow instructions to install the **MallincamSKy** software and drivers onto your computer:

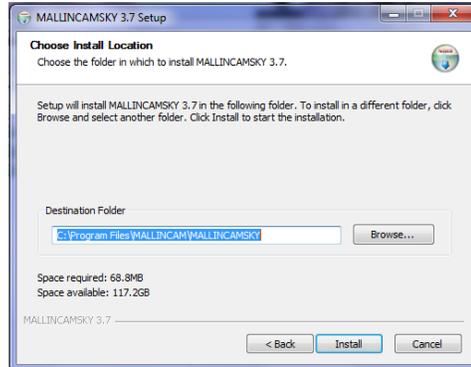
The following **MallincamSky Setup Screen** will then appear:



Step 3

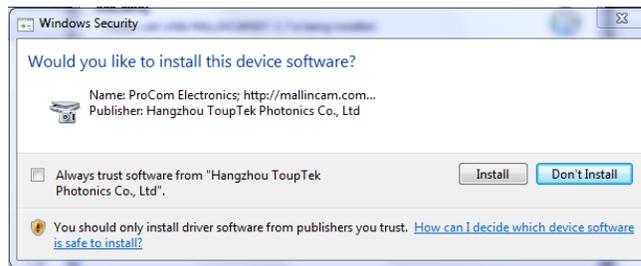
Click on Next to start the installation process.

The installation program now wants to know where you would like to install the software. Either choose your own location or select the **default**.



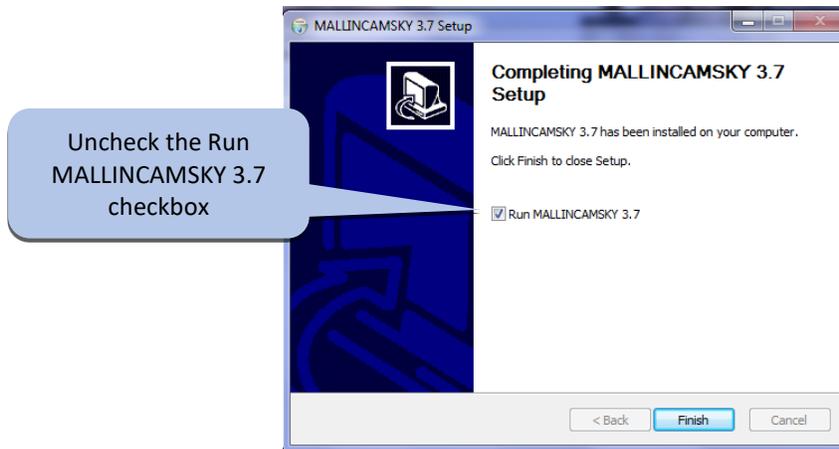
Step 4 Click on **Install** to proceed.

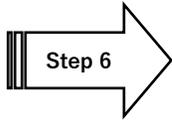
Windows may again ask for permission to install the device software.



Step 5 Click on **Install** to accept.

The **MallincamSky Software** will take about a minute to be installed. When completed, the following screen will appear:





Step 6

Click on **Finish**, and the **MallincamSky** Icon will appear on your screen.



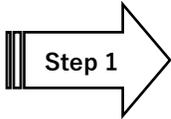
MallincamSky and its drivers are typically all you need to install to control the DS432 camera, but if you would like to have other image programs control of the DS432 then you can install two other optional drivers: ASCOM and DIRECTSHOW



Installing DirectShow Driver



DirectShow drives provide an alternative way for third party software to control most (but not all) of the aspects of the SkyRaider camera. Look for the Mallincam name in the camera selection routines of those software packages.

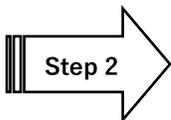
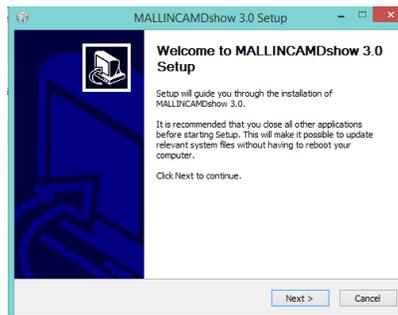


Step 1

Open the **DIRECTSHOW DRIVER** folder, then locate and **Double-Click** on the **MALLINCAMDshowSetup** File.

Windows may display a warning asking for permission to run the program, if it does, select **YES** to continue.

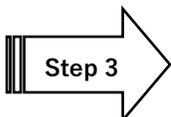
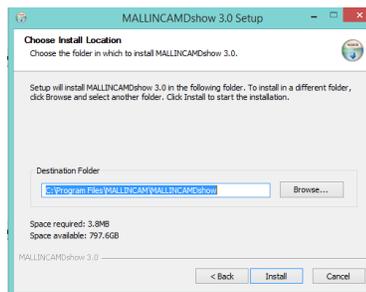
The following **MallincamSky Setup Screen** will appear:



Step 2

Click on **Next** to start the installation process.

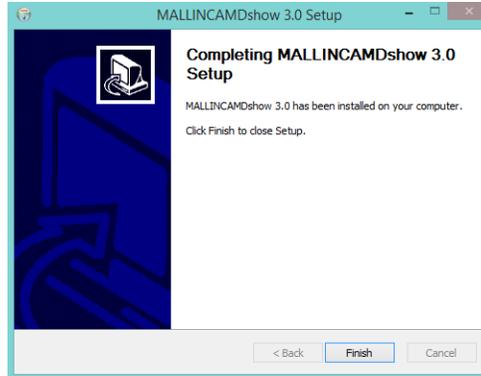
The install **Location Window** will open, asking for the Destinations folder to install the drivers. We recommend using the default location.



Step 3

Click on **Install** to start the installation process.

The final window will appear. This window just wants to inform and have you acknowledged that the setup is completed.

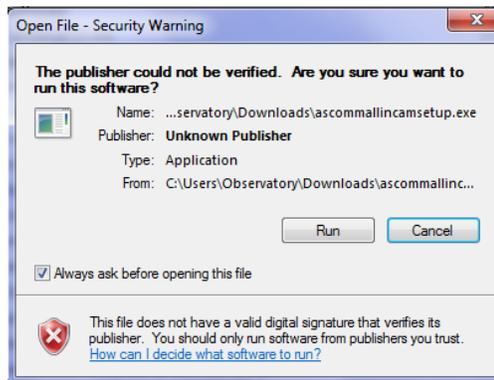


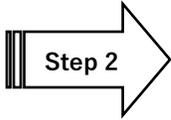
Step 4 → Click on **Finish** to close the process.

→ **Installing Mallincam ASCOM Driver**

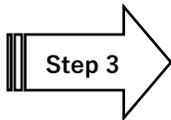
 **You must have already installed** the latest **ASCOM Platform** on your computer (www.ascom-standards.org).

Step 1 → **Double Click** on the **Driver** to install it onto your computer system (Windows). Depending upon the version of Windows, the following screen might appear.

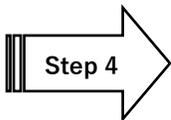
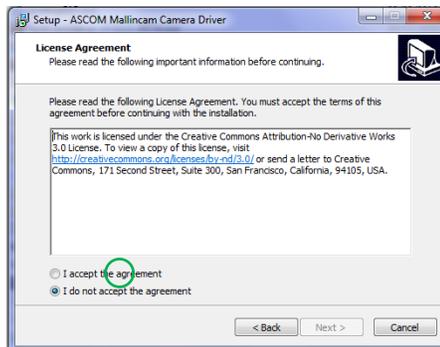




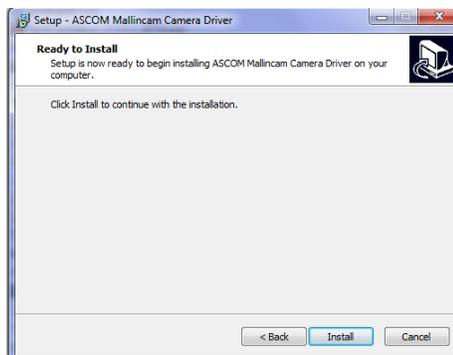
Click on the **Run Button**. The following Window should now Pop-Up.

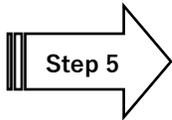


Click on **Next to Continue**. The **License Agreement Window** should now appear.

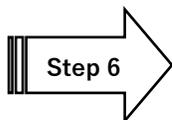
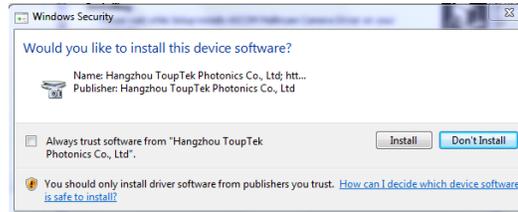


Click in the '**I accept the agreement**' Radial Button, then **Click on Next**. The **Ready to Install** Window will appear.





Click on Install to install the ASCOM Driver. Depending upon the version of Windows, you may see the Following Pop-up. **Install** it.



The installation process will provide you with the final Pop-up window to inform you that the installation was successful. Click on the **Finish** Button to acknowledge.



Chapter

6

C6: Using Third Party Software



Keeping in mind that the SkyRaider DS432 TEC is a video imager rather than a dedicated single shot camera, we can control the camera with other 3rd party software products via the DirectShow driver or the ASCOM driver.

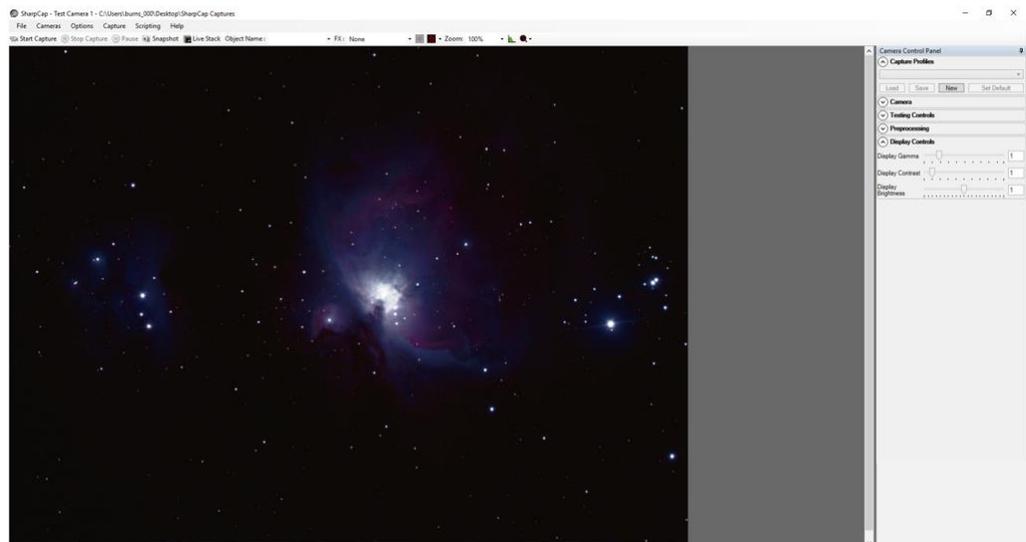
**ASCOM Note**

When displaying image using a third-party software of a color camera using RGB, the image will not appear in color (it can appear checkered). This is because Image data from colour cameras in RAW format always needs to be 'de-bayered' to obtain a colour image.

**Imaging in SharpCap**

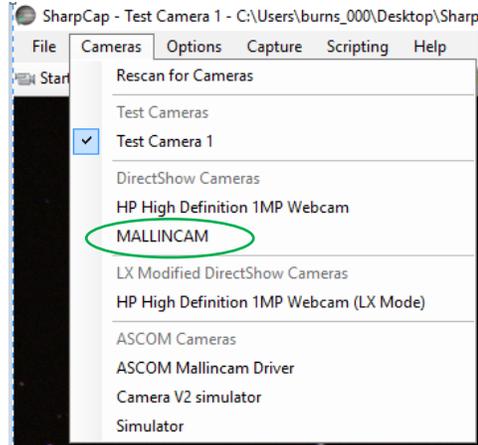
Now this is the first generation of DirectShow/ASCOM driver interaction with SharpCap and as such, not all the commands are perfected for user control.

SharpCap can be obtained at <http://www.sharpcap.co.uk/>

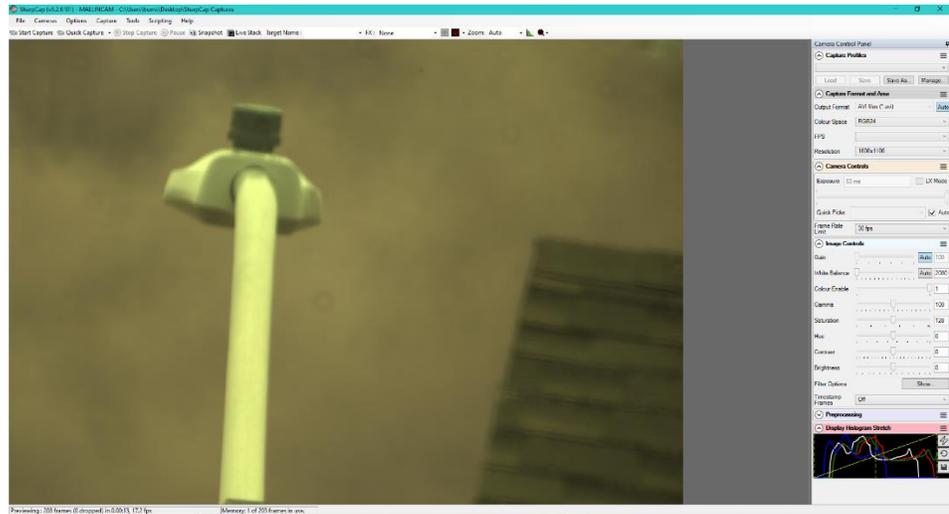
**Start SharpCap**

⇒ Chose Cameras (DirectShow)

From the Top Heading Tab, chose Cameras, then in the **DirectShow Cameras**, pick **MALLINCAM**.



Once you have selected, the **Mallincam Directshow Driver**, SharpCap will display what the SkyRaider is imaging.



The controls on the right of the screen (**Exposure, Gain, Gamma, ...**) allow you to change the settings of the SkyRaider.



If you cannot control the exposure from Sharpcap, use the Video capture Filter below to change the exposure.

It takes a bit of practice to become familiar with the settings as these are more generic controls, the majority of the controls have their own scales (the exposure does not indicate seconds, but has an equivalent range from 0 seconds to 5 seconds). You will need to record those numbers to assist you.

SharpCap recognizes that the DS432CTEC does have an **extended mode** for exposures that are over 5 seconds.

To turn on the **extended mode** (over 5 seconds), then enable the **LX Mode** in the **Options Tab** on the Top of the screen. This lets the exposure slider now provide exposures over 5 seconds (even though you don't actually see the time on the slider). **Disable LX mode** to return to the 5 second max exposure.

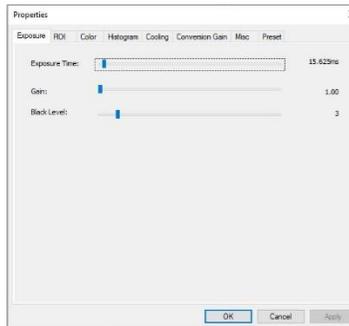
SharpCap will display the exposure you have set on the bottom of the SharpCap window after the first exposure is taken.



SharpCap can Pop-Up the SkyRaider **Video Filter** (DirectShow control window). Click on the Show Button in the **Video Capture Control**



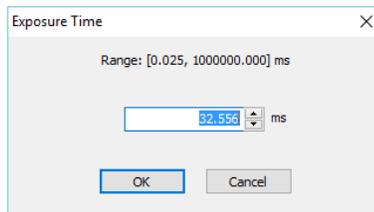
The Pop-Up Window gives you some familiarity with settings as it provides you with more comfortable units (exposure time in ms).



You can choose the **Exposure Tab** in the **Filter window** to slide the **Tab** to match the exposure time in **ms** (divide by 1000 to get seconds).

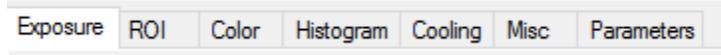


You can also **Click** on the **Time setting** on the right of the **Slider** to Pop-Up a window that allows you to directly enter in the time in **ms**.



You can also control the **Gain** in the window.

The other Tabs in the Window will also you to adjust other settings in the SkyRaider Camera.



Once you are comfortable with the settings, **Click** on the **OK** Button in the Properties window to close it.



SharpCap will start the imaging process and will, on the bottom of the window, display information about the exposure and remaining time. You can watch the green status bar move to the right as the exposure is being taken.

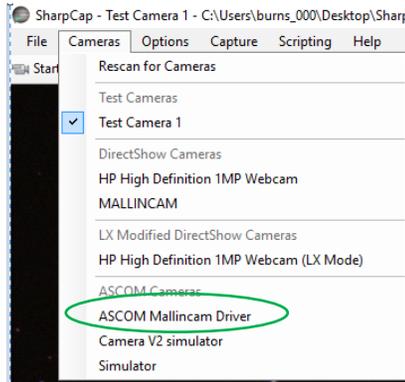
6603 frames (0 dropped) in 0:26:55, current exposure 19.9s, last frame 0.0s (estimated)

Frame: 00:02/00:18

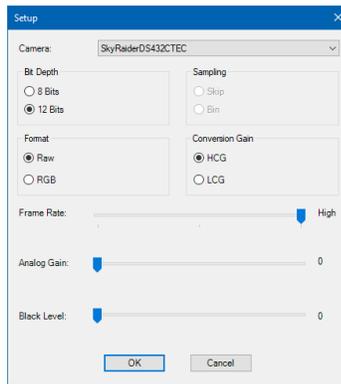


Chose Cameras (ASCOM)

From the Top Heading Tab, chose Cameras, then in the **ASCOM Cameras**, pick **ASCOM Mallincam Driver**.



