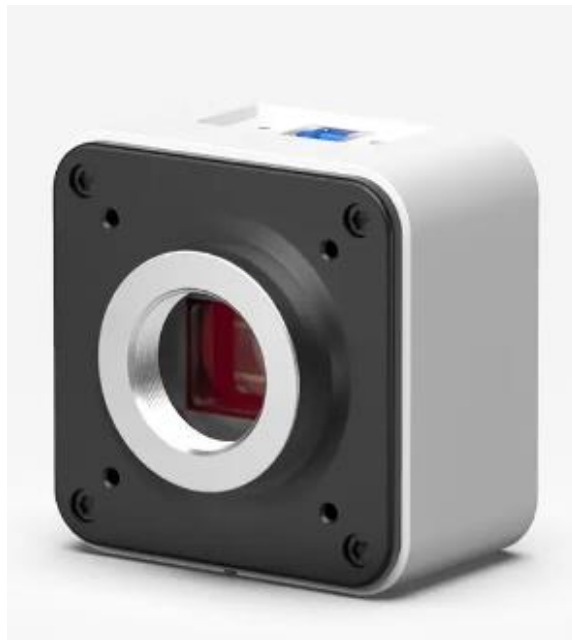


MALLINCAM SolarCam 20

[Version 1.0]
Michael Burns
Rock Mallin



[Mallincam SolarCam 20 User Manual]

This document will quickly introduce you to the wonders of the Mallincam SolarCam 20 Camera. We will include instructions on how to install the Software and Drivers and how to connect the **SolarCam 20** to your computer along with explanations of the camera's major settings. The purpose of this guide is to quickly get you up and running with the **SolarCam 20** Camera so that you can image the skies and share your passion with others.





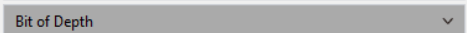

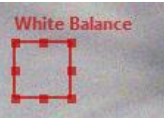

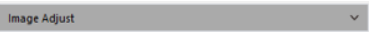

Revision History

Version	Date	Revision Description
1.0	11/06/2023	Template Creation

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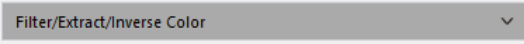

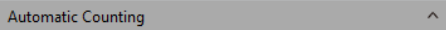
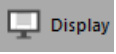

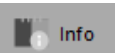
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1. Introduction

Introducing the MallinCam **SolarCam 20** imager, the newest member of the **MallinCam** family of astronomical imaging video cameras. This state-of-the-art camera boasts a Sony 20 MP sensor, providing heightened sensitivity essential for observing and capturing celestial events, especially solar phenomena. Tailored for demanding astronomical solar applications, the **SolarCam 20** excels in real-time observation and imaging of solar system objects, making it the most versatile video/imaging camera ever developed for computer use. It enables live observation of all solar system targets while simultaneously capturing images or recording video.

Equipped with a square megapixel ceramic CMOS sensor featuring a pixel size of $2.4\mu\text{m} \times 2.4\mu\text{m}$, the **SolarCam 20** delivers impressive 5472×3648 resolution, covering a diagonal field of view of 15.86mm. The **SolarCam 20** camera produces high-resolution 20 million-pixel images using various solar telescope setups. Users also have the flexibility to expand the field of view or magnification further by incorporating an optional focal reducer or Barlow, facilitating the detailed observation of vast astronomical objects. Notably, the **SolarCam 20** offers "Newton Rings" Free performance on solar telescopes, both in H Alpha and White light.

With its 1-inch large target surface, the **SolarCam 20** captures images with optimal clarity and detail. This professional-grade camera provides complete control through its dedicated software, offering seamless connectivity via USB3. It comes bundled with a professional USB cable featuring secure hardware attachments for outdoor use. The package includes specialized software stored on a thumb drive, a 1.25" adapter, and a high-grade USB 3 cable, ensuring a comprehensive and user-friendly experience for all astronomers.

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

The Contents of the SOLARCAM 20 - Package

Specifications:



Sensor:	Sony CMOS sensor IMX183CQJ-J
Sensor size:	13.1 x 8.8 mm
Array Diagonal:	15.86 mm
Active pixel array size:	5472 (H) × 3648 (V) (20 Mega Pixels)
Effective Area:	13.1mm x 8.8mm
Pixel size:	2.4 x 2.4 microns
Analog-to-Digital conversion:	8/16-bit output
Exposure time range:	18 micro-seconds to 15 seconds
Weight:	11.5 oz. (327 g)
Mounting interface:	c-Mount
Shutter Mode:	Rolling
Frame Rate:	15fps@5472x3648
Exposure Time:	18μs-15s
Binning:	2x2, 3x3, 4x4
Color Temperature:	2000-15000K
Picture Format:	TIFF/JPG/PNG/DICOM
Camera Size:	68mmx68mmx46mm
Data Interface:	USB: 3.0 Power:3W
Environment: Temperature :	-10~45°C; Humidity: 10%~85%
Operating System:	Windows 7/10 (32 Bit/64 Bit)/Mac
Analog-to-Digital conversion:	8/16-bit output

Included in Package:



- ① MallinCam **SolarCam 20** imaging camera.
- ② Flash drive containing software installation files.
- ③ USB 3.0 Cable with mounting screws.
- ④ 1.25" eyepiece adapter

Optional Components

- MallinCam 1.25" 0.5 x Focal Reducer w/25mm extension
- MallinCam 1.25" IR Blocking Filter
- MallinCam 1.25" Polarizing Filter



2. Installing Driver and Software

System Requirements

PC running either Windows ® (32-bit & 64-bit) or MAC

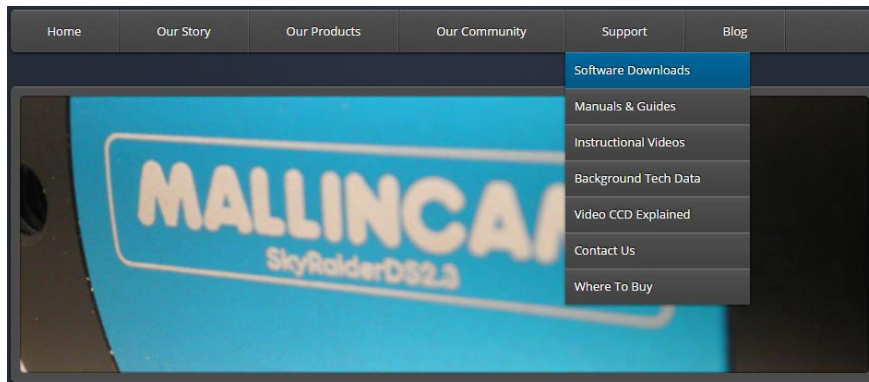
Performance is not guaranteed if the following specification cannot be reached.

- Equal to Intel Corei5 or Higher
- Memory: 8GB or More
- USB port: USB 3.0 Port
- Display Monitor: 17" or Larger Recommended
- A video display capable of rendering 1024x768 resolution minimum; 1280x1024 or higher is recommended, and in 24-bit color.
- One available fully specified high-speed USB 3.0 port.

Installing the Software

Step 1

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



Step 2

Select the Blue **Click Here** Button to download the **SolarCam 20** Driver.


MALLINCAM HD-10 II, SolarCam 20 Software [Click Here](#)

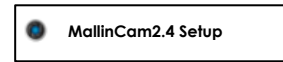
After you have clicked on the Blue **Click Here** indicator, a zipped file will be downloaded onto your computer.

Note

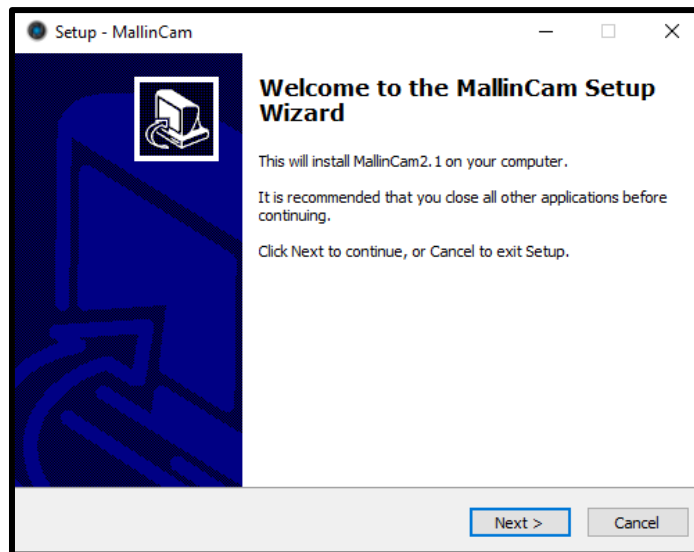
Make sure that the SOLARCAM 20 is **not plugged** into the computer.

First Time Installation of Software

 **Double-Click** on the **Mallincam2.4 Setup** to start the installation process (You may need to accept installation).

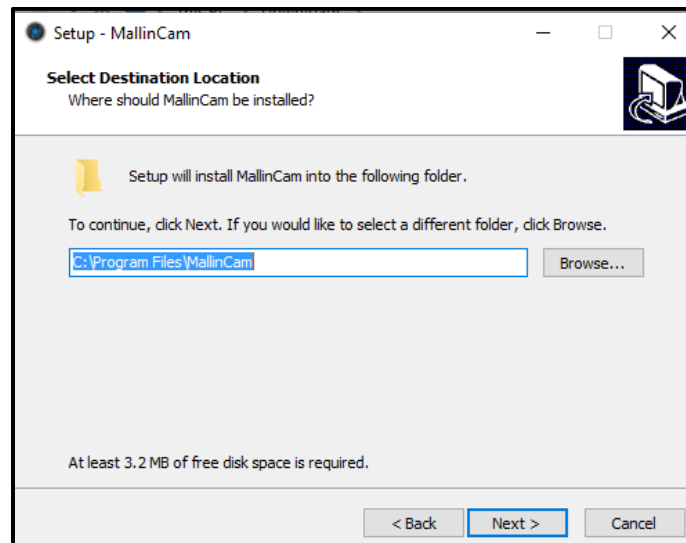


 The following window will appear:




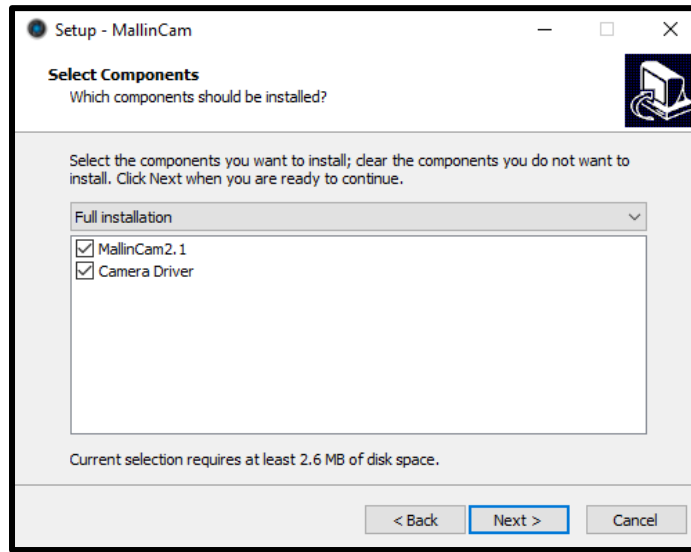
 **Click** on **Next** to continue the installation process.


An **Acceptance Window** will now appear.



 Either **accept** the file location for the **Mallincam2.1 Software** to be installed in or **choose** a folder of your choice. We recommend accepting the default location.