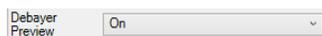
Once you have selected, the **Mallincam ASCOM Driver**, SharpCap will open a setup window.



It is from here that you get to choose **Bit Depth** and **Format**.



Raw Internal format: you will need to select **Debayer Preview** to **On** to see image in color





The controls on the right of the screen (**Exposure, Gain, Gamma, ...**) allow you to change the settings of the SkyRaider.



If you cannot control the exposure from Sharpcap, use the Video capture Filter below to change the exposure.

It takes a bit of practice to become familiar with the settings as these are more generic controls, the majority of the controls have their own scales (the exposure does not indicate seconds, but has an equivalent range from 0 seconds to 5 seconds). You will need to record those numbers to assist you.

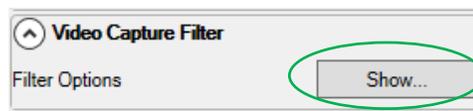
SharpCap recognizes that the DS432CTEC does have an **extended mode** for exposures that are over 5 seconds.

To turn on the **extended mode** (over 5 seconds), then enable the **LX Mode** in the **Options Tab** on the Top of the screen. This lets the exposure slider now provide exposures over 5 seconds (even though you do not actually see the time on the slider). **Disable LX mode** to return to the 5 second max exposure.

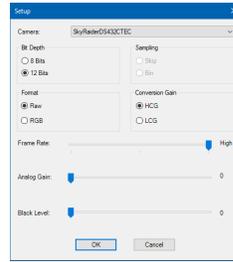
Sharpcap will display the exposure you have set on the bottom of the SharpCap window after the first exposure is taken.



SharpCap can Pop-Up the SkyRaider **Setup** (ASCOM control window). Click on the **Show Button** in the **Video Capture Control**



This window will allow you to change the **Format** and adjust the **Gain** and **Black Level**.



SharpCap will start the imaging process and will, on the bottom of the window, display information about the exposure and remaining time. You can watch the green status bar move to the right as the exposure is being taken.

6603 frames (0 dropped) in 0:26:55, current exposure 19.9s, last frame 0.0s (estimated)

Frame:  00:02:00:18

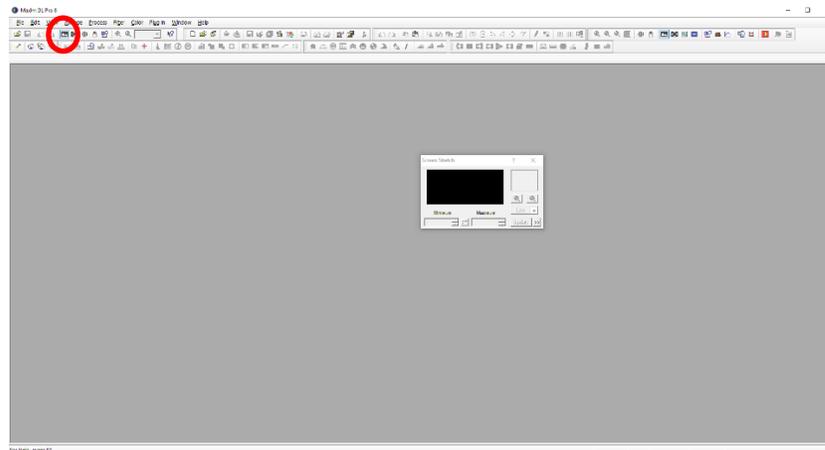


Imaging in MaximDL

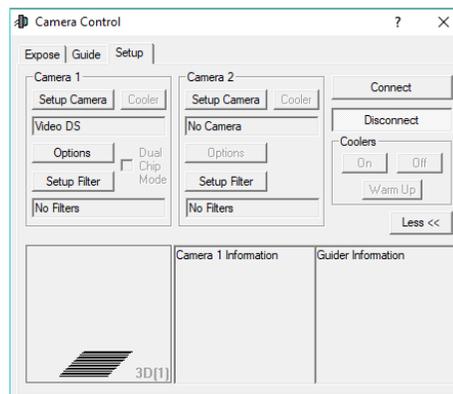
MaximDL is an image acquisition and composition software tool.



Start MaximDL

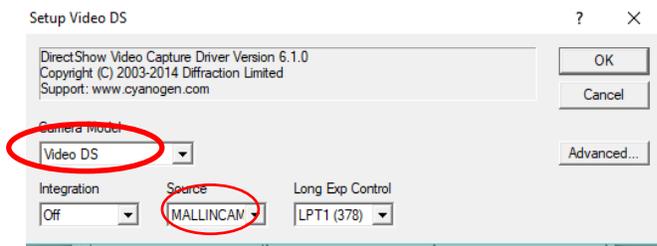


Click on the Camera Control Icon



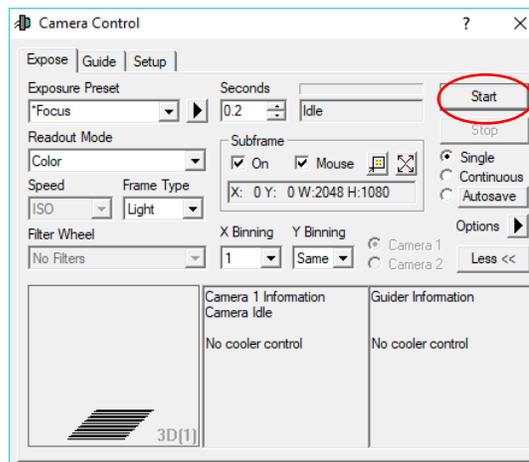
Select **Video DS** from the Setup Camera button, and **MALLINCAM** as the Source.

MALLINCAMSKY DS432TEC USER MANUAL

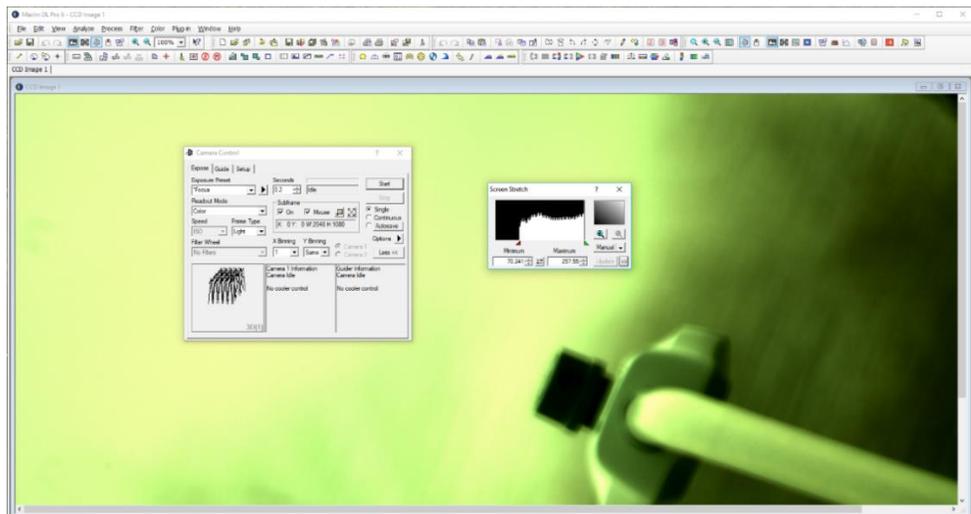


You will be presented with a live video window from the DS432CTEC, just minimize this window.

⇒ Chose **Expose** and **exposure time, Binning**, etc... then **Click on Start** to take an image.



Have fun and see what you can do.

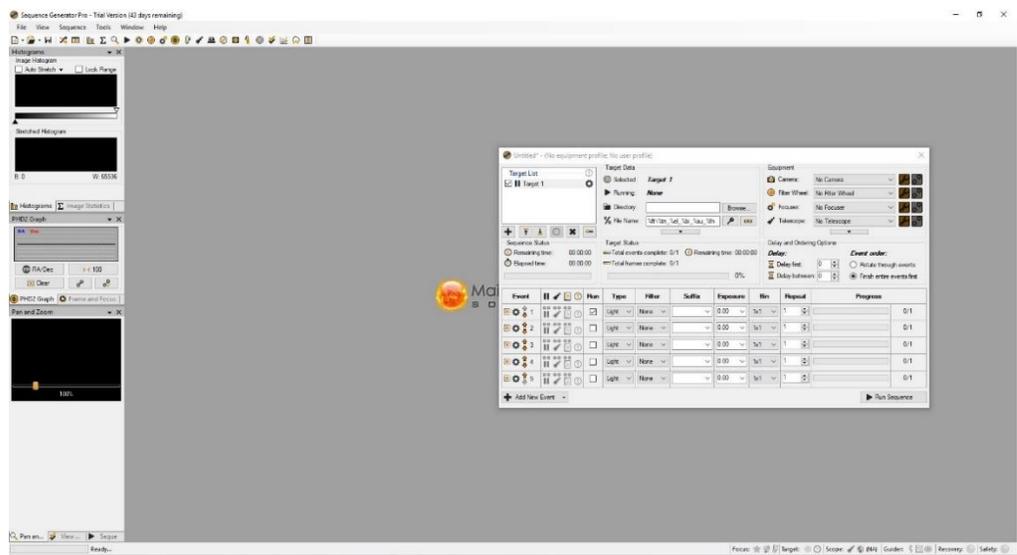


➤ Sequence Generator Pro and SkyRaider DS432CTEC

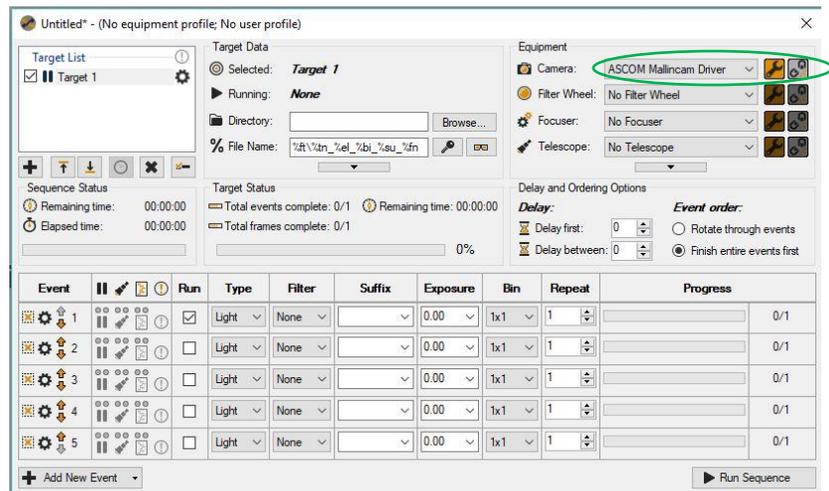
Sequence Generator Pro is a software package that can execute complex sequences of capture events which will allow you to spend more time using and less time fighting with your equipment. You have lots of hardware that is sometimes difficult to get it all working together. Sequence Generator pro work with ASCOM-based SkyRaider DS16CTEC.

Make sure you are using the latest version of ASCOM (both the **ASCOM core** and **ASCOM Mallincam Driver**).

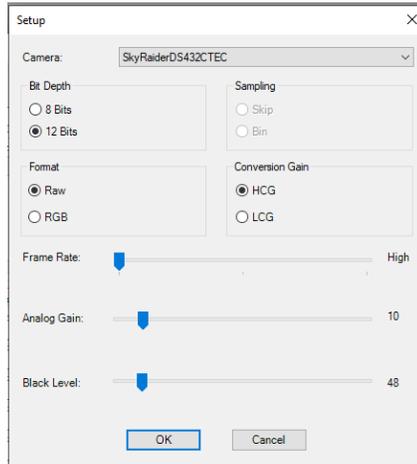
➔ Start Sequence Generator Pro 



➔ Select **ASCOM Mallincam Driver** as the camera in equipment profile

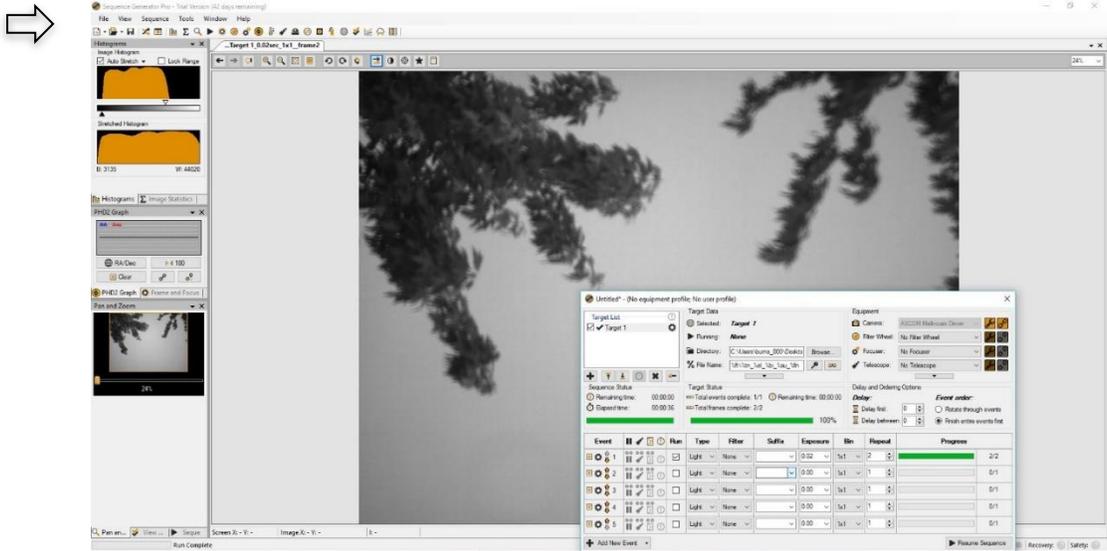


⇒ Select the required resolution and ensure that you are using **Raw** as the format.



☞ Your images will appear **Black and White** with a checkered look. This is normal if you are using a color camera since you will need your image processing software to debayer your saved images.

Start **Running Sequences** based on your needs.



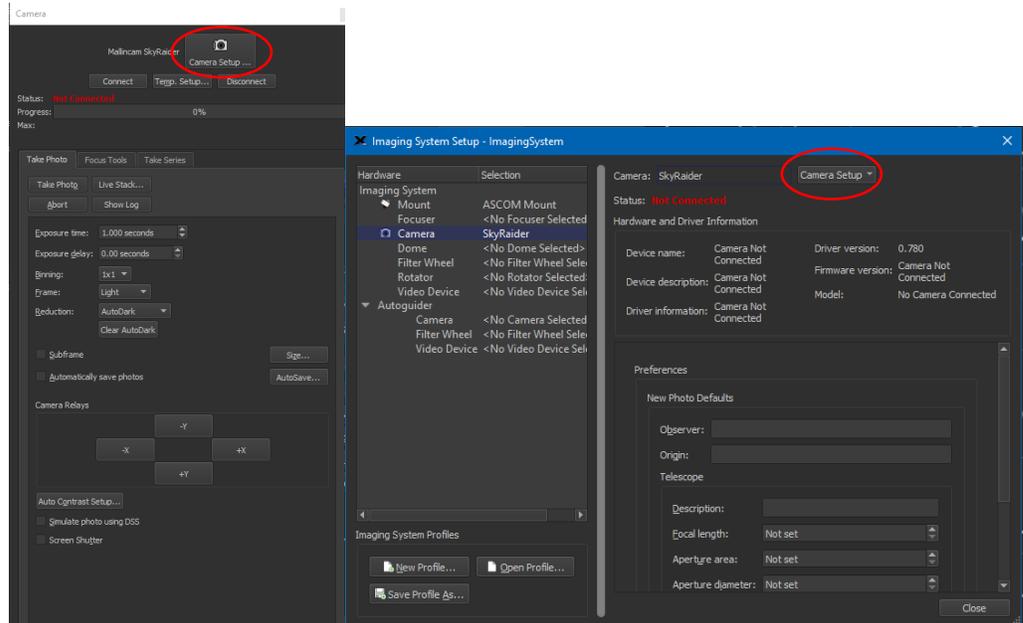
☞ If you are using Sequence Generator Pro then you will need to save flats, biases, and darks as you would with every other camera.

The SkyX and the SkyRaider DS432CTEC

The SkyX is a telescope control software package, that can perform many tasks that are related to controlling a telescope. One of the capabilities is using a camera to assist in aligning (T-Point) and locking onto objects using a camera.

We can have The SkyX use the Mallincam DS432CTEC for this process.

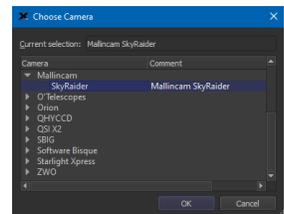
- ⇒ Click on **Camera Setup** from the Camera Tab in SkyX. This will open The **Imaging System Setup** Window. **Click on Camera Setup** drop down in this window.



- ⇒ Select **Choose** from the Drop-Down list.

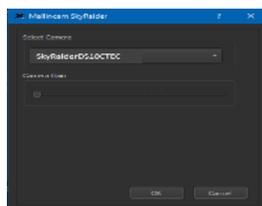


- ⇒ SkyX will open a list of supported cameras, chose **Mallincam SkyRaider** from the list. Hit the **OK** button.