 **Click Next** to pop-up the **Components window**.

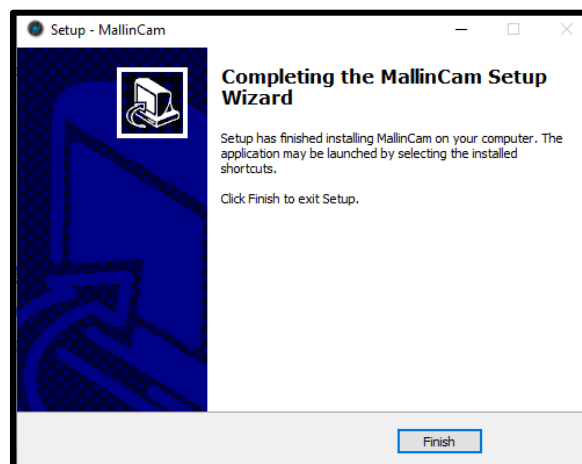


 Make sure both the **MallinCam2.1** and **Camera Driver** are checked.

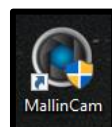
 **Click Next** to accept the **Components**.

The **MallinCam2.1** and **Drivers** will be installed on your computer. Then the **Completing the MallinCam Setup Window** will pop-up.

 **Click** on **Finish** to acknowledge the installation.



Once complete, you will now have a **MallinCam Icon** on your desktop.



3. Mallincam SOLARCAM 20 with a Computer

➤➤ Connecting the SolarCam 20 to your Computer

First make sure you have the following pieces of equipment:

- Mallincam **SolarCam 20** Camera
- 1.25" C nose-piece adapter
- USB 3.0 Cable
- Laptop or Computer

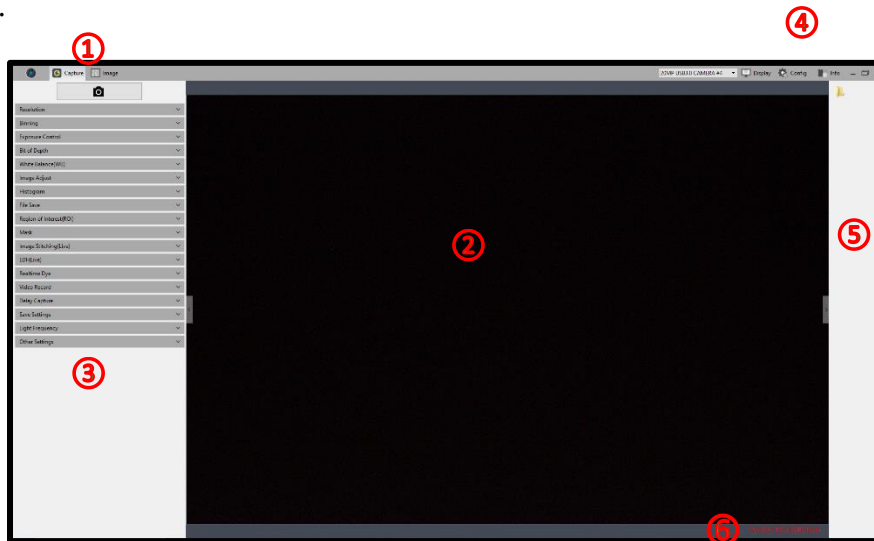
➤ Starting on the SolarCam 20 on the Computer

➤ Attach the provided **USB 3.0 cable** from the **SolarCam 20** to a USB 3.0 port on your Computer (Drivers may install on first attachment).

➤ **Double-Click** on the **Mallincam Icon** (located on your Desktop) to start the software (Note: it takes a few seconds to activate).



The **Mallincam Window** should open with current image displayed in the Video window.



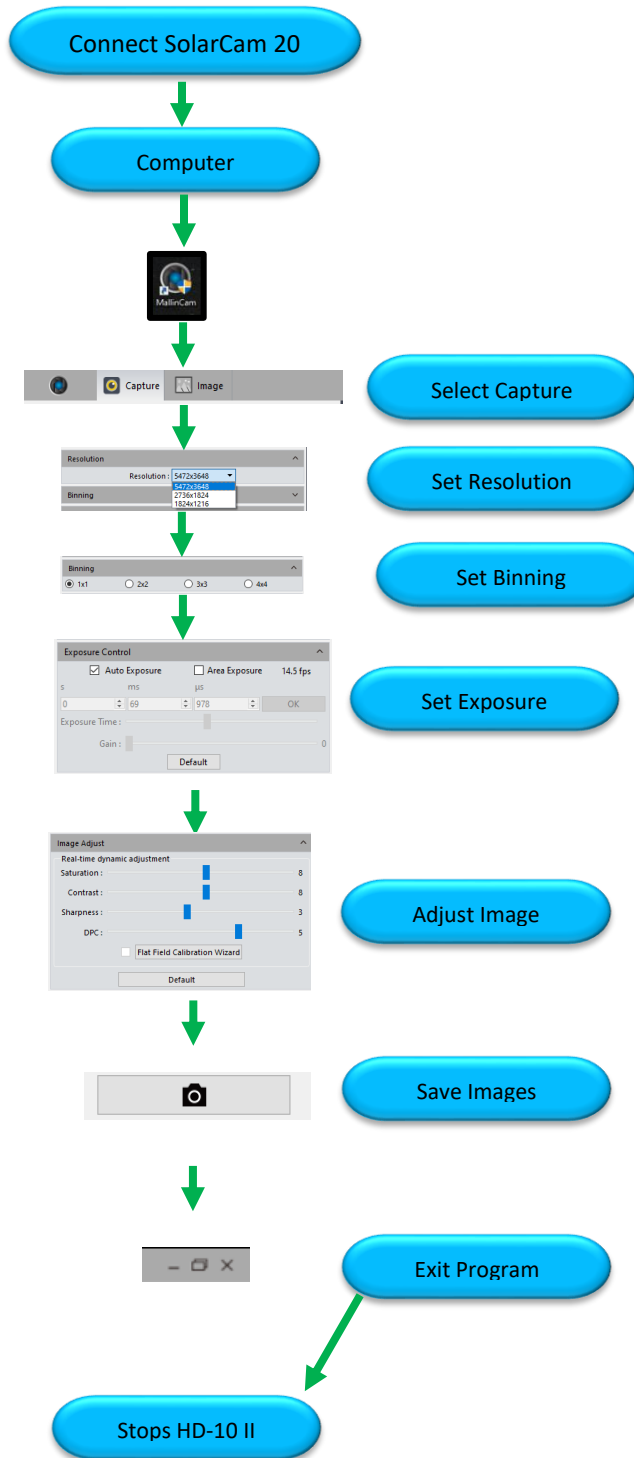
- ① **Status Bar**
- ② **Display Window.**
- ③ **Feature Tabs.**
- ④ **Image Bar.**
- ⑤ **Image Tray.**
- ⑥ **Data Bar**

The **Feature Tab Panel** provides a variety of **Drop-down tabs** to open-up more controls within the **Feature Tab Panel**. When the little **black triangle** next to the tab descriptor is pointing to the right, the tab is closed. When the little black triangle is pointing down, the Tab is open (thus displaying more controls)

Clicking in the little black triangle toggles the tab from being open or closed, thus allowing you more control of what information controls are available for you to use.

➤➤ SolarCam 20 Quick Setup and Pictorial Workflow

A typical workflow when using the **SolarCam 20**.

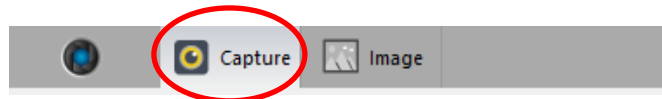


➡➡ Detailed Work-Flow Procedures on a Computer

This section describes the typical procedures in imaging using a computer. For a more detailed explanation of each control of all of their options, see the section **SOLARCAM 20 Control Software** below.

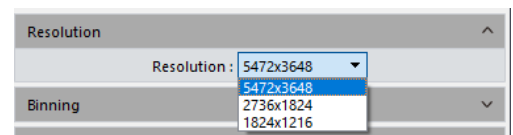
Once you have the **SolarCam 20's Software** up and running, you should see an image of whatever the **SolarCam 20** camera is looking at (at whatever exposure setting the software is set at).

At the Top of the Window on the **Status Bar**, ensure that the **Capture** tab is selected.



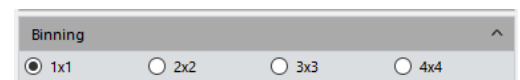
Step 1 Resolution

The SolarCam 20 provides 3 resolutions for you to choose from. So, from the **Resolution Tab**, we might as well choose the default 5472 x 3648 to verify that our computer can handle this. Note: the lower the resolution, the higher the frame rate.



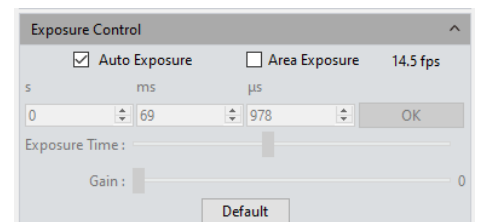
Step 2 Binning

The SolarCam 20 provides 4 binning choices for you to select from. So, from the **Binning Tab**, we might as well choose the default 1 x 1 to see how our computer and telescope parameters handle this.



Step 3 Exposure

The first thing you should do (until you become more familiar with the operation of the Camera) is to turn on the **Auto Exposure**. The Mallincam Software provides a simple process of selecting and deselecting the autofocus along with the ability to manually adjust the exposure settings. **Area Exposure** will provide you with a resizable blue box to select a specific area of your image for the **Auto Exposure** to examine.



The MallinCam **SolarCam 20** has an exposure range from **18 ms** to **15 seconds**.

To activate the **Auto-Exposure**, just check the box next to its name. This will gray out the manual adjustments, **Exposure Time** slider and the **Gain** slider. The software will then continuously adjust the **Exposure** and the **Gain** slider values to optimize the image.

You have two ways to manually adjust the exposure (make sure **Auto Exposure** is unchecked):

1. By using **Manual** entry values.

You can enter in a value in the **s**, **ms**, and **μs** boxes or use the **up** and **down** arrows adjacent to the box to increase or decrease the value in the box.

Click on the **OK** button accept the new exposure value.

Note

The **SolarCam 20** will not change the exposure value until you give it permission by clicking on the **OK** button.

2. By using the **Exposure Time** slider and the **Gain** slider, adjustments are immediately transferred to the **SolarCam 20** for real time viewing.

Left-click-hold and drag the slider to adjust the exposure time. You will notice the exposure time value in the manual entry boxes for the time change in real time along with the real time response from the camera.

Gain

When on **Manual Exposure**, you can also adjust the **Gain** (**Left-Click-Hold-and-Drag** the **Gain slider**) to make the image brighter (larger **Gain** value) or dimmer (smaller **Gain** value). You will get more comfortable with finding the best exposure/gain values for your image. Play with them to see how both the **Exposure** and the **Gain** values affect your image. **Gain** is a setting that controls the amplification of the signal from the camera sensor to the screen. Too much amplification can cause noise in the image.

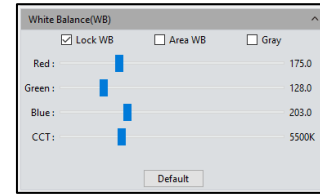
Note

By clicking on the **Default** button, the software will activate **autoexposure**, and both the **Exposure** and **Gain** slider will adjust to match the current conditions to produce an image.

Step 4

White Balance

Different planetary objects, in combination with different sky conditions, may throw off the colour balance of the SolarCam 20. We can bring everything back to normal by using the **White Balance** control which is located in the **Feature Tab**.



The default setting of the **White Balance** is **Auto-White Balance** (unchecked), but you can manually adjust the ratio of the three individual components of **Red**, **Green** and **Blue** to reflect the true image color under various illuminating conditions. To adjust the values, **Checkmark** the **Lock WB** and then use the sliders to adjust the color ratio to the required values. Do not uncheck the **Lock WB** as this will again activate **Auto White Balance**. **Area WB** will allow an Auto White Balance based on image inside the resizable and moveable red enclosure box.