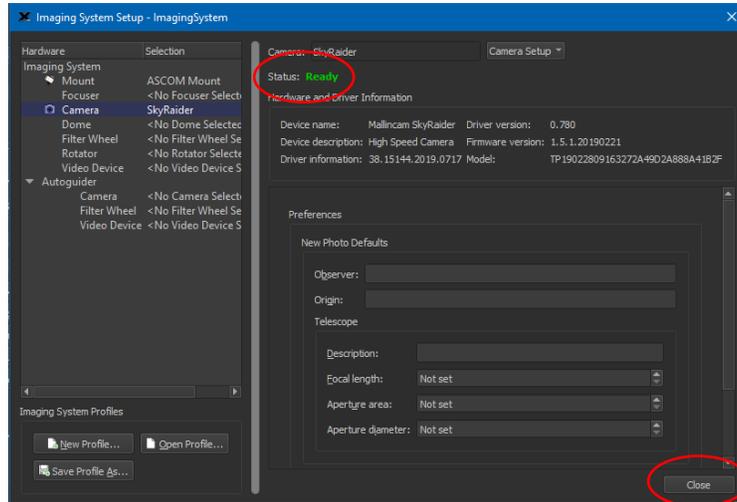
- ⇒ Select **Settings...** from the **Camera Setup** drop down list.

- ⇒ Select your Mallincam Camera from drop down list and hit **OK**.



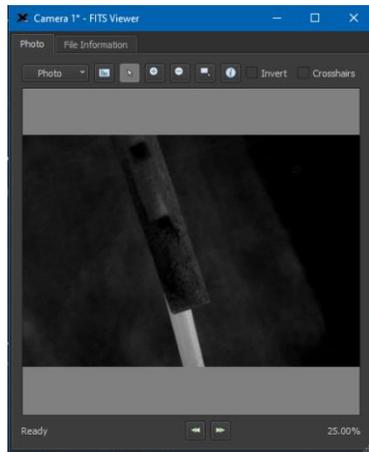
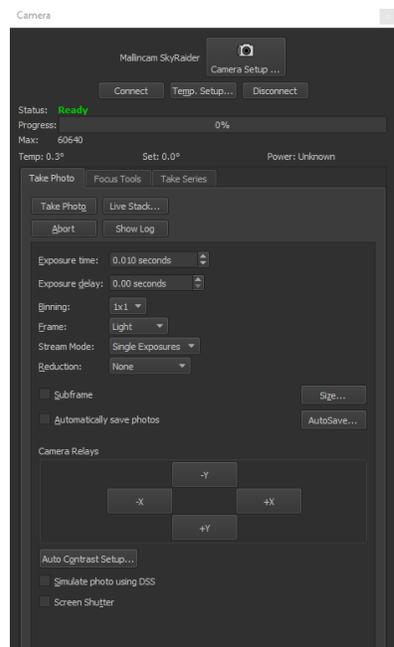
- ⇒ Select **Connect** from the **Camera Setup** drop down list (the fan on the camera should start).

The status should now say **Ready** as the **Status:** in the Setup Window. You can now close this window.



⇒ Now from the **Camera tab** you can enter an exposure time, binning amount, stream type (single exposure), frame type (light), saving parameters

⇒ Once you have the settings selected, **Click on the Take Photo** button and SkyX will take a photo.



☞ A Quick frame viewer will popup displaying the FITS image for you. Recall that RAW FITS images are in Black and white and will need to be debayered to see color.

☞ The LTI version of SkyX automatically debayers the images.



C7: First Aid



This chapter deals with issues and questions that you may have after using MallincamSky for a while or have encountered a problem that you do not know how to resolve.



How do I



How do I get rid of the Green Exposure Rectangle?

First remember the **Green Exposure Rectangle** is only used for the **auto-exposure** process, but it can be annoying when you are imaging.

- The way to remove it from the Video Window is to **uncheck** the auto-exposure box.



If you require the **Exposure & Gain Control** to be expanded and auto-exposure turned on, but still do not want the **Green Rectangle** in the middle of your screen, try this.

- Chose **Fit to Window** from the **Zoom** Drop down Box (on the **Icon Tool Bar**). Now just drag the **Green Rectangle** (**Left-Click and Hold** technique) to the lower left of the window.
- Next grab one of the corners of the **Green Rectangle** and drag it to the matching corner of your **Video Window**. Next, grab the opposite corner of the **Green Rectangle** and drag it to the same location as the first corner. This will make a zero-size rectangle.



How do I Select a part of the Image and Zoom in?

- In **Video Mode**, expand the **ROI** control (a **Blue Rectangle** should appear around you image). Using the **Left-Click Hold and Drag** technique, maneuver, and size the **Blue Rectangle** so that it encloses the area you are interested in. **Left-Click on Apply** and watch the part of the image in **Blue Rectangle**, be the whole image in the **Video Window**.
- Now, **Left-Click** in the **Blue Rectangle**, and use the scroll wheel on your mouse to enlarge or reduce the image (you can also use the **Fit to Window** control on the **Icon Tool Bar**).
- **Left-Click on Defaults** to get back to Full screen.
- See **ROI** section in Manual for creating an **ROI** in **Trigger Mode**.

**How do I automatically save 1 image every 30 seconds?**

- Choose the **Time-Lapse (Auto Capture)** from the **Capture Menu** on the **Top Menu Line**. Now determine your naming convention and location.
- Enter **30** in the **Time slot**
- Enter the total number of images you would like (or leave unchecked, and you will manually stop the process when you are ready).
- **Left-Click** on **OK**

At the bottom of the MallincamSky Window, a running count will be displayed.

- **Left-Click** on **Stop Time-lapse (Auto Capture)** to stop the process.

**How do I adjust the brightness in my monochrome SkyRaider?**

You will have noticed that the **Brightness** command in the **Color Adjustment** control is deactivated. You can use the **Gamma** command (moving it to the left will brighten the whole image, but the better control is the **Histogram** command in the **Side Bar**).

By moving the **Left Marker Line** or the **Right Marker Line** (or a combination of both) to the left will brighten up you image in a more controlled manner.

**How do I Broadcast my image onto Night Skies Network (NSN)?**

As a direct way is not yet available, you will need to use a third-party software to assist you.

Obtain one of the following: **KVYcam**, **WebCam Max**, **SplitCam** (different opinions on which is the best, it becomes a personal preference). Each of these software programs will allow you to capture what is happening on your computer screen. The software packages also act as a webcam to NSN.

Therefore, whatever screen image these software packages are capturing, will display on NSN as a webcam image.

See **Setting up to Broadcast on Night Skies Network** in the **Appendix** for more detailed instructions.

**Can I Use MallincamSky with One SkyRaider and Auto-Guide with another?**

Yes, you can open multiple instances of MallincamSky, plus you use **DirectShow**, **WDM** or **ASCOM** with the second **SkyRaider**.

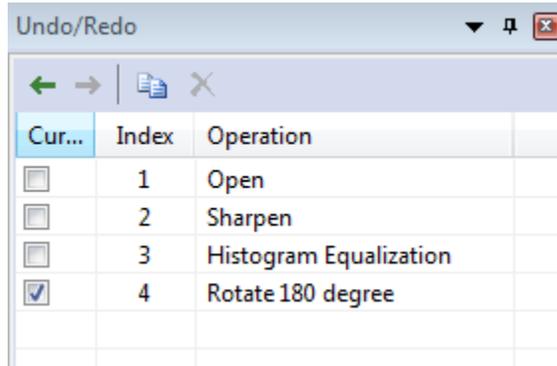
**How Do I Pause the Video?**

You can Pause or Resume the live video by either choose **Setup>Pause** from the **Top Menu Line**, or even easier, just press on the **pause key** on your keyboard.



How do I Undo an Operation?

On the **SideBar**, there is an **Undo/Redo Tab**; Just **Left-Click** on the Tab and it will open with a list of all the operations you have performed on your Image (not Video, you cannot undo video operations such as contrast).



Just **Left-Click** on the location before the operation you would like to undo and **MallincamSky** will revert the image back to that step.



How do I make my ROI the whole Image Again?

Just **Left-Click** on the **Defaults Button** in the **SideBar's ROI** control. Note, by changing the **ROI**, the **Dark Fields** will be removed from the **SkyRaider**.



How do I Turn Off Dark Field correction?

Just **Left-Click** in the **Enable** box to remove the check mark in the **Dark Field** correction control on the **SideBar**. Place a checkmark back in the **Enable** box to reactivate Dark Field correction.



How Do I take Another Dark Field?

Just retake the Dark Fields and it will overwrite the previous ones.

Note: If you save (export) the current Dark Fields, you will have the option of bringing them back in at a later date.



My ROI Window is Black?

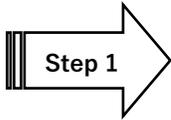
You must wait until the next exposure until the ROI Window gets filled. This can happen on longer exposure times.



Upgrading my SkyRaider Camera Software

Rock has his software engineering team always looking at improving the software to make it work better for you. Once an update is made available, you will be notified on the Mallincam Groups website: <https://groups.io/g/MallinCam/topics>.

There are a variety of ways of updating the software, but the following method seems to have the best success rate when working with Windows.

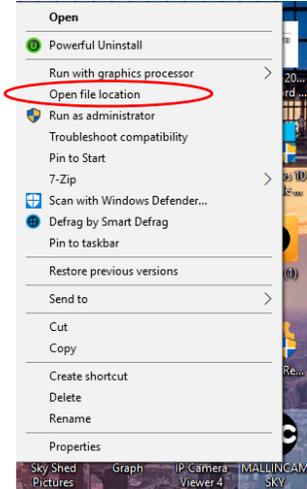


Step 1

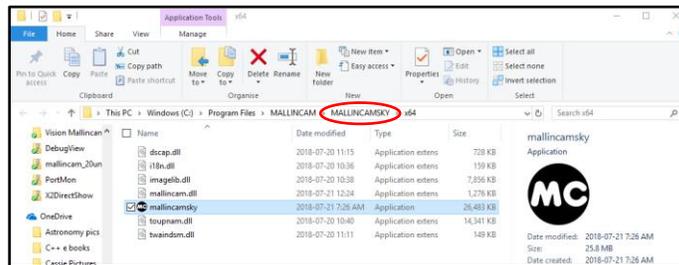
Uninstall SkyRaider Software



- Unplug the SkyRaider Camera from your computer.
- Locate the MallincamSky Icon on your Desktop and **Right-Click** on the Icon to open-up a selection window.
- In this window select **Open file location**

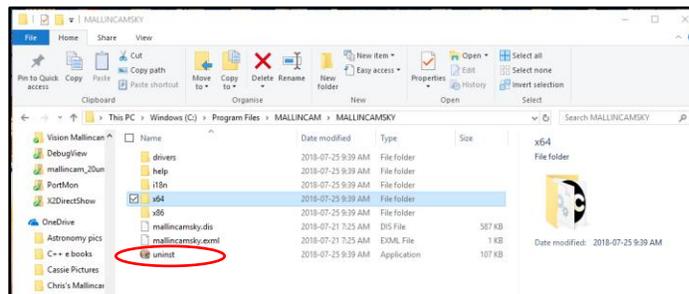


Windows will then open-up the File folder that contains the software and drivers from MallincamSky.

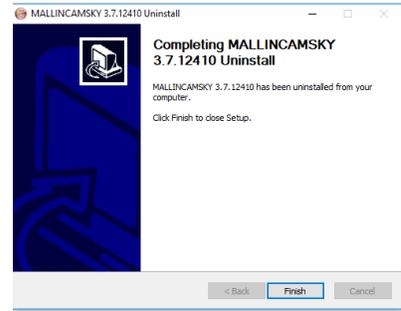
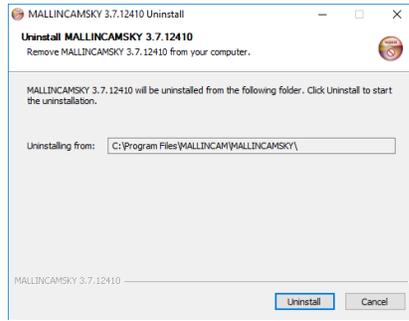


We want to jump back one folder (since this contains the **Uninstall** software for MallincamSky).

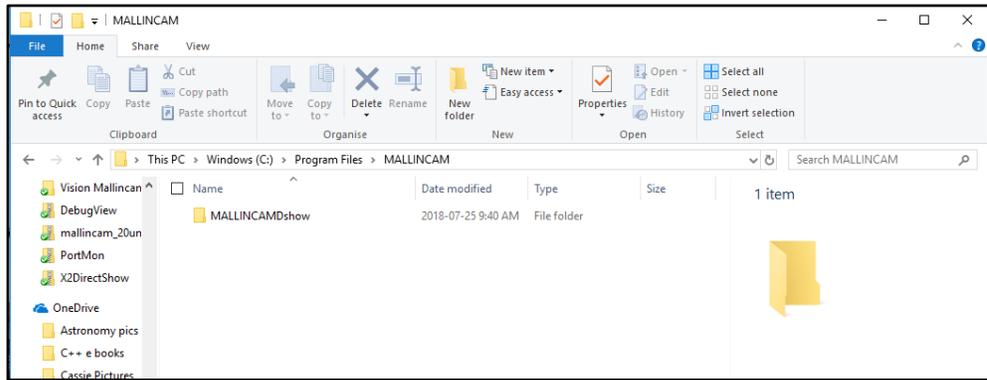
- With the folder still open, just **Click** on the word **MALLINCAMSKY** located in the folder address (see above image). This will take us back one folder.



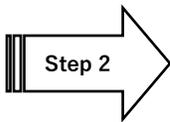
- We want to run the program **uninst**. So, **Double-Click** on the program name **uninst** and follow the instructions as Windows uninstalls MallincamSky.



Once MallincamSky is uninstalled, Windows will take you back to the **MALLINCAM** folder. This Folder may be empty, or if you have also installed the **Mallincam DirectShow** drivers you will see a folder named **MALLINCAMDshow** in the window.

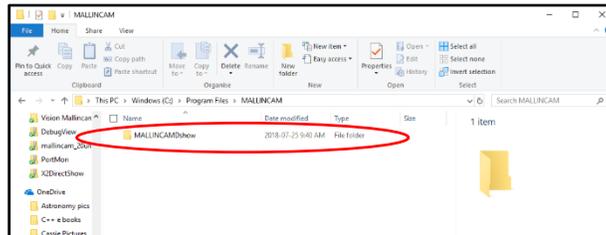


If you did not install the **DirectShow** drivers then jump to **Step 3**, else follow **Step 2** to uninstall the DirectShow drivers.



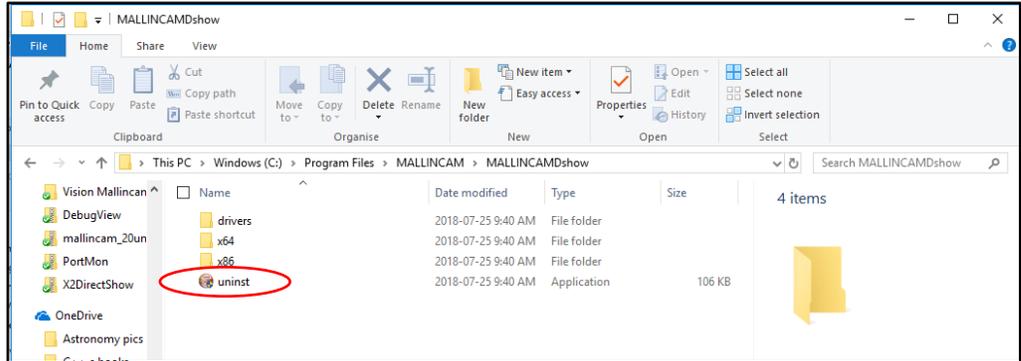
Uninstall SkyRaider DirectShow Drivers

Continuing from **Step 1**, you should have the **MALLINCAM** folder Windows open with the only file folder named **MALLINCAMDshow** displayed.

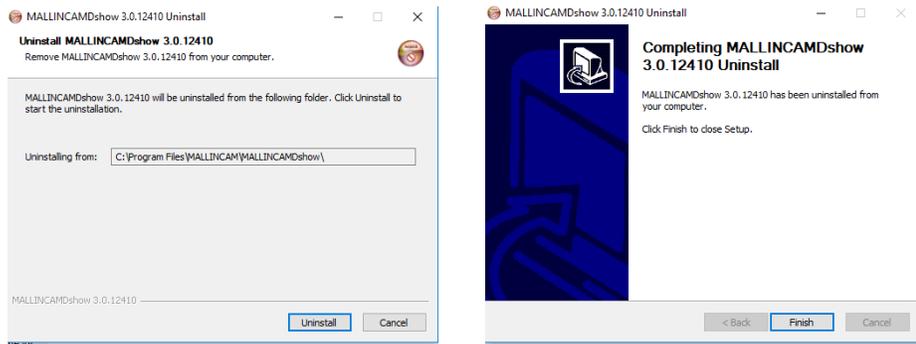


- **Double-Click** on the folder name to open it up.

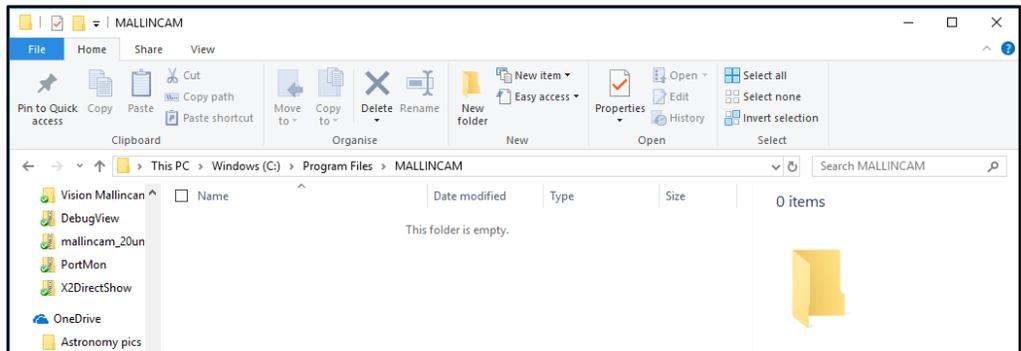
Window will then open-up the **MALLINCAMDshow** folder displaying its contents.



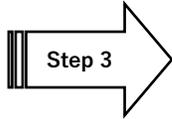
- Again, there is a program named **uninst**, **Double-Click** on the **uninst** program name and follow instructions to uninstall the DirectShow drivers.



Once the DirectShow drivers have been uninstalled, Windows will take you back to the **MALLINCAM** folder to show you that it is empty.



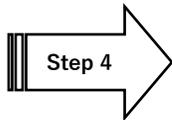
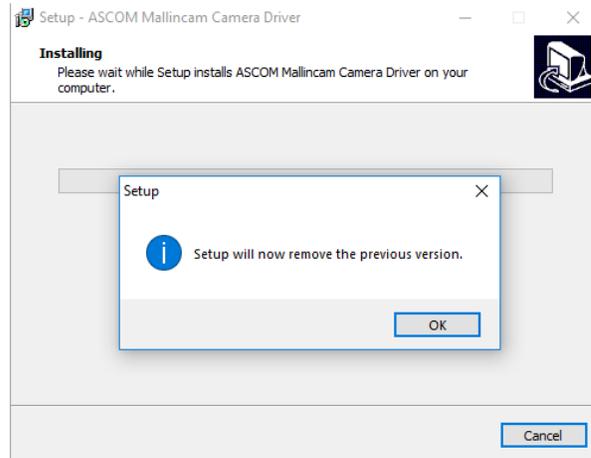
If you did not install the ASCOM drivers, then jump to **STEP 4**.



Step 3

Uninstall SkyRaider ASCOM Drivers

This step is extremely easy as **ASCOM** will automatically uninstall the previous drivers when it installs the latest drivers, so just follow the instructions above in **Section 7** of the User Manual on installing ASCOM drivers.



Step 4

Finish the Uninstalling Procedure

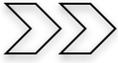
- This is an especially important step as it clears out the Windows registries. Reboot your computer via the **restart** option.

Now, if you haven't already done so, **download** and **install** the latest version of **MallincamSky**, the **DirectShow**, and the **ASCOM** drives at www.mallincam.net. (note: you want the latest version)

• SkyRaider Series MALLINCAMSKY Software-Drivers, Windows, Mac (Lite), Linux, ASCOM package, DSHOW for All SkyRaider Cameras. Ver. 3.7.12128.20180614 [Click Here](#)



Do not forget to plug back in the SkyRaider camera after installing the software.



First Aid for the SkyRaider Series



When I click on the SkyRaider camera from the Camera list, a message pops up saying Failed to Start: SkyRaider

There is an issue establishing fulltime communications with the camera. This can occur for a variety of reasons but the most common one is the cable is too long for the USB port on that specific computer to establish the correct timing protocol. This is more so with USB 3.0 devices.

Recommended solution: if you need to use a longer length of USB 3.0 cable for the DS432 TEC, then there are two options:

- Connect a **powered USB 3.0 hub** to the computer and connect the USB cable between the hub and the SkyRaider camera.
- Connect an active (not passive) USB 3.0 extension cable between the camera and the included USB 3.0 cable. Something along the lines of the Tripp-Lite USB 3.0 SuperSpeed Active Extension Repeater Cable



When I try to connect I receiver message “Catastrophic failure (Exception from HRESULT:0x8000FFF (E_UNEXPECTED))”

This message indicates that something has blocked or overwritten the driver. Installing another driver or even a major Windows update has played havoc with the original SkyRaider Drivers.

Recommended Solution: Uninstall the current driver through the **Control Panel** (or if you cannot find it in the **Control Panel** check out the **c:/PROGRAM FILES/MALLINCAM/MALLINCAMSKY** folder, there is a program called **uninst**. **Double-Click** on **uninst** to uninstall MallincamSky and its drivers).

Once uninstalled, reboot your computer, then reinstall MallincamSky again. This should fix the issue.



All I see is a White image

Recommended Solution: Move **Gain** to the extreme Left (1). Ensure automatic exposure is off. Make sure you are in Video Mode. Move exposure to minimal value say 10 ms. Now slowly cover telescope to see if image darkens up to black as you completely cover up the telescope. If this occurs, then SkyRaider is working properly so you need to check your telescope and focus setup.



The computer keeps beeping when I plug in the USB 3.0 cable

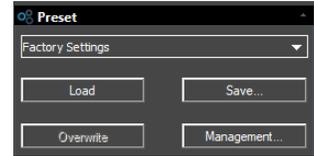
Recommended Solution: The computer is not providing enough power from the USB 3.0 port for the camera's transmission. Insert a powered USB 3.0 hub between the computer and the camera.



MallincamSky acts Strange After Update

Recommended Solution: Reset Mallincam Sky to Default Factory Settings

Go to **Preset** and **Click** on the **Load** Button.



How do I Optimize my Computer?

Recommended Solution: Optimizing your windows computer sometime is a never-ending process but visit the website:

<https://www.youtube.com/watch?v=Hdb4iybN8gg>

for some great suggestions on how to optimize your computer.

To summarize as per the research done by **Doug Murphy**

Add a much RAM as you can into your system

Settings/System/Privacy Settings

- General: all off
- Location: all off
- Camera: all off
- Microphone: yes (for messaging, voice recorder)
- Notifications: off
- Speech: ignore
- Account info: on
- Contacts: off
- Calendar: off
- Call history: off
- Email: on
- Tasks: off
- Messaging: off
- Radios: on (for Bluetooth)
- Feedback: basic/off/never

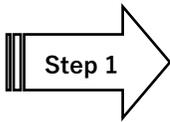
Background apps leave on alarms and clock, photos, settings, sticky notes, voice recorder (need for broadcasting)



Stacking is going terribly slow or Stops completely?

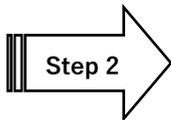
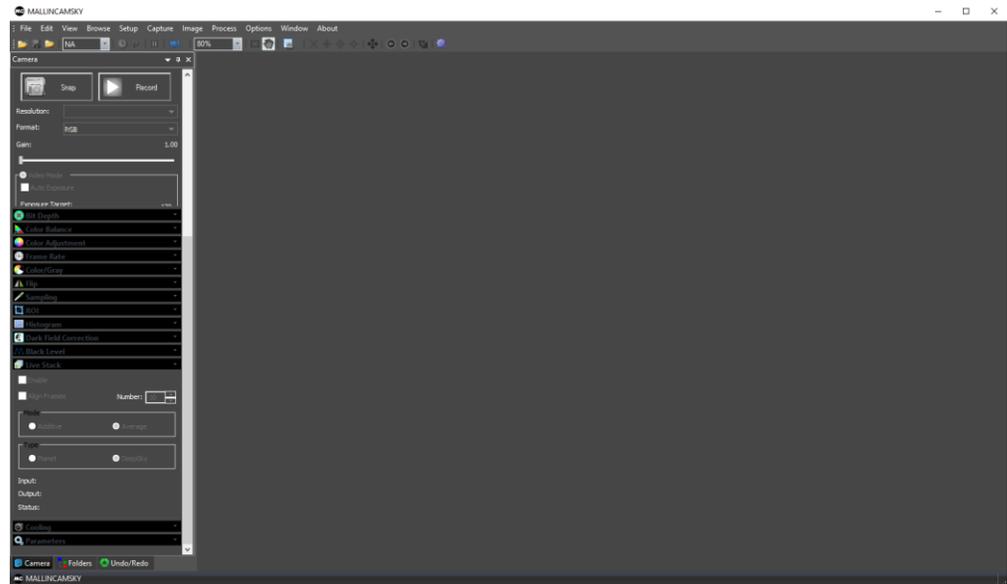
The reason for the slowing or freezing of the stacking process is not completely understood, but it is encountered by many processes that task the **usb** and **video processes** of computers. This problem is experienced by many video gamers and the solution that resolves this problem is to select only 1 or 2 of the CPUs running the program. The work around, is to tell MallincamSky to use only 1 processor rather than all of them.

Recommended Solution:



Step 1

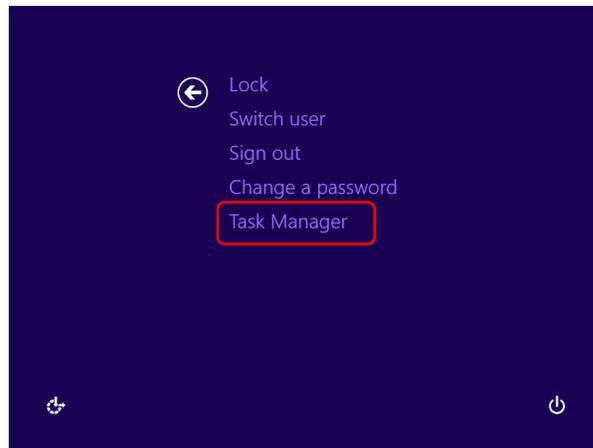
Start MallincamSky

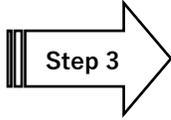


Step 2

In this Step we want to activate the **Task Manger**. There are a variety of ways to perform this task, but I find that the **CTRL-ALT-DEL** method is the fastest.

Press and Hold the **CTRL-ALT-DEL** buttons at the same time to pop-up the Control Window.



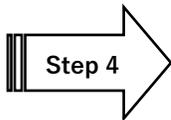


Step 3

Using your mouse, Choose **Task Manager** from the list.

This will open-up the task **Manager Window**.

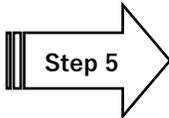
Name	Type	Status	PID	7% CPU	61% Memory
Service Host: Local System (Network Restricted) (19)	Windows process		500	2.2%	111.5 MB
Norton Security with Backup	Background process		4408	1.9%	40.9 MB
Windows Explorer	Windows process		65796	1.0%	33.0 MB
Desktop Window Manager	Windows process		33068	0.7%	41.7 MB
Uninstall Programs (32 bit)	Background process		60756	0.6%	1.0 MB
Task Manager	App		51176	0.6%	14.4 MB
Performance Monitor (32 bit)	Background process		67676	0.3%	7.3 MB
System	Windows process		4	0.2%	0.1 MB
Windows Audio Device Graph Isolation	Background process		18420	0.1%	4.7 MB
mallingcamsky	App		74868	0.1%	13.1 MB
Snipping Tool	App		72244	0.1%	2.9 MB
Google Chrome	App		73928	0%	106.3 MB
Service Host: Local Service (Peer Networking) (3)	Windows process		4184	0%	1.9 MB
UninstallerMonitor (32 bit)	Background process		67864	0%	1.8 MB
Touch Keyboard and Handwriting Panel	Background process		25344	0%	0.4 MB
Client Server Runtime Process	Windows process		56452	0%	1.3 MB
System interrupts	Windows process		-	0%	0 MB
Microsoft Word (32 bit)	App		43768	0%	56.7 MB
JIDhit.Makura.Finhtar.Servica (32 bit)	Background process		1212	0%	4.4 MB



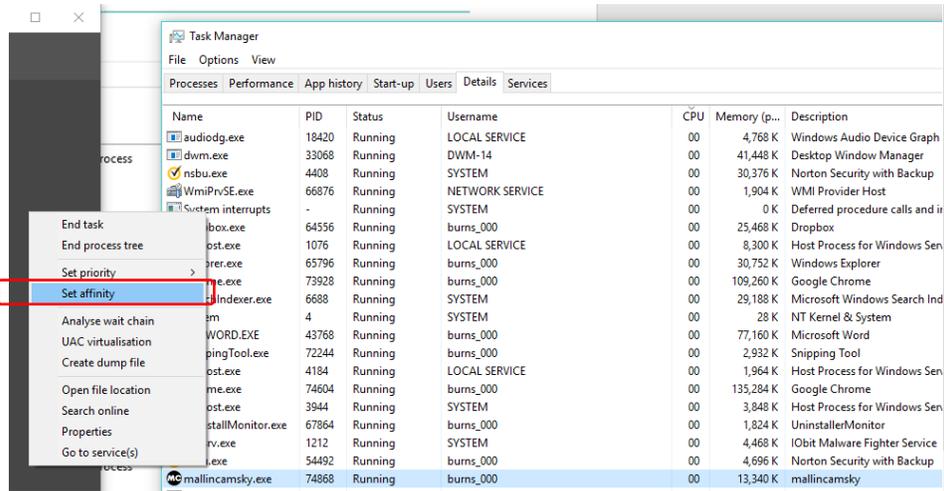
Step 4

Locate and **Right-Click** on **mallingcamsky** Process located in the **Task Manager**. This will open up a small Selection Window, **Click on Go to details** in that selection window. This select the **Details Tab** in the Task Manager.

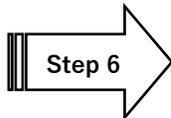
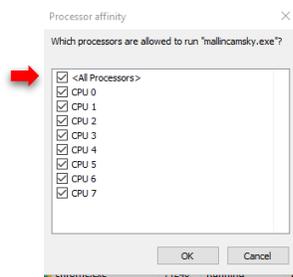
Name	Type	Status	PID	4% CPU	62% Memory
Advanced SystemCare Ultimate Service (32 bit)	Background process		1204	0%	1.6 MB
Snipping Tool	App		72244	0%	2.9 MB
Service Host: Remote Procedure Call (2)	Windows process		388	0%	6.6 MB
Advanced SystemCare Ultimate 10 (32 bit)	Background process		58540	0%	0.6 MB
Google Chrome	Background process		74604	0%	131.8 MB
HP My Display (32 bit)	Background process		66600	0%	1.2 MB
mallingcamsky	App		74868	0%	13.0 MB
Microsoft Word (32 bit)	Background process		6688	0%	28.5 MB
Host Process for Windows Defender	Background process		67380	0%	1.3 MB
Service Host: Local Service (Network Restricted) (6)	Windows process		1524	0%	5.1 MB
Spooler Service	Background process		2348	0%	3.7 MB
NVIDIA Control Panel	Background process		4236	0%	2.0 MB
Local Security Authority	Windows process		884	0%	4.5 MB
Service Host: Local Service (Network Restricted) (6)	Windows process		1076	0%	8.0 MB
WMI Provider Host	Background process		3024	0%	3.0 MB



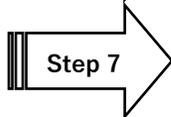
In the **Task Manager Window** locate and **Right-Click** on the **mallincamsky.exe** file and another selection window will appear, choose **Set affinity** from that list.



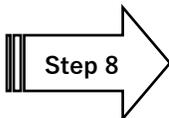
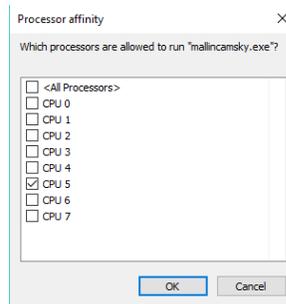
This will pop-up the **Processor affinity** window.



Uncheck **<all Processors>**



Then **Check** a processor of choice (I usually select **CPU 5**), then Click **OK** to return to the task manager window.



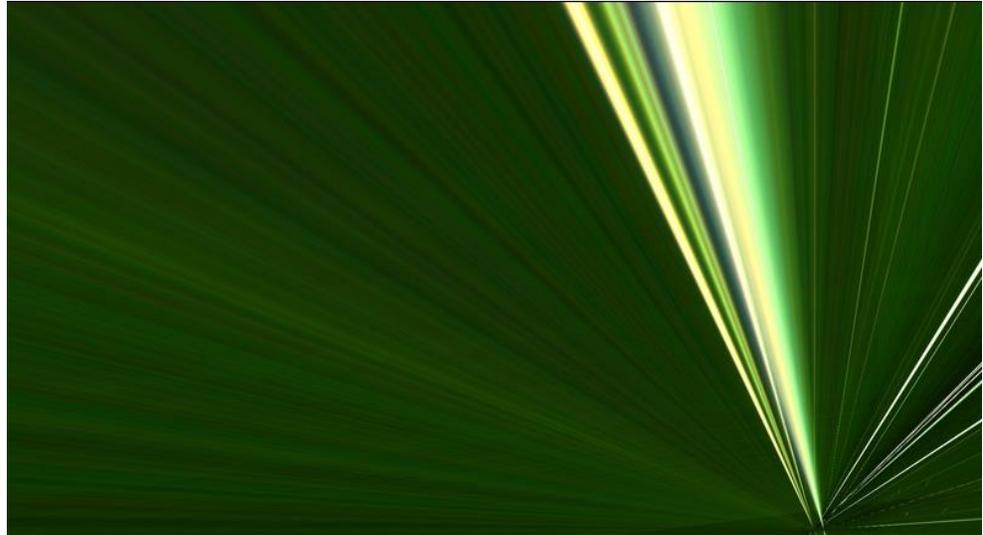
Close the **Task Manager Window**

Note: you will have to repeat this every time you restart the MallincamSky, as windows does not remember you selecting 1 processor from the **Task Manager**.