Gray



Check-marking this option will convert the color image to a black and white image. When selected, the color sliders are deactivated.



Color Temperature (CCT)

When the **Lock White Balance** is **checked**, the current approximate color temperature can be achieved by adjusting the two sliders which are **Red** and **Blue**. It can also be manually adjusted by moving its own slider to match the approximate color temperature according to the illuminating environment (*It will automatically adjust the **Red** and **Blue** sliders and set **Green** to 128*). A light having higher color temperature will have more blue light or larger Kelvin value as compared to lower light, which has a smaller Kelvin value. By calibrating the **White Balance** sliders, you will more accurately achieve the correct color temperature. The color temperature settings range from **2000K** to **15000K**.



Note

If you don't like the White Balance adjustments, you can go back to the default settings by **Clicking** on the **Default** button beneath the **White Balance** controls. It will set **Red** to **175**, **Blue** to **203**, **Green** to **128**, and **CCT** to **5500K**.

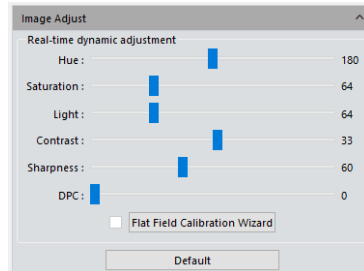
Default

WB SETTINGS	COLOR TEMPERATURE	LIGHT SOURCES
	10000 - 15000 K	Clear Blue Sky
	6500 - 8000 K	Cloudy Sky / Shade
	6000 - 7000 K	Noon Sunlight
	5500 - 6500 K	Average Daylight
	5000 - 5500 K	Electronic Flash
	4000 - 5000 K	Fluorescent Light
	3000 - 4000 K	Early AM / Late PM
	2500 - 3000 K	Domestic Lightning
	1000 - 2000 K	Candle Flame

Step 4

Hue, Saturation, Light, Contrast, Sharpness, and DPC

Located in the **Image Adjust** Tab are the six controls called **Hue**, **Saturation**, **Light**, **Contrast**, **Sharpness** and **DPC**. By using the mouse cursor, **Left-Click-Hold-and-Drag** the slider bar of each of the controls to produce an image that meets your requirements.



Hue - Hue is the shade of the color, adjusting ranges from 0 to 360. Hues are made up of the three primary colors (red, blue, and yellow) and the three secondary colors (orange, green, and violet) that appear in the color wheel or color circle. When you refer to hue, you are referring to its pure color, or the visible spectrum of basic colors that can be seen in a rainbow. When hues are combined with other color qualities, such as **Saturation**, or **Light**, then the resulting combination is known as the color's chromaticity.

Saturation - Saturation is similar to contrast, however instead of increasing the separation between shadows and highlights, we increase the separation between colors. It represents the purity of the color, the higher the purity, the more vivid it appears. It ranges from 0 to 255.

Light - Light is the brightness and darkness of the image. It ranges from 0 to 255.

Contrast - Contrast is the scale of difference between black and white in your images. Without contrast you wouldn't have an image because there wouldn't be any differentiation between light and dark; everything would be black, white, or a single shade of grey somewhere in between. It ranges from 0 to 63.

Sharpness - Sharpness can be defined as edge contrast, that is, the contrast along edges in an object in the image. When we increase sharpness, we increase the contrast only along/near edges in the object while leaving smooth areas of the image alone.

DPC - This represents for **Dead Pixel Correction** and is used to detect and remove dead pixels from the active image. It ranges from 0 to 3. The higher the number the more aggressive the Dead Pixel removing process.



Before: DPC=0



After: DPC=1

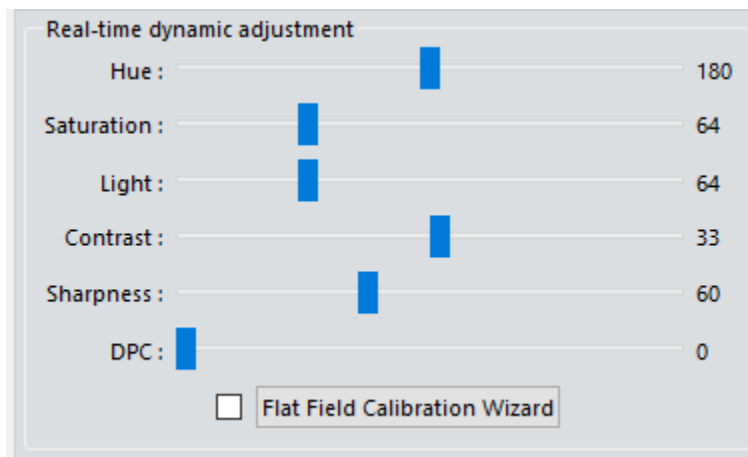
Flat Field Calibration Wizard

This control will start a process that will help eliminate any optical spots caused by dust and particles on the optical path (from lenses to mirrors on the telescope). This Wizard will walk you through taking a couple of images so it can detect and remove the imperfections making a more uniform image. With flat field correction, those types of defects could be effectively reduced, the imaging effects will be more uniform, and the color reproduction of the images is smoother and more realistic.

Once the **Flat Field Calibration Wizard** process is complete, you can activate it or deactivate it by check marking the **check box**.

Default

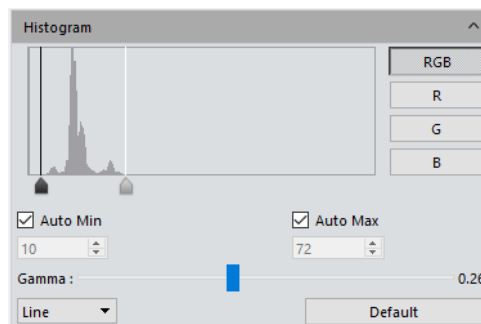
Clicking on the **Default** button resets all of the **Image Adjust** parameters to their default values.



Step 5

Histogram

The **Live Image Histogram** allows you to either manually control the **brightness** of each of the color channels or let the software perform this task for you automatically. This allows you to pull out as much detail hidden in the image as you can.



Again, if you get messed up with in making adjustments, this Tab provides a **Default Button** that will reset everything back to the default settings.

It will take you the most amount of time to become comfortable with the tools in this **Histogram Tab**. Don't be afraid to experiment with the settings.

The Histogram allows you to manually or automatically adjust the **image levels** of all color components the image that the SolarCam 20 camera is producing. You can control each individual channel (**Red**, **Green**, and **Blue**) or the combined color channel. The color level adjusting means redefine the **R\G\B** color levels in each channel and then re-allocate of the pixel values in among

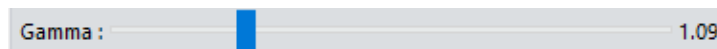
You have manual control of the image levels when the **Auto checkboxes** are **un-checked**.

Left-Click and **Hold** to drag the **Black** or **Grey** arrow **Slider** underneath the Live **Histogram**.

The **Histogram** provides a pictorial view of the image intensities from dark to bright. In a dark image, the graph will be more towards the left, and in a bright image will have the histogram pushed towards the right. Adjust the exposure to get a **Histogram** that uses most of the window, then move the **White** and **Black Sliders** to just touch the left and right sides of the **Histogram**. If the arrow sliders are inside the **Histogram**, then the brightness' are clipped (which sometimes is beneficial when too bright or too dark an image is on the screen).

You have the ability to display the **Histogram** either in a **linear mode** or a **logarithmic mode**.

Gamma - Each pixel in an image has brightness level, called luminance. This value is between **0.64** to **2.55**, where **0.64** means complete darkness (black), and **2.55** is brightest (white). Different display devices (monitor, phone screen, TV) do not display luminance correctly. So, one needs to correct them, therefore the gamma correction function allows you to brighten the dimmer area for the image or darken the brighter area of the image.



Step 6

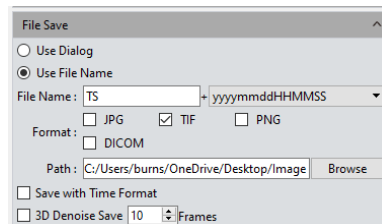
Capture a Snapshot

You now have your masterpiece on the screen (the Moon, a Planet), and you have played with the Histogram and the Image adjustment tools and now you would like to save it for bragging rights.



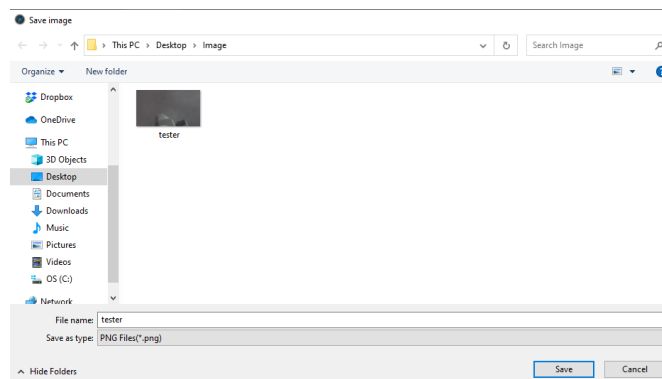
The first thing you want to do before taking a snapshot is to determine where and what format you would like the software to save the images when you actually take a snapshot. Spend some time thinking about locations and file name structures you want to use.

Expand the **File Save** Tab



Use Dialog

This radial button will open up the **Save Image Window** when you take a snapshot. It is in the dialog box where you can choose a directory location on your computer, a file name for the image, and the format you would like the image saved in (**JPEG, TIFF, PNG, DICOM**).



Use File Name

This radial button will allow you to select a default File name plus an extension (date format or index number), the default format(s) you would like the images saved in (**JPEG, TIFF, PNG, DICOM**), and finally the default location (**path**) where to automatically save the image in when the snapshot is taken.

For example **File Name** : TS + yyyyymmddHHMMSS

Will have a file named as: **TS-20231014075034**

Note

You can save the image in multiple formats at the same time using the **Use File Name** radial by **checking** more than one choice.

➤ Take a picture time.

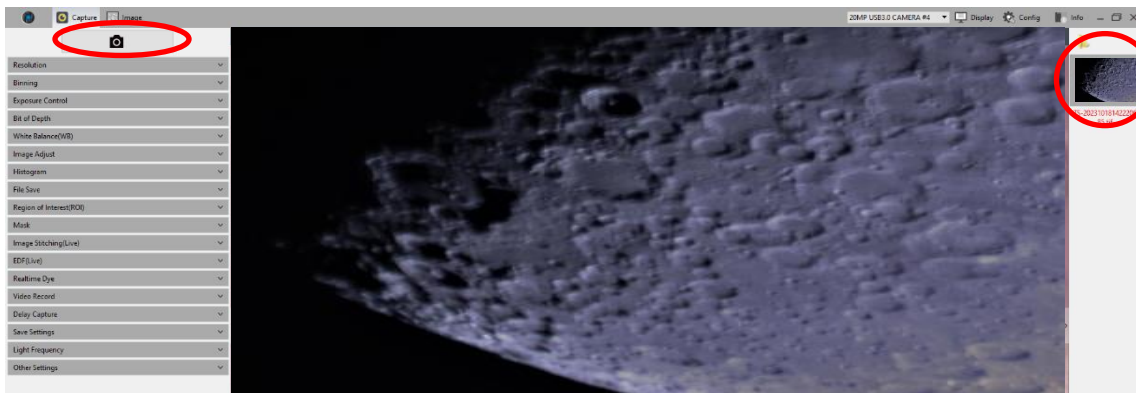
Since you have already chosen how and where the image is to be saved, now is the time to take your picture.