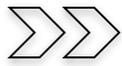
I see a Pink Floyd Kaleidoscope effect on my Screen

This effect has to do with star alignment difficulties when stacking images. You need bright stars to get a successful frame alignment. In other words, increase gain or increase exposure or re-adjust histogram to deliver a brighter image. Also, investigate adjusting the GAMMA and Contrast.



Some users have seen this occur when they use **DeepSky** to align and have had some success by choosing **Planet** rather than the **DeepSky** in the Live Stack **Type** checkbox.





Explanations



Dark Field Explanation

The following is the best explanation of what Dark Field is, and it comes from the work of **Simon Hanmer**.



Dark Frame Subtraction

First, take an image with the camera shutter closed or the camera/scope covered under the same conditions of exposure time and temperature as the light frames you are going to capture of your astronomical target. Many astronomers will take ten or more such dark frames and then combine them into a master dark frame, principally for statistical reasons: the more sub-frames, the better quality of master frame.

This will give you a single (master) frame of hot and warm pixels generated in the imaging chip, electronically and thermally, including amplifier glow.

Second, subtract the dark frame from each of the light frames in order to remove hot and warm pixels and amplifier glow. However, other noise will remain and needs to be removed with other manipulations and software.



Dark Field Correction

Dark Field correction is another matter entirely. It does not refer to a single image and the recommended/default 10 frames captured to perform the **Dark Field** correction are not used to generate a master frame – nor are they simply subtracted from the light frames.

Instead, the 10 frames are first used to perform a **running stacking**, analogous to the stacking procedure applied in both the SSI software and the new Universe/SSI software.

Running Stacking: the first frame in the series of 10 is recorded in the camera as is. Then the first and second frames in the series of 10 are combined to form a new frame that is also recorded. Then the third frame is combined with the preceding 2 frames to form yet another combined frame that is also recorded ... and so on until you end up with 10 frames in a series that represent 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 combined frames, respectively.

Note that stacked and combined frame #10 represents information derived from all 10 frames.

But hold on ... we are not talking CCD imaging here – this is video. When a CCD chip is activated it cranks at full blast and requires effective cooling to prevent it from rapidly heating up beyond a user-determined temperature. But video chips work differently: they heat up slowly and progressively. This means that the first frame of the series of 10 was taken at a lower chip temperature than the final one. Therefore, each of the 10 frames records different levels of thermal noise. In other words, when stored in the camera, these 10 combined frames represent a library of information that the camera and software can now choose from and use to CORRECT (note: not « **subtract from** ») the light image that we want to display on our computer screen.

Now, how does this work in practice – and why is it called a **Dark Field** correction?

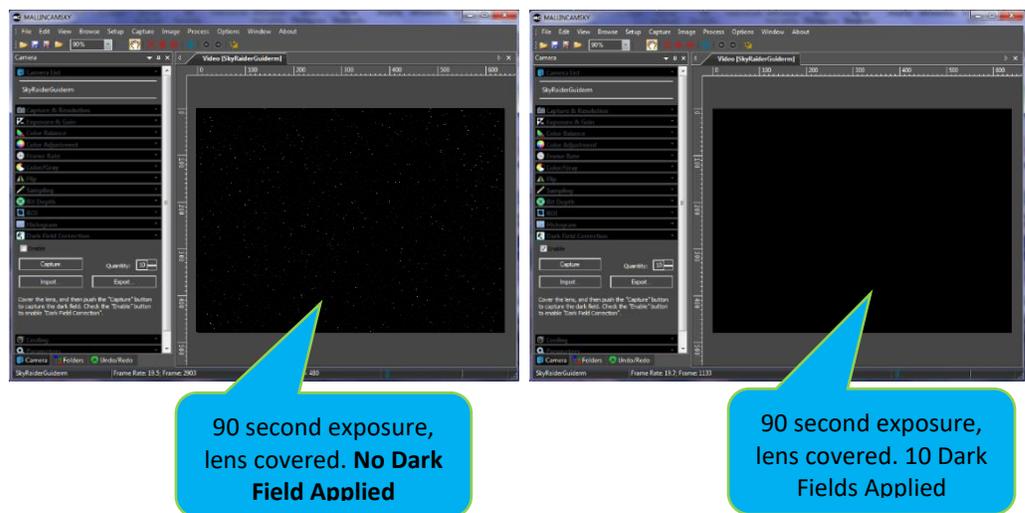
The **Dark Field** correction is prepared by the user at the beginning of an observing session by covering the camera or scope, pre-determining the exposure time and setting the software to automatically taking up to 10 images. We all know our equipment and the skies we observe under (or we certainly will with a bit of practice). We also have an idea of what range of filters we might use that night and the effect they have with respect to exposure times. Take this into account when selecting your exposure time for your 10 dark images.

But remember this is NOT a **Dark Frame** subtraction – the exposures required for dark frame subtraction must be close to those used for the light frames of our astro-targets. Not so for **Dark Field** correction. The camera and software in the latter case are not looking for a single FRAME to subtract based on exposure time. They are looking at the 10 combined frames to see which one has the noise level that most closely matches the noise level in the light frame itself. In other words, they are looking for a noise FIELD. The point here is that camera and software will select the appropriate **Dark Field** for the correction, for both shorter and longer light frame exposure times from the same « library ».

In addition, unlike the single frame of a CCD dark frame, the images used for **Dark Field** correction are interlaced combinations of odd and even scan lines. Apparently, this too factors into the fact that this correction removes ALL NOISE, not just hot and warm pixels.

The important point to retain here is that, because of the stacking and combining to form the library of images for the correction procedure, long light exposures do NOT require similarly long exposures for the **Dark Field** correction images. For example, a 2-minute light exposure using a narrow-band h-alpha filter may still only require the user to prepare ten 30 second dark images for the dark field correction. The precise numbers will vary with your equipment and conditions.

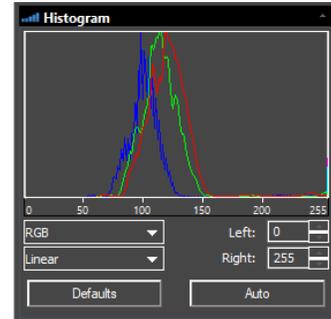
The two screen captures below demonstrate the difference that applying a Dark Field to an image can provide.





Histogram Explanation

A **histogram** is a graph that displays the distribution of brightness (luminosity) over the range from the darkest possible (left side) to the brightest possible pixel (right side). When we examine the histogram of a typical deep-sky image, we will notice that the intensity range (the bump) is both narrow and situated toward the left (dark) of the Histogram Window. This bump holds the bulk of the information about our deep-sky image, but there still are other details of the image that are in the Histogram that can be brought out. Our task is to stretch the pixels over a larger part of the graph to increase the dynamic range.

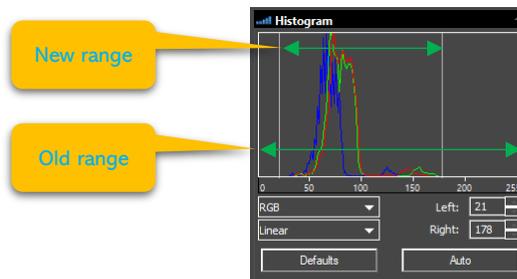


In **MallincamSky**, there are two vertical lines (as well as numerical indicators) that show the Dark (left side, 0 value) and Light (right side, 255 value). This range of 0 to 255 represents the whole window get to play with. In a daylight image, our bump may use most of that range, but with deep-sky objects, we will notice a narrower bump hanging at the left side of the Window. This is because we have very few bright pixels and a whole bunch of dark pixels (after all we are shooting at night).

What we want to do is stretch the bump by reducing the range where bright pixels lay, after all there are very few of them where the brightest ones in our image are just hanging to the right of our bump. So, if we tell the Histogram to forget about including the brightest possible values (which we have none of) and start displaying the Histogram at the brightness of about where the stars are. We can stretch to remaining data from the dark to the new bright marker.

That is what moving the Right slider or reducing the right value from 255 to a smaller number does. This will brighten up our image because we are removing the range of brightest possible pixels (which we have none of) and telling MallincamSky to display (stretch) our imaging to only include the new range.

Likewise by moving the Left slider or increasing the left value from 0 to a larger number, will darken our image because we are removing the range of very dark pixels and displaying our new range (which still contains darks, but very few brights).



The Brighter our object the more to the right the bump will be located in our Histogram. So, if you increase the **gain**, **gamma**, or **exposure** the bump will also move the the right. This requires you to adjust the **Left** and **Right** markers to ensure you do not clip (remove), parts of the image that are outside the range.



So, what does this mean in English? As you adjust the **Left** and **Right** markers, you remove data that is not relevant to your image. The remaining data is then readjusted (stretched), to bring out more details of dimmer aspects of the image that was overridden by the previous settings. We have improved the dynamic range of our image, thus pulling out the fainter aspects of the Deep Sky Object.



Before Adjustments



After Adjustments



Electronic Assisted Astronomy vs Live Video Imaging



Electronic Assisted Astronomy

Electronic Assisted Astronomy (EAA) has many definitions, but for the purpose of Mallincammers, it will be synonymous with Astrophotography. In EAA, you will obtain the best image you can. You will create a set of Dark Frames (not Dark Fields), Flat Frames, Bias Frame, and even Dark Flats. All images will be saved in a non-compressed data format (such as FITS or TIFF). These images will then be combined (calibrated) using specialized software (MAXIM/DL, AstroArt, PixInsight, DeepSky Stacker, etc, ...), and then finally enhanced, color adjusted, and tweaked, again using specialize software (Photoshop, etc,...).



Live Video Imaging

This is when the video images and its adjustments, enhancements, stacking, Dark Fields, and Flat Fields, are all done live on the screen. The final image is live and can be saved, recorded, and broadcasted as needed. It is this process that the Mallincam SkyRaider cameras are designed for as their purpose, and Live Video Imaging is the objective of this User Guide.



Can the Mallincam SkyRaider Camera do EAA

The answer is **yes**, but the process will be totally different than that of Live Video Imaging.

First, you will not be using **Dark Fields** or **Flat Fields** since you will be taking **Dark Frames** and **Flat Frames**. Images saved in RAW format will not include any of the **Dark Fields** or **Flat Fields** even if you have applied them to your image.



Process



Take **Flats Frames** and save them in either RAW (which is a FITS format), or RGB (use FITS or TIFF) format. **Flat Frames** are actual images which you can examine.



Take **Bias Frames** and save them in the same format as the above Flats.



Take **Dark Frames** and save them in the same format as the above Flats.



Take your **Light Images** and save them in the same format as the above Flats.



Now, **Calibrate** these images with your favorite astro-image processing software, then enhance using your astronomy enhancing software.

Most EAA imagers will be using monochrome cameras and will require color filters and the taking and organizing these filtered images is in the wheelhouse of specialized imaging software. MallincamSky can perform these tasks, but you will be in the driver's seat every step of the way. Therefore, Mallincam SkyRaider cameras have an ASCOM driver so these specialized astro-imaging software packages can control the SkyRaider camera.



Lossless File Formats used by MallincamSky



FITS (Flexible Image Transport System)

FITS is an open standard defining a digital file format for astronomical images and contains a Metadata header. This Metadata header provides keyword information that includes particulars about the camera and its settings used in taking that image. Your favorite astro-imaging software can read and use this Metadata for its processing tasks. You may want to add a FILTER field in the Metadata to indicate what filter you used with this image.

```

Image #1
SIMPLE = T / file does conform to FITS standard
BITPIX = 16 / number of bits per data pixel
NAXIS = 2 / number of data axes
NAXIS1 = 720 / length of data axis 1
NAXIS2 = 540 / length of data axis 2
EXTEND = T / FITS dataset may contain extensions
COMMENT FITS (Flexible Image Transport System) format is defined in 'Astronomy
COMMENT and Astrophysics', volume 376, page 359; bibcode: 2001AA...376..359H
BLANK = 32768 / offset data range to that of unsigned short
BSCALE = 1 / default scaling factor
DATE-OBS= '2020-05-29T18:18:40' / date of the observation
DATE = '2020-05-29T18:18:40' / date of file creation
EXPTIME = 0.018594 / Exposure time in seconds
EXPOSURE= 0.018594 / Exposure time in seconds
GAIN = 100 / Analog Gain
WPINX2 = 6.9 / Pixel Width in microns
YPINX2 = 6.9 / Pixel Height in microns
XBINNING= 1 / Binning level along the X-axis
YBINNING= 1 / Binning level along the Y-axis
INSTRUME= 'SkyRaiderDS287C' / Camera Model
OBJECT = 'ix filter' / name of observed object
CCD-TEMP= 32.2 / actual measured sensor temperature in degrees C
IMAGETYP= 'Light Frame' / type of image
CREATOR = 'MALLINCAMSKY V4.8.15988.20191124' / the name of the software task the
PROGRAM = 'MALLINCAMSKY V4.8.15988.20191124' / the name of the software task the
SWCREATE= 'MALLINCAMSKY V4.8.15988.20191124' / string indicating the software us
FILTER = 'ix csw' /
COLORTYP= 'RGB' / Bayer mosaic
    
```

FITS is in a bayered format for color cameras (so it will look like a checkered Black and White images), so think of it as one image hiding 3 or 4 other images inside itself, just waiting to be unbayered and combined to produce a color image (which is an art in itself).



TIFF (Tagged Image File Format)

TIFF files are lossless (or lossy) formats that also contain header information (not as much detail as in FITS). Color images can be saved in TIFF format without being bayered.

```

SIMPLE = T
BITPIX = 16
NAXIS = 3
NAXIS1 = 720
NAXIS2 = 540
NAXIS3 = 3
COMMENT SkyRaiderDS287C
EXPOSURE= 0.050
COMMENT TP18071815544528E8F36388F24ACFD
DATE-OBS= '2020-05-29T17:21:32'
COMMENT C:\Users\burns\Desktop\test 1 rgb.tif
END
    
```

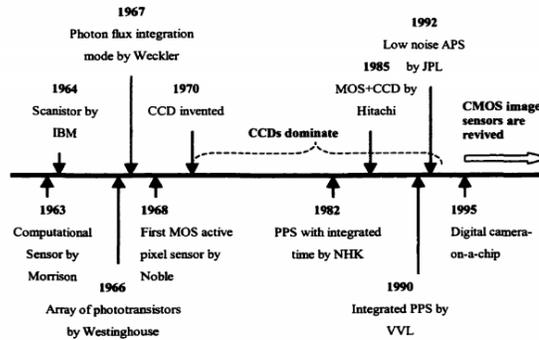


An Introduction to the Stacking Algorithm



Historic Review

In the 1970's a major breakthrough took place in the world of imaging, the CCD was invented. This technology started slowly to replace film as the medium for taking images of the night sky. CCD's are still the medium of choice in the professional field of astronomical imaging. But in the late 1990's advancements in CMOS technologies have started another revolution, CMOS optical sensors. Let the battle begin.



Simply both CMOS and CCD's do the same thing. They capture and convert photons (light) into an electrical signal that can be used by a computer. How they do it, is what distinguished CCDs from CMOSs.

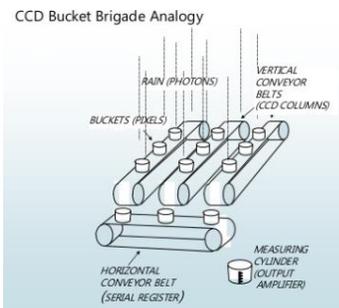


CCD (Charge Coupled Device)

A CCD uses a thin silicon wafer, this wafer (or chip) is divided into thousands or millions of tiny light sensitive squares (or rectangles) called photosites. Each of these photosites corresponds to an individual pixel in the final image.

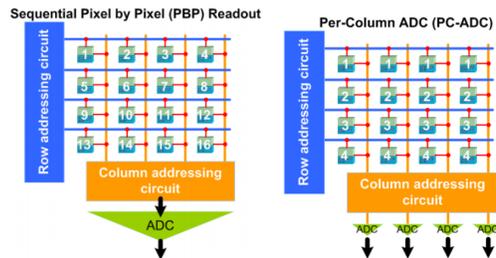
Think of the photosite (pixel) as a capacitor that converts the photons (light) into electric energy which it stores. When the CCD is finished collecting the photons, the charge is transferred downwards along the columns. Hence, during the CCD clocking operation, rows are transferred downwards to the final row (the readout register) which is used to transfer the charge in each pixel out of the CCD so it can be measured. In the Horizontal read-out register the charge is transferred in the horizontal direction, along the readout register. When charge has been collected and is to be read-out it is transferred one charge packet at a time to an output amplifier where the charge is converted to a voltage.

See Bucket Brigade image below for a visualization of the process.



⇒ CMOS (Complementary Metal Oxide Semiconductor)

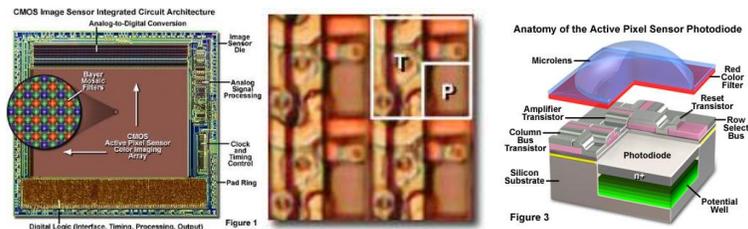
Unlike a CCD, a CMOS sensor's approach the converting of light photons into a voltage signal by having each pixel do its own charge to voltage conversion and amplification rather than shuffle the electrons off the sensor and perform the charge to voltage conversion and amplification there. Thus, the CMOS sensor, each pixel site is essentially a photodiode and three transistors, performing the functions of resetting or activating the pixel, amplification, and charge conversion (Analog to Digital Converter, ADC). This provides both high speed for CMOS sensors, but also low sensitivity (as well as high fixed-pattern noise due to fabrication inconsistencies in the multiple charge to voltage conversion circuits). CMOS sensors can be designed to read each pixel individually or read a whole column simultaneously.