Located above the **Resolution** Tab is the **take-a-snapshot** icon. Just **Click** this icon and the **Mallincam Software** will capture the image.



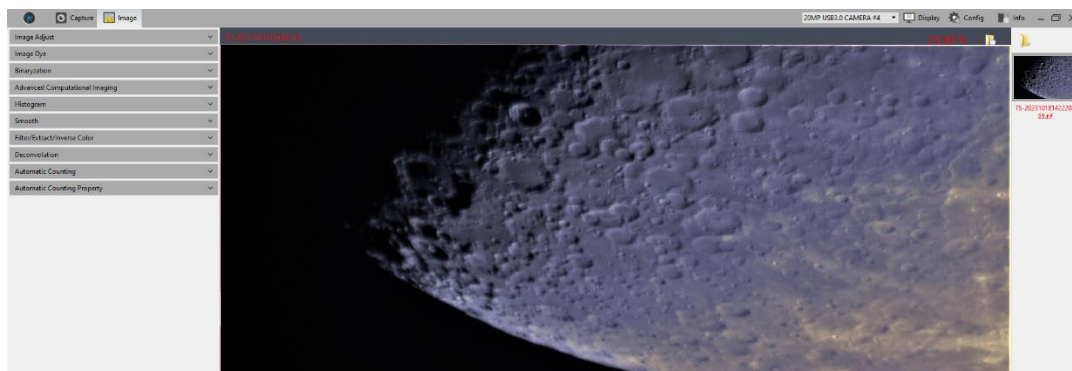
- If you had selected **Use Dialog** in the **File Save** Tab, a window will open allowing you to choose both a location and file format for the image.
- If you had selected **Use File Name** in the **File Save** Tab, the image will automatically be saved in your previously determined location.

After the image has been saved, the software will display a thumbnail of that image in the **Image Tray**.



➤ Click on this Thumbnail to move into the **Image** component of the **Mallincam Software**.

From here we can tweak the image before re-saving it (but most of us will use another image tweaking software after we have finished with the SolarCam 20 session).



Later in this **User Manual**, we will discuss the **Image Window's** controls in more detail.



Step 7

Capture and Save a Video Sequence

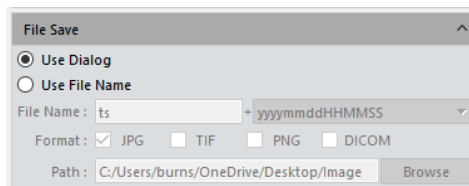
So, you might be thinking that still captures are good, but video captures are better. Well, let's save a short video clip (in **avi** format) of what our Mallincam SolarCam 20 is imaging.



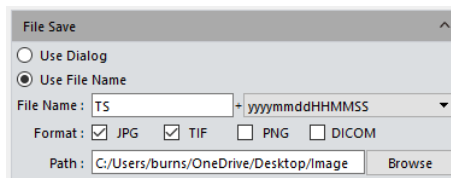
Just as in taking a snapshot image, you can either choose the **Use Dialog** or the **Use File Name** radial to control how and where you would like the Video clip saved.

Use Dialog

This radial button will open up the **Save Image Window** when you take a Video. It is in this dialog box where you can choose a directory location on your computer, and a file name for the Video.

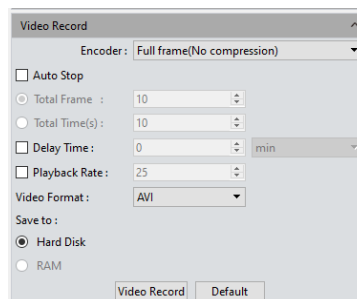
**Use File Name**

This radial button will allow you to select a default **File name** plus an **extension** (date format or index number). Also, you can select the default location (**path**) where to automatically save the Video in when it is taken.

**Let's take a Video.**

Since you have already chosen how and where the Video is to be saved, now is the time to take it.

Now in the **Capture Tab**, expand the **Video Record** Tab.



You have the option of compressing the video, but we don't want to do that, so ensure that **Encoder:** is selected as **Full frame (No compression)**.

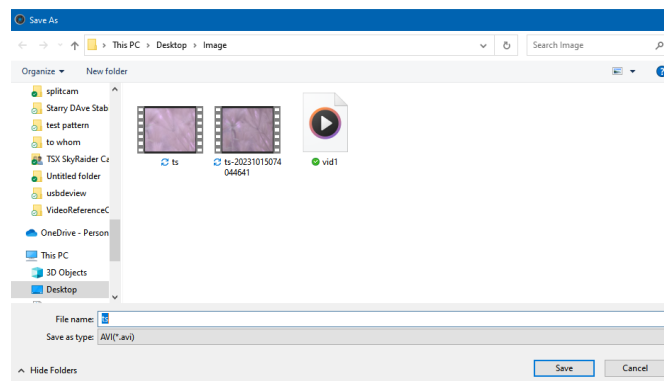
You have **2** choices on how to control the Video recording process:

➤ 1. Manual Control

You **Start** the saving process with a **Click** of the **Video Record** button located at the bottom of the **Video Record Tab**. Once clicked, its name will change to **Stop Video**, and a duration indicator will appear beside the Auto Stop checkbox. You **Stop** the recording by again hitting the **Stop Video** button. The Video will be saved, and a thumbnail of the video clip will appear in the **Image Window** Panel.



If **Use Dialog** was checked, then a window will first appear to ask you for a **location** and **name** for the Video File.



➤ 2. Automatic Control

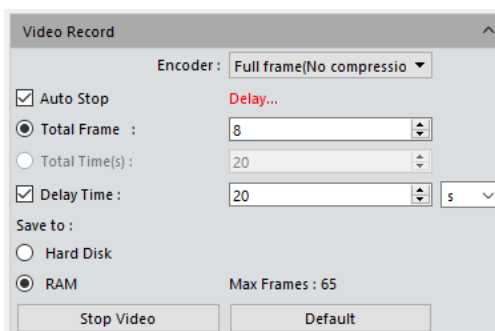
You can have the Video recording stop after a fixed **number of Frames** have been captured, or after a specific **length of time**.