In simple terms, the Photosites in a CCD are passive (they do not work) they just move the information along to a final Output Amplifier, while the photo-sites in a CMOS sensor are active (they do work), they amplify and can-do local processing.

⇒ CMOS Imaging

When the light hits the sensor of the Mallincam camera (remember the camera is configured as a Video camera) it is read and processed from each pixel (P). It sends all of the pixel's data (which we will call a FIELD (to distinguish it from a image FRAME) to another processing locations via the Transport System (T) where it is temporarily stored and more logic and processing algorithms can be performed on the elements of the FIELD. This where the proprietary work is performed by the Mallincam Camera including the ability to apply both analog and digital Gain before the FILED is sent to the computer. Note: it is these support circuit elements around the CMOS Pixel array that can cause AMP GLOW (see image below). Modern CMOS manufacturers are working on moving these support circuits away from the Pixel sensor array to reduce or eliminate Amp Glow noise.



To assist you understanding FIELDS and FRAMES. It takes a specific number (depends upon camera sensor) of FIELDS in 1/30th of a second to make up a FRAME. If the required number of FIELDS do not make it from the Camera to the computer software (either too much processing is being performed by the camera or computer, or FIELDS are being requested too fast by the USB port) then the FRAME will not be created. If the software fails to display an image (FRAME), then slow down the FIELD retrieval request rate of the USB by moving the

Frame Rate slider to the left (slows it down). It is this issue, of the computer software not having enough time to correctly process the information, that causes the Pink Floyd effect when Live Stacking.



What is happening when you Live Stack



Average

When this control is activated from the software, the processing takes place on the FIELD data that is located in the Memory and Logic circuit on the CMOS chip. For example, for any given exposure time, many FIELDS of data are stored in the Memory and Logic Circuits of the Camera. Now if you entered 5 as the Number in Live Stack, then the Logic and Processing algorithms will continuously combine (average) 5 sets of FIELD data to create a MASTER FIELD in the Camera before sending this MASTER FIELD data to the computer software. The computer software will continuously incorporate (via a proprietary algorithm) these received MASTER FIELDS into the previous image FRAME's data (the required number of MASTER FIELDS must be met to create the FRAME) which will be displayed on the computer. The **Input**, **Output**, and **Status** indicators will indicate the process of the stacking. The averaging will be continuous with every new exposure incorporating a new MASTER FIELD. The initial output will provide a very noticeable increase of resolution as outliers and noise is averaged out. But, after many Outputs, the improvement return that you obtain in the image is diminished with the inclusion of more MASTER FIELDS (you may have incorporated 100's of previous MASTER FIELDS). If you do not see any more image improvement, it is time to take a Snapshot of the image.

At First, you will notice a distinct delay after initially enabling **Live Stacking**, even after the camera has taken its user-determined exposure. In part, this delay reflects the fact that the camera circuitry is performing the compilation of the FIELDS (let us say 5 for our example). It must determine whether the data in the 5 FIELDS is of sufficient quality for the successful compilation of a MASTER FIELD. Remember, to analyze a group of fields, the CMOS sensor must evaluate the values at every location in every FIELD in the MASTER FIELD, it must even investigate every dark pixel, even if the pixel doesn't say anything particularly interesting about that location in the FIELD. Therefore, we want to keep the value in the Number box at a low value (e.g. 5) to minimize the amount of FIELD processing required by the camera.

When a MASTER FIELD has been successfully compiled within the camera and download to the computer the **Input number** is incremented to 1. Note that the **Output number** is still 0, and the **Status** indicator remains blank. Note that the MASTER FIELD is also stored in the camera memory as a reference group for comparison with successive compiled groups of 5 fields during the ongoing Live Stacking run.

The MallincamSky software in the computer will attempt to incorporate the downloaded MASTER FIELD with the original noisy image that was visible on the computer's screen prior to enabling Live Stacking. Incorporating here means averaging and maybe aligning (if enabled) the MASTER FIELD with the original noisy image. Note, this involves processing FRAMES or images for display purposes. The alignment process does use stars (if Deep Sky is selected), or larger areas (if Planetary is selected) in the FRAME, which is quite different from the processing of FIELDS in the camera. This initial computer-based processing accounts for the other part of the initial delay perceived by the user at the beginning of Live Stacking. If MallincamSky determines that alignment and averaging was successful, it will now place the result in the Output Stack. This constitutes an output, and the **Output number** is incremented

from 0 to 1, and the **Status** indicator is set to **OK**. Sometimes the computer will reject the attempted first Output (maybe not enough good stars for an alignment) and will wait for the camera to download a fresh MASTER FIELD, hopefully with better quality data. In this case, the **Input Number** will continue to increment until the computer software accepts the first Output and sets the **Output Number** to 1. A new image that represents the processed Stack is then sent to the computer screen where the user will note a significant decrease in the random noise. This process is then repeated until you disable the Live Stacking.

The larger the value entered in the **Number Box**, the more processing that must be performed by the camera to create MASTER FIELDS. This can cause a processing overload as the camera and software are trying to work together to continuously create Live Video Frames (software continuously saying Feed me data (via USB frame rate setting), and the camera processing and dumping the data) that can be displayed on the screen. So, we recommend a small number between 4 and 10, so that both the computer and camera are happy. Since the incorporating of new MASTER FIELDS is continuous, you will average hundreds of MASTER FIELDS in your image and after a while achieve the same result of having entered a large value in the **Number Box**, but without the CPU overhead.

Note: If you are enabling alignment of Deep Sky Objects (which uses Stars in the alignment process), if there is too much bouncing around of the image (either due to mount stability, weather conditions, Sky conditions, or image rotation due to an Alt-Az setup), the computer algorithms may have difficulty aligning and you could obtain the Pink Floyd effect. You can observe this phenomenon, by tapping your mount while imaging in Deep Sky.



Additive

When this control is activated from the software, the processing takes place on the FIELD data that is located in the Memory and Logic circuit on the CMOS chip. For example, for any given exposure time, many FIELDS of data are stored in the Memory and Logic Circuits of the Camera. Now if you entered 5 as the Number in Live Stack, then the Logic and Processing algorithms will continuously combine (add) 5 sets of FIELD data to create a MASTER FIELD in the Camera before sending this MASTER FIELD data to the computer software. The computer software will continuously incorporate (via a proprietary algorithm) these received MASTER FIELDS into the previous image FRAME's data (the required number of MASTER FIELDS must be met to create the FRAME) which will be displayed on the computer. The **Input**, **Output**, and **Status** indicators will indicate the process of the stacking. The initial outputs will provide a very noticeable increase of brightness until the selected number in the Live Stack is reached (5 in this example). But, when the **Output Number** exceeds the Live Stack number, you will notice no increase in brightness (unless the brightness of the object changes during the rolling stacking process) so it time to take a Snapshot of the image.

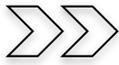
At First, you will notice a distinct delay after initially enabling **Live Stacking**, even after the camera has taken its user-determined exposure. In part, this delay reflects the fact that the camera circuitry is performing the compilation of the FIELDS (let us say 5 for our example). It must determine whether the data in the 5 FIELDS is of sufficient quality for the successful compilation of a MASTER FIELD. Remember, to analyze a group of fields, the CMOS sensor must evaluate the values at every location in every FIELD in the MASTER FIELD, it must even investigate every dark pixel, even if the pixel doesn't say anything particularly interesting about that location in the FIELD. Therefore, we want to keep the value in the **Number box** at a low value (e.g. 5) to minimize the amount of FIELD processing required by the camera.

When a MASTER FIELD has been successfully compiled within the camera and download to the computer the **Input number** is incremented to 1. Note that the **Output number** is still 0, and the **Status** indicator remains blank. Note that the MASTER FIELD is also stored in the camera memory as a reference group for comparison with successive compiled groups of 5 fields during the ongoing Live Stacking run.

The MallincamSky software in the computer will attempt to incorporate the downloaded MASTER FIELD with the original image that was visible on the computer's screen prior to enabling **Live Stacking**. Incorporating here means adding and maybe aligning (if enabled) the MASTER FIELD with the original image. Note, this involves processing FRAMES or images for display purposes. The alignment process does use stars (if Deep Sky is selected), or larger areas (if Planetary is selected) in the FRAME, which is quite different from the processing of FIELDS in the camera. This initial computer-based processing accounts for the other part of the initial delay perceived by the user at the beginning of Live Stacking. If MallincamSky determines that alignment and adding was successful, it will now place the result in the Output Stack. This constitutes an output, and the **Output number** is incremented from 0 to 1, and the **Status** indicator is set to **OK**. Sometimes the computer will reject the attempted first Output (maybe not enough good stars for an alignment) and will wait for the camera to download a fresh MASTER FIELD, hopefully with better quality data. In this case, the **Input Number** will continue to increment until the computer software accepts the first Output and sets the Output Number to 1. A new image that represents the processed Stack is then sent to the computer screen where the user will note a significant increase in the brightness. This process is then repeated until you disable the Live Stacking.

The larger the value entered in the **Number Box**, the more processing that must be performed by the camera to create MASTER FIELDSs. This can cause a processing overload as the camera and software are trying to work together to continuously create Live Video Frames (software continuously saying Feed me data (via USB frame rate setting), and the camera processing and dumping the data) that can be displayed on the screen. So, we recommend a small number between 5 and 10, so that both the computer and camera are happy, plus the object that you are imaging does not become too over exposed. Since the incorporating of new MASTER FIELDS is a continuous rolling loop, you will continuously add the **Live Stack** number of MASTER FIELDS to create your image and after a while, achieve the same result as having entered a large value in the **Exposure Time** control.

Note: If you are enabling alignment of Deep Sky Objects (which uses Stars in the alignment process), if there is too much bouncing around of the image (either due to mount stability, weather conditions, Sky conditions, or image rotation due to an Alt-Az setup), the computer algorithms may have difficulty aligning and you could obtain the Pink Floyd effect. You can observe this phenomenon, by tapping your mount while imaging in Deep Sky.



Setting up to Broadcast on LiveSkies



Introduction

I found that when I first started connecting to **LiveSkies** things started happening too fast for me to keep track of everything at once. So, pre-planning was the most crucial step for me. I found that by doing test runs in the comfort of my house allowed me to develop my techniques that work for the equipment and software that I use. Below are the results and steps that I use to broadcast on LiveSkies, feel free to follow them and/or made modification as you deem as necessary.



Computer real estate will be your nemesis. So, depending upon the size of the monitor (laptop), then number of screens that you are using, then number of software programs that using are simultaneously are using, will dictate how you will manage your windows. I will describe how I have organized my windows under a variety of situations (1 computer, 1 computer with 2 monitors, which software packages am I using, and what am I trying to do this session). Remember, it is all about having fun, and **time** and **patience** are your best friends (not to mention all the guys and gals, and the Google – MallinCam site:

<https://groups.io/g/MallinCam/topics>

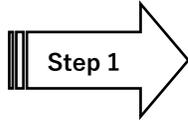
One of the most important decisions you will need to make with broadcasting the image of the SKYRAIDER is what Video capture software are you going to use. Some simple suggestions:

Currently MallincamSky is not capable of modifying the Video Image and having that Video Image be directly captured by LiveSkies. So, if you want to use all the features of the MallincamSky software and broadcast those results, as well as save screen shots and videos of your images, then we need another program to capture MallincamSky's output and have the output from that program directly linked to a Liveskies Channel.

You currently have many choices for that screen capture program: Splitcam, Manycam, WebcamMax, OBS Studio, StreamLabs OBS, All have about the same features, some of these have versions that will cost you, but all have a version that is free (reduced functions, advertisements, etc.). My current program of choice is Splitcam (Visit www.mallincam.net software downloads for website address, or Google the software of choice). You will then use Splitcam/OBS along with MallincamSky Software to broadcast the images on NSN.

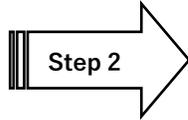
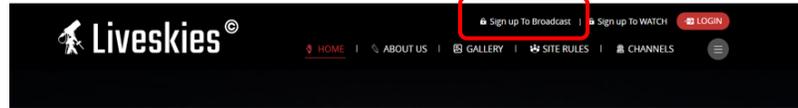
To Broadcast on LiveSkies, you will need to obtain a broadcast account from Rock. Once obtained, you will be able to broadcast, observe other broadcasting channels, and participate in real time discussions.

Obtaining a Broadcast Account



Step 1

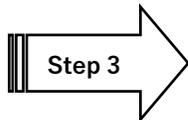
Visit <https://liveskies.org>



Step 2

Click on **Sign up To Broadcast** (located at top right of screen)

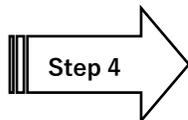
Remember each channel name will have a unique email address



Step 3

Complete the Registration Form

The Channel Name and Username should be the same with NO SPACES and SPECIAL CHARACTERS in the name

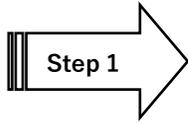


Step 4

Do not forget to check the **agreement Rules checkbox** and then Click on the red **Create Account** button.

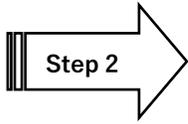
In a couple of Days, Rock will approve your account. If you try to broadcast prior to approval, Liveskies will inform you that approval is still pending.

Logging into Liveskies



Step 1

Visit <https://liveskies.org>

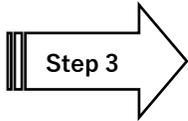


Step 2

Click on the red **Login** button on the upper right of the window.

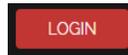


A login window will pop up

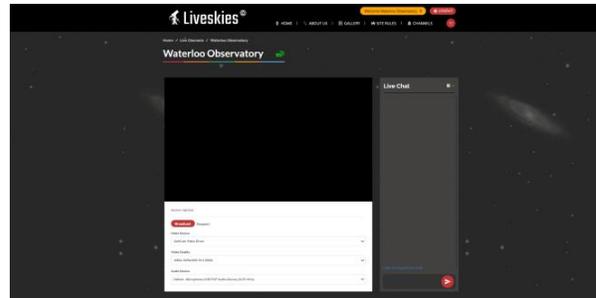


Step 3

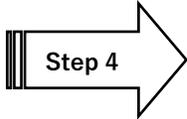
Enter both your **Username** and **Password** and click on the red **Login** button.



*You can have Liveskies remember your credentials
When you have successfully logged in, you will be presented with the
main display and control window.*



*It is from here that you can select your Video source, Resolution, and
Audio source. Liveskies tries to remember what you used last time
and will automatically fill this information in for you if it can.*



Step 4

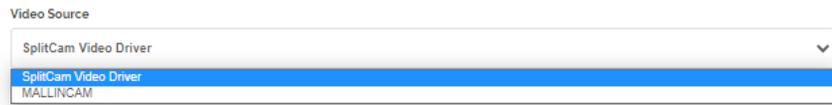
Video Source

At this point, determine how you would like to broadcast your live video of MallincamSky. I will go into more detail with two options **SplitCam** and **OBS** in the next section.

I am assuming that you have either **SplitCam** or **OBS** running and displaying the active MallincamSky Window. (See below on how to achieve this).



Clicking on the dropdown list will provide you the current **DirectShow** options available to you on your computer (depends upon what software you have installed).

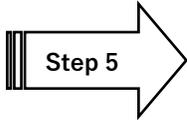


If you have installed the **Directshow** drivers then Mallincam will be added to the list.

*Note: In using **Directshow**, you will see the image of what the camera is observing, but you will need a **Directshow** software (such as **AMCap**) to control most aspects of the camera.*



If you have installed **Splitcam** (recommended), you will see **Splitcam Video Driver** in the List. Select your **Video Source** from the list.

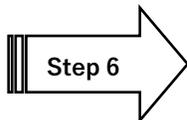


Step 5

Video Quality

From the drop-down list select the best resolution your system can handle.

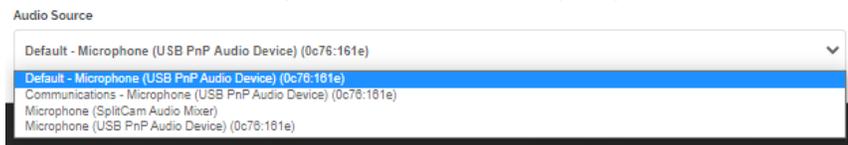
Start with 1080p and see if you can broadcast with this resolution. If you find that your system (internet) cannot handle this level of resolution, just take the resolution down.



Step 6

Audio Source

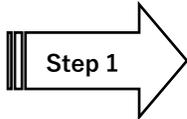
The drop-down list will indicate what current audio devices you have available on your computer. Choose the one which provides the best sound quality.



➔ **This section explains how to Capture and Broadcast Using either SplitCam or OBS**

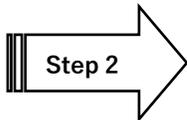
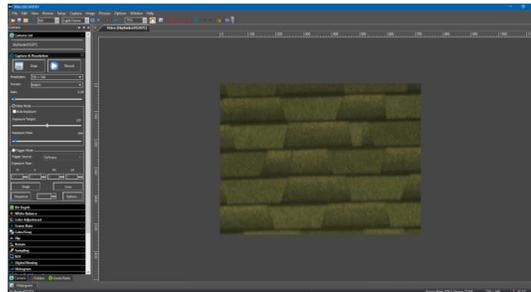
You will want to stream the **MallincamSky** image to the Liveskies server. I will give procedure for two of many options. Once you have activated your option of choice, just bring the **MallincamSky** Window up front so you can control it. If you have multiple monitors, you can leave Liveskies and **MallincamSky** each on its own monitor, so they are available to control.

Using SplitCam (either visit *Mallincam.net* or *splitcam.com* to download)



Step 1

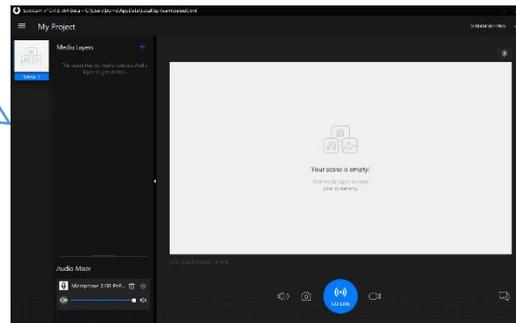
Start **MallincamSky** and connect to your camera. Ensure **MallincamSky** is active on your monitor and is not reduced.



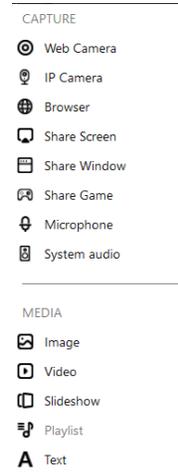
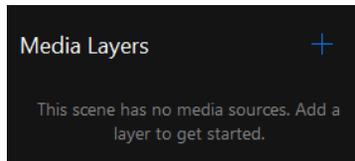
Step 2

Start **Splitcam** (I will illustrate with the latest version)

*I recommend you have **SplitCam** appear on your task bar, so all you need to do is click on it, so it opens over the active **MallincamSky**.*



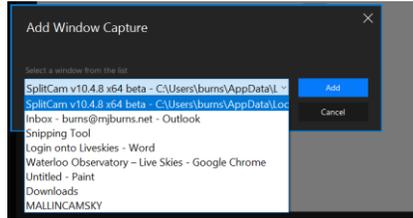
Click on the blue **+** beside **Media Layers** to select what part of the screen you would like **SplitCam** to capture.



The new window will offer you many choices, but the two best choices will be either **Share Screen** or **Share Window**.

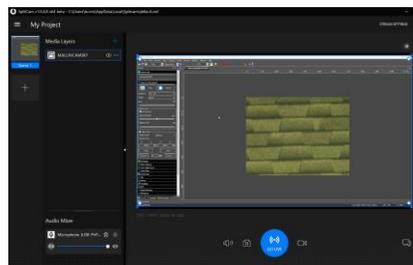
- **Share Screen** allows **SplitCam** to capture the whole screen.
- **Share Window** allows **SplitCam** to capture only a specifically running piece of software (such as **MallincamSky**). We recommend using **Share Window**.
 - You will not be able to annotate over **Share Window**.

When **Share Window** is selected, a drop-down box will provide a list of currently running programs.

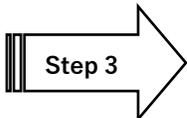


Choose **MALLINCAMSKY**

You will now have **SplitCam** displaying the **MallincamSky's** window in its display window.

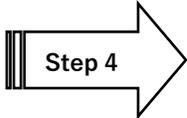


*I recommend setting the resolution to **1920 x 1080** in SplitCam's **General Settings** (the 3 horizontal lines beside **My Project** in the SplitCam screen.*



Step 3

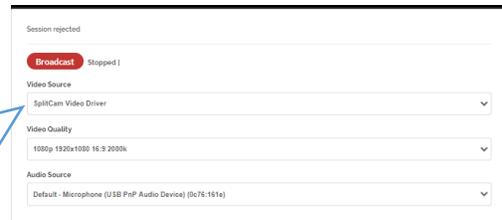
Splitcam will choose a default microphone for you, but you can delete it, and choose another microphone (or include system audio) by again clicking on the **+** in **Medial Layers** and selecting **microphone** or **system audio** and select your choice.



Step 4

On the **Liveskies** window, click on the red **Broadcast** button.

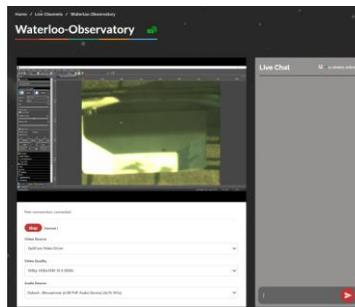
Select **Splitcam Video Driver** as the Video Source and either select your microphone directly or select **Splitcam Audio** to choose the microphone(s) you selected in **SplitCam**



CAPTURE

- Web Camera
- IP Camera
- Browser
- Share Screen
- Share Window
- Share Game
- Microphone
- System audio

If everything connects correctly, you will see **“peer connection connected”** at the top of the **Video source** window (the **Broadcast** button will change to a **Stop** button).



➔ **Live Chat**

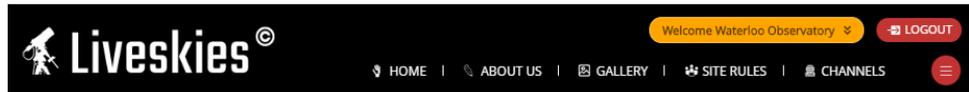
On the right-hand side of the Liveskies window you will see a Live Chat box. It is from here that you will be able to Chat and see responses from other viewers in real time. Just type in your message and hit the red button to the right of your message to send it.



➔ **Finished**



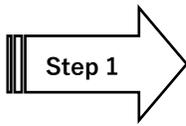
When you are finished with your session, just click on the red **LOGOUT** button at the top of the Liveskies screen, then shutdown **SplitCam** and **MallincamSky**.



*To control **MallincamSky**, just bring it to the front. If you have a small sized monitor, you may want to reduce the size of the **MallincamSky** window so you can also view the **Liveskies** window and participate in the chat process.*

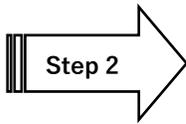
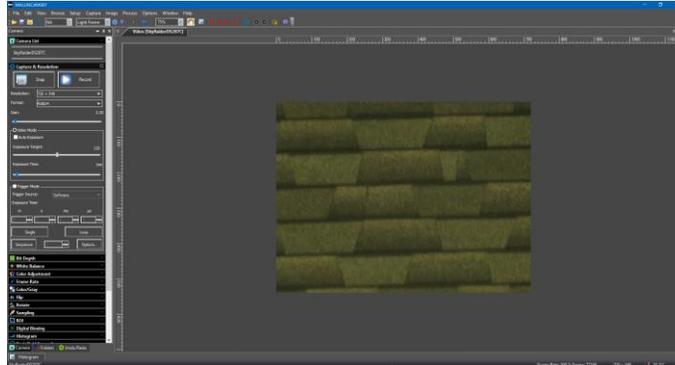
*Having multiple monitors gives options of placing the **Liveskies** window on one monitor while **MallincamSky** is on the other monitor.*

Using OBS (Open Broadcast Software) – This is a more challenging process to initially setup



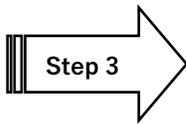
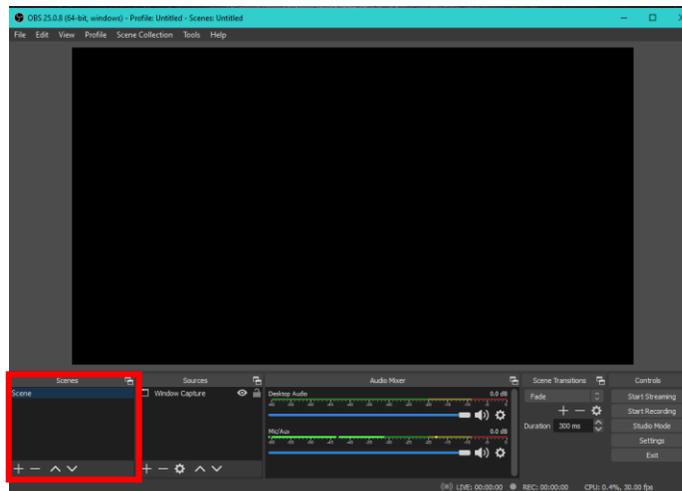
Step 1

Start MallincamSky and connect to your camera



Step 2

Start OBS



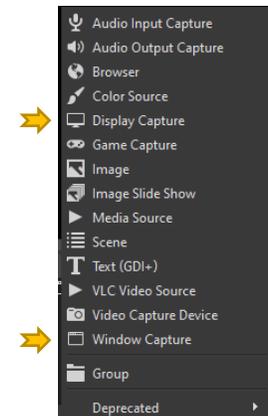
Step 3

Click on the + in the Sources box to select a source for OBS

A new Window will open up where you can select from a list of possible sources.

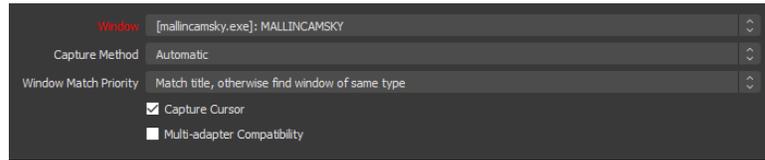
*Two two best choices are **Display Capture** and **Window Capture**.*

*We recommend **Window Capture**.*



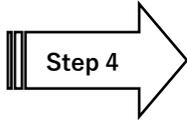
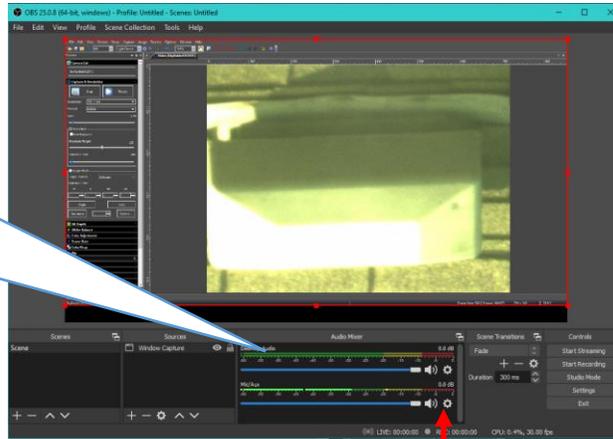


When the **Window Capture** selection appears, use the dropdown list to select **MallincamSky**.



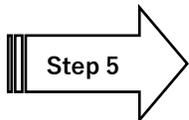
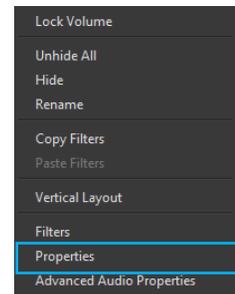
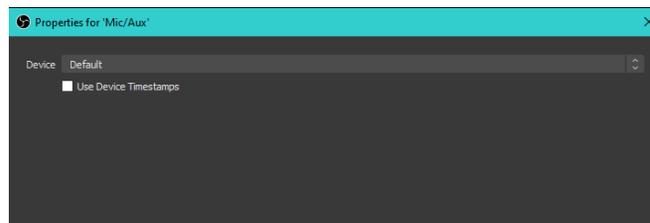
You will see the **MallincamSky** screen in **OBS's** display

If you have the **Desktop Audio** setting too high, then you will catch your voice on that as well and this can lead to repeated echoing



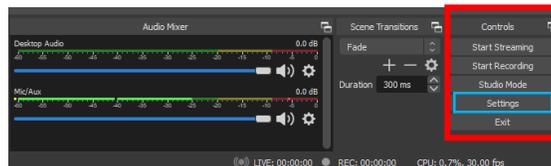
Step 4

Click on the **Gear** symbol in the **Mic/Aux** box and then select **Properties** to choose a microphone for broadcasting from the drop-down list. (you can test the microphone by speaking and watching the green level bar change)

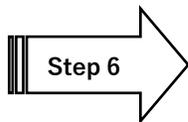
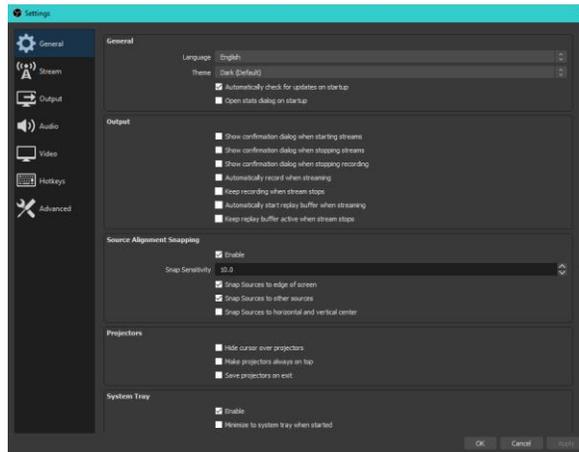


Step 5

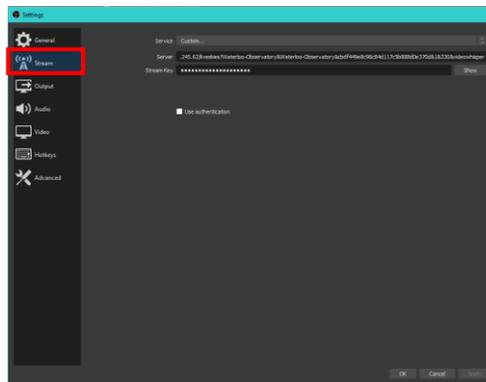
Now click on the **Settings** tab in the **Control** box.



| This will open-up the **settings selection** for OBS |



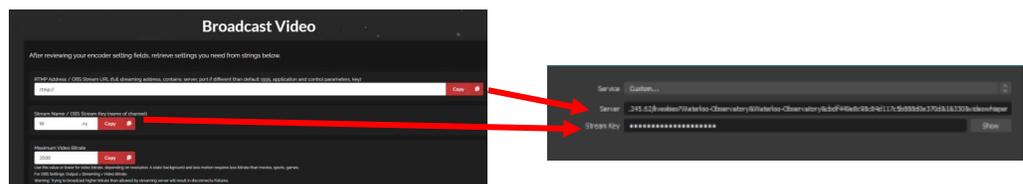
We want to **Stream** the MallincamSky Window, so select **Stream** from the selection on the left column.

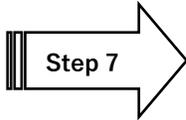


OBS will now require 3 pieces of information.

1. That the service is **Custom** (so select it from the drop-down list)
2. The server's **rtmp address**
3. The **Stream Key** name

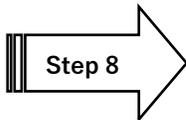
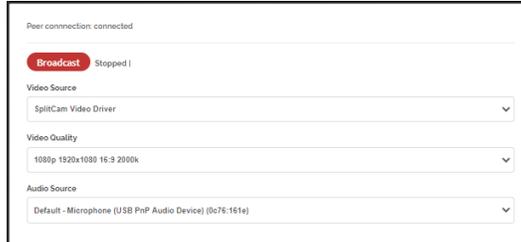
Both the **rtmp address** and **Stream Key** are located in **external encoders window on Liveskies**





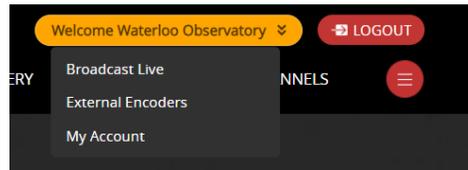
Step 7

Go back to **Liveskies** screen and make sure that you are not broadcasting (it will say Stopped! beside a red Broadcast button, do not worry about Video source)



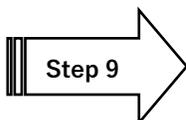
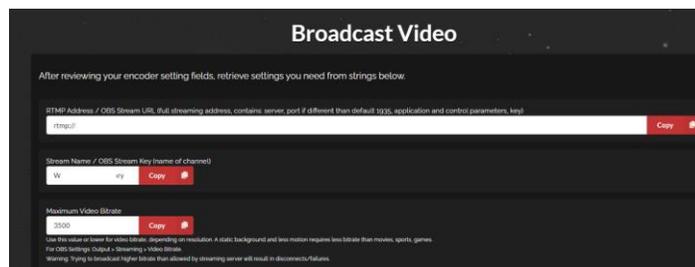
Step 8

We need to tell **OBS** (and give permission) where to send the **MallincamSky's** live video image. In the **Liveskies** window, place your mouse over the orange name of your channel. A pop-down list will appear.



Move the mouse to select **External Encoders** on **OBS Drop Down**

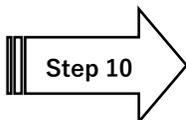
*The **Broadcast Video** window will appear that contains all of the data needed for broadcasting. Only the first two lines **RTMP Address** and **Stream Name** contains the information OBS needs. What we need to do is copy the information (one piece at a time) and give it to OBS.*



Step 9

Click on the red **Copy** button next to the **RTMP Address** box

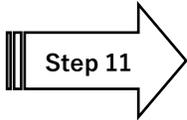
*This copies the **rtmp** address information.*



Step 10

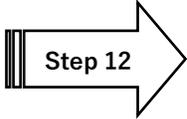
Go back to the **OBS** window and paste (ctrl-C) the location into the **Server** box





Step 11

Go back to the **Liveskies Window** and click on the red **Copy** button for the **Stream Name**



Step 12

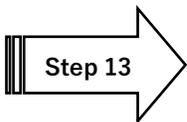
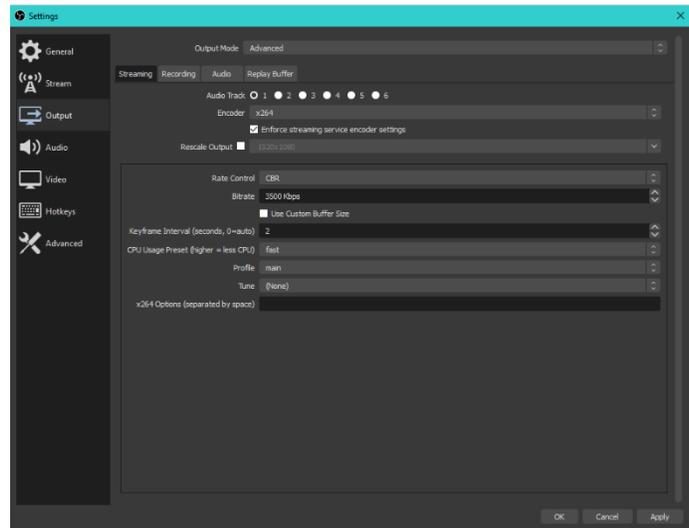
Go back to the **OBS** window and paste (ctrl-C) the location into the **Stream Key** box



Now click on **Apply** to **OK** these address locations on **OBS**.

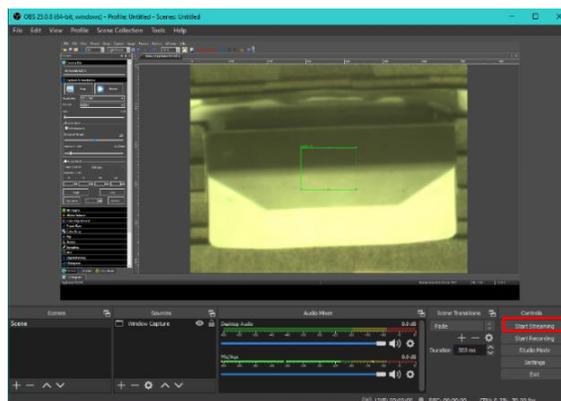
*Liveskies has a maximum video bandwidth of 3500, so you will want to ensure that you do not exceed that in **OBS** via the **Settings>Output** control. If your computer has a dedicated Video card, see if there is a hardware encoder in the **Encoder** dropdown box. If so try it to see if you get less cpu usage when using OBS. Visit youtube on advice for tweaking the settings on **OBS**.*

*In **Settings>Video** you can set the **Base** and **Output** resolution (1920 x 1080). Make sure they are both the same values.*



Step 13

To start streaming just click on the **Start Streaming** button in the **OBS** control box.



If everything is working, you will see a green box appear on the bottom of the OBS window. ■



To stop streaming, just click on the **Stop Streaming** button in the **OBS** control box.

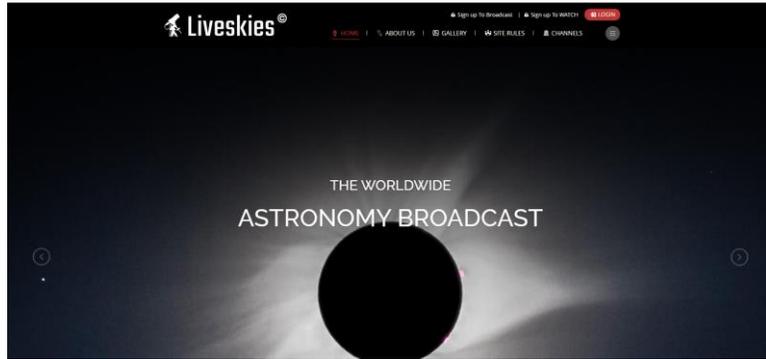
Comments about using **OBS** (or other streaming software)

- There will be a delay (3 to 5 seconds) between your adjustment to the broadcast view. This has to do with the way **rtmp** works (encoding, buffering, ...).
- You do not need to be logged into your Liveskies account to use **OBS**, it will automatically stream to your channel (once you select **Start Streaming**). You can minimize **OBS** and use MallincamSky as you normally would. But, since you have not logged in, you will NOT be able to use the **Live Chat** (bummer). So, just log in to your Channel and then **view** your own channel to use **Live Chat** or Log in as **Guest** to view the channel. Some users use their phone to view the **Live Chat** and answer questions over the microphone in **OBS**.
- Once you have setup the settings on **OBS**, it remembers them. So, the next time you start **OBS**, all you need to do is click on **Start Streaming** and you are broadcasting.
- **SplitCam** (Version 10) also has the capabilities to broadcast on **rtmp** as well as **directshow**.

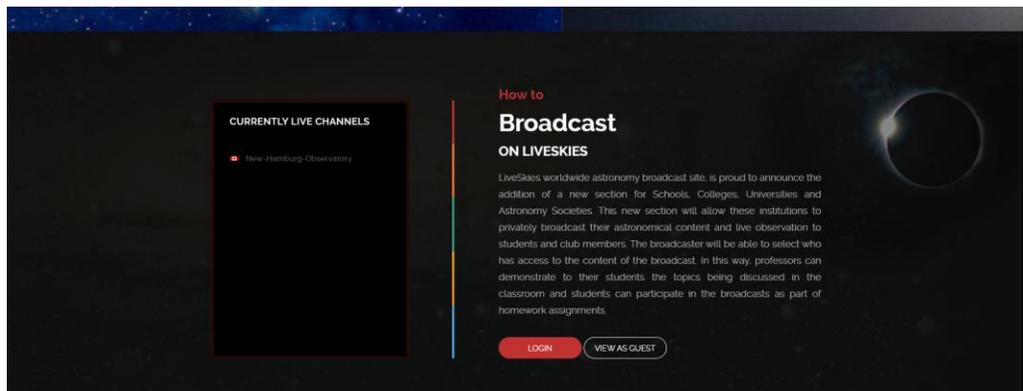
➔ **Viewing a Live Skies Channel**

Logging into Liveskies

➔ Visit <https://liveskies.org>



Below the main display window of **Liveskies** is a list of the currently broadcasting channels, or just click on the **CHANNELS** button on the top line to display currently broadcasting channels.



➔ If you just want to watch and not participate in the Live Chat, just click on the **Channels** Button to display available channels to watch. Then just click on the channel image and you will be presented with the live channel.

If you want to participate in the Live Chat

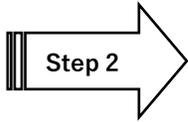
Step 1 ➔

Click on the red **Login** button on the upper right of the window.



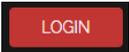
A login window will pop up



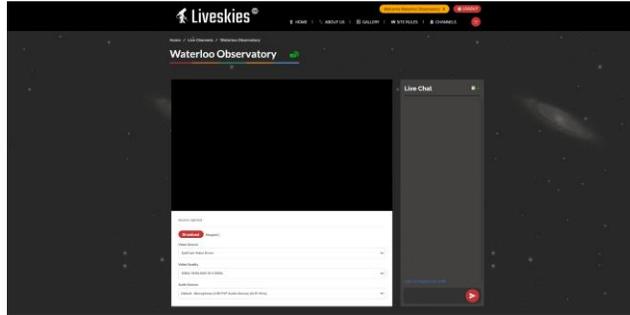


Step 2

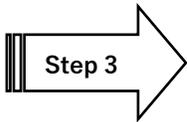
Enter both your **Username** and **Password** and click on the red **Login** button.



*You can have **Liveskies** remember your credentials
When you have successfully logged in, you will be presented with the
main display and control window.*



*If you have previously broadcasted, Liveskies may automatically
activate your broadcast channel*

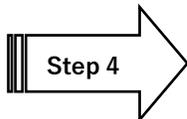


Step 3

Click on the **Channels** button at the top left of the Liveskies window.

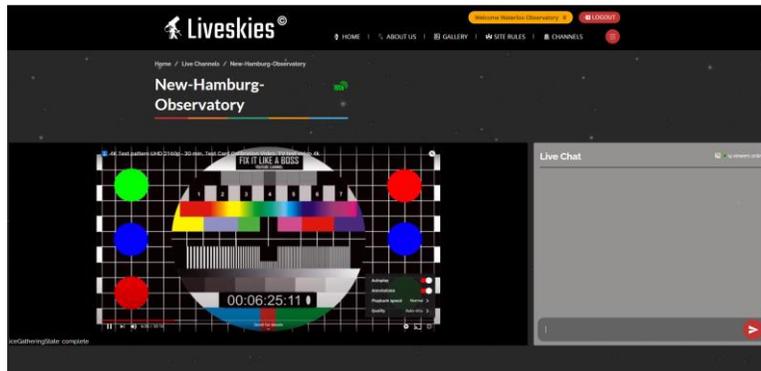


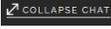
A list of available channels will be displayed



Step 4

Just click on the Channel and you will be presented with the channel and the Live chat window



➤ You can make the Broadcast Video Window **full screen** by clicking on the  located on the bottom right side of the **Liveskies** video window (you will not be able to see the **Live Chat** Window), or simply by double clicking on the Video Window of the broadcast (double clicking on the full screen broadcast channel will return it to its original size). Clicking on the  button will also toggle on or off the **Live Chat** window (also increases the size of the Video Window).

These are great ways to see the live broadcast in amazing detail, but you lose the Live Chat Window

➤ If you are using Google Chrome (or similar), use the zoom feature (3 vertical dots on upper right of browser) to increase size. Experiment by increasing zoom factor.

*For my monitor zoom 150 give me best video and **Live Chat** arrangement, zoom 300 placed **Live Chat** underneath Video window.*

➤ You can pause the video stream by clicking on the 2 vertical bars on the lower left side of the Liveskies video window.

When you resume the video, it jumps to the current live video stream, not where you left off

To Live Chat

➤ Just type your text in the entry box at the bottom of the Live Chat window and click on the red **delivery** button to the right of the entry box.

Your chat and other replies will display in the scrolling Live Chat window.

Clicking on the **(Viewers Online)** opens a Viewers List containing your current viewers.

Clicking on it again, closes the Views List

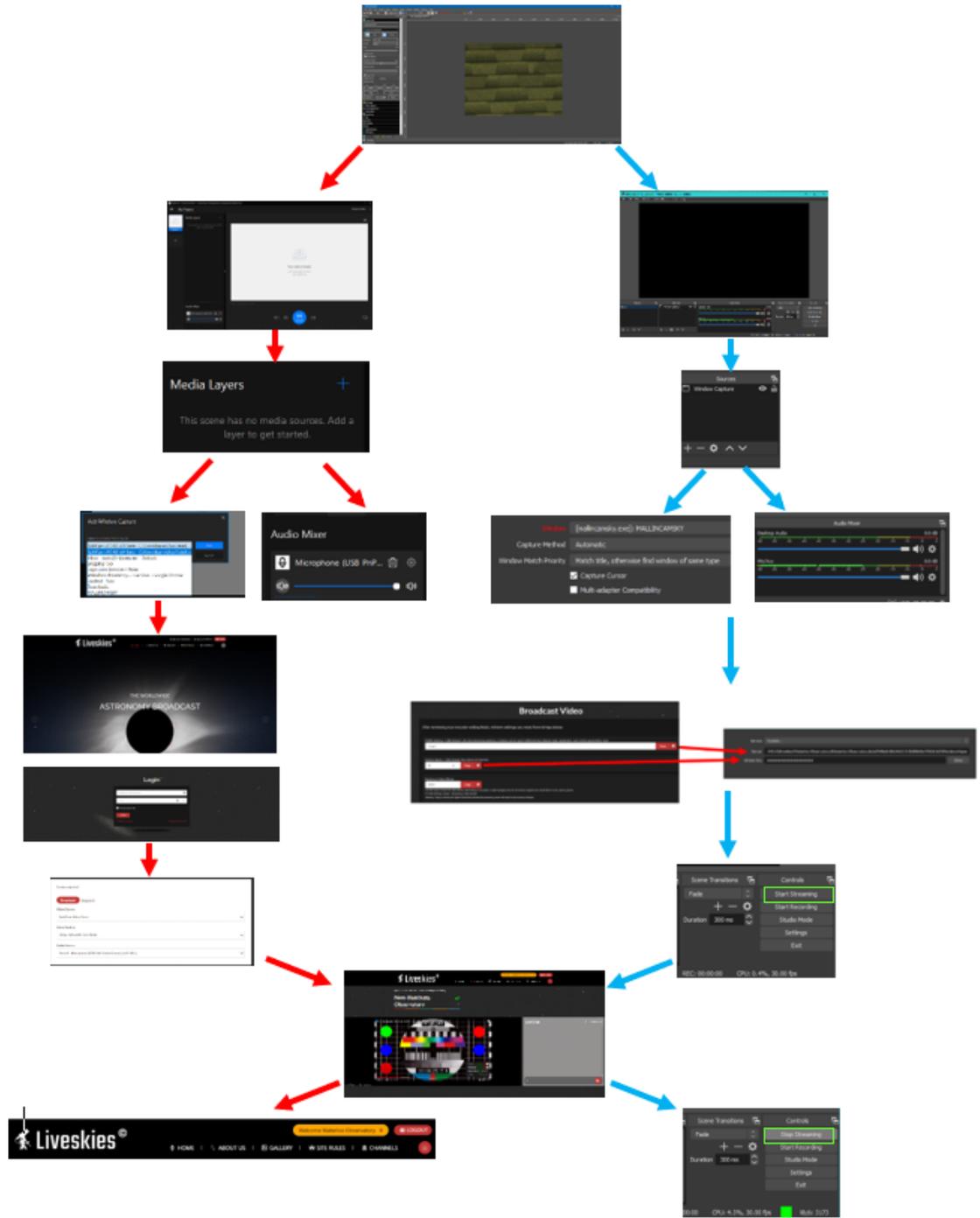
To exit

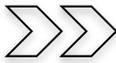
➤ All you need to do is Log-Out by clicking on the red **LOGOUT** button on the top of Liveskies Window.

You can also click on the channels but to change channel if you require.



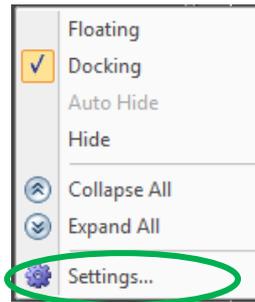
⇒ One Page Broadcast Summary



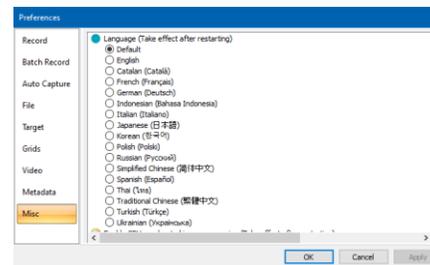
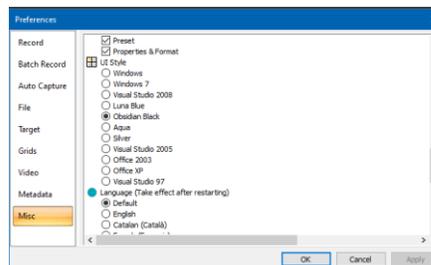
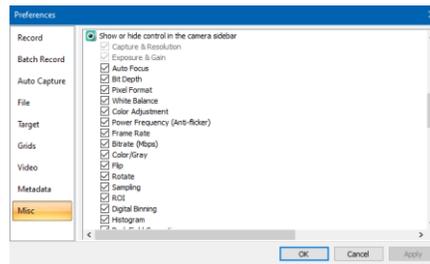
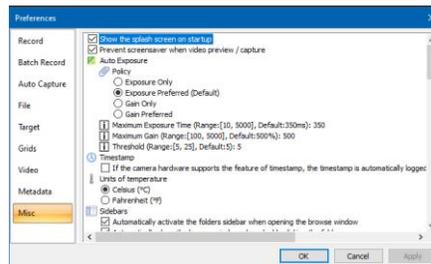


Customizing the Screen

You can customize what controls (and the defaults for most of the controls) you want active, by **Left-Clicking** anywhere in the **Left Sidebar** then choose the **Settings** choice to open-up a **Preference Window** that allows you to make various setting changes.



Select **Misc** from the **Preference Tab** and then examine (or modify) all the controls and options available to you. You use the Preferences to activate (or deactivate) controls displayed on the left sidebar of MallincamSky, the colors of the commands in MallincamSky, or even the Language the controls are written in.





Focal Reducers

MFR-10 Focal Reducer

Because of the Large sensor size on the SkyRaider DS432 TEC, the best focal reducers to use is the MallinCam 2-inch version. The MallinCam MFR-10 (MallinCam Focal Reducer-10) is a breakthrough in optical performance only from MallinCam. You can now have a focal reducer for your larger size (up to 28.4mm diagonal) CCD or CMOS sensor astronomical camera. The large format focal reducer has a 2" (48mm) thread on either end and comes with a T-to-2" adapter to allow use with all T-mount type cameras. Reduction for a 17.5 mm back focus camera is 0.46X. The 3 element multi-coated system has a built-in field flattener crucial for RC type telescope and SCT as well. The MFR-10 will make your telescope F/ ratio faster when using a CCD or CMOS camera, cutting exposure time by up to 5X. Using this with a 10mm spacer provides the fastest system with the least amount of distortion effects.



Universe .5X focal reducer

The Universe focal reducer and a 10 mm spacer is the best match for the DS432 camera. Designed and built for use with the large sensor in our Universe camera, this 0.5x focal reducer can also be used with other large sensor cameras such as our SkyRaider DS16, DS10c, DS10CTEC. The Focal Reducer has a T-mount thread on either end, allowing it to be securely attached between the camera and nosepiece. Three small set screws allow you to lock the T-mount threads after it is assembled