Select **Auto Stop checkbox** to enable the Total Frame and the Total Time(s) selectors.

You also have one other option that you can select with the **Auto Stop** technique, **Delay Time**.

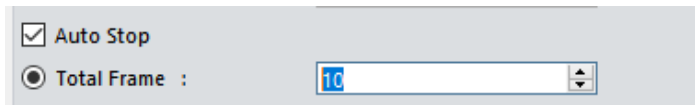


If you **check-marked** the **Delay Time**, then you can enter time delay (minutes, seconds, milliseconds) before the **Mallincam Software** executes your Video Recording.



➤ Total Frame

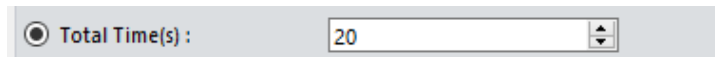
Click on its **radial button** to activate its selector. Then either enter in the number of frames you would like to record or use the arrows beside the box to set the number of frames.



Click on the **Video Record** button to start the recording process. The software will automatically stop when the number of frames you chose has been saved.

➤ Total Time(s)

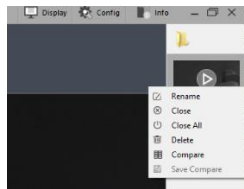
Click on its **radial button** to activate its selector then either enter in the time (in seconds) you would like the record duration to be or use the arrows beside the box to set the duration time.



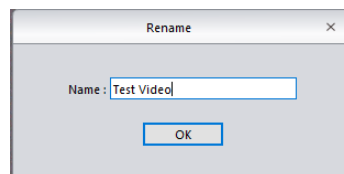
Click on the **Video Record** button to start the recording process. The software will automatically stop when the record time has been met.

No matter which technique you used, a thumbnail of the Video will appear in the **Image Tray** after the recording is complete (the video saved on your computer).

➤ You can watch the Video by **double-clicking** on its thumbnail, or if you **Right Click** on the Thumbnail, you will have the option of deleting it and/or renaming the Video.



➤ Let's rename the Video to "Test Video", so **Right Click** on the Thumbnail, and select **Rename**. A Window will open-up that allows you to enter a name for the Video (you can use this to rename the video as well).



Step 8

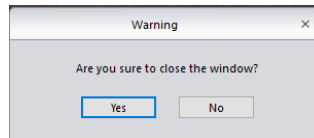
Exit the Software

Your evening session is over, and it is now time to power down both the **Mallincam Software** and the **SolarCam 20** camera.

Click on the **X** on the upper right side of the **Mallincam Software** Window.



The Software will ask you for verification, Select **Yes** to shut down the **Mallincam Software**.



Remember the **SolarCam 20** is power though the **USB 3.0** Port, so when the software is shut down, the camera also shuts down.

The above instructions were meant to get you going quickly and provide enough instructions to adjust your live image in real time. Techniques of saving a Snapshot or a Video of the image were also proved. The next section will provide full details of each command and how their adjustments affect your image.

4. Mallincam Software Commands

In the Previous section we walked through the process of connection the **SolarCam 20** to your telescope, Installing the Software, and taking and capturing images and videos. Here we will go into full detail about each of the commands available to you. Don't be afraid to experiment with the camera so that it produces the best images matching your equipment.

➤ SolarCam 20 Status Bar (Computer)

The top of the SolarCam 20 Control Software window contains a Status Bar.



The Status Bar will allow you to:

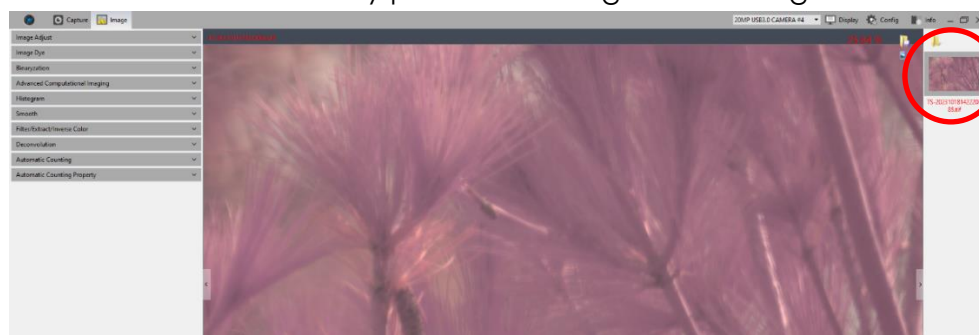
- View what the **SolarCam 20** camera is imaging.
- Examine and adjust the saved image.
- Zoom in/out and flip and rotate the Image Window.
- Rearrange the control tabs on both the Capture Tabs and the Image Tabs.
- Select Display Language.
- Provide information about the Software Version.
- Minimize and resize the software window.
- Shut down the **SolarCam 20** Control Software.

➤➤ Action Tabs



The Mallincam **SolarCam 20** Control Software provides you with two major **Action Tabs**: **Capture**, and **Image**.

- The **Capture Tab** displays what the **SolarCam 20** is currently imaging in real time and allows you to adjust the image and exposure values, save still shots or save video sequences.
- The **Image Tab** allows you to adjust and tweak the saved image's properties and also allows you to rename or delete the file. When you double click on an image from the Video Frame, the software will automatically place that image in the Image Tab

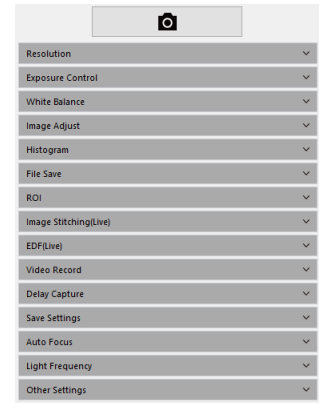


Capture Tab

The **Capture Tab** is the main Tab used for viewing your live images from the **SolarCam 20** camera.

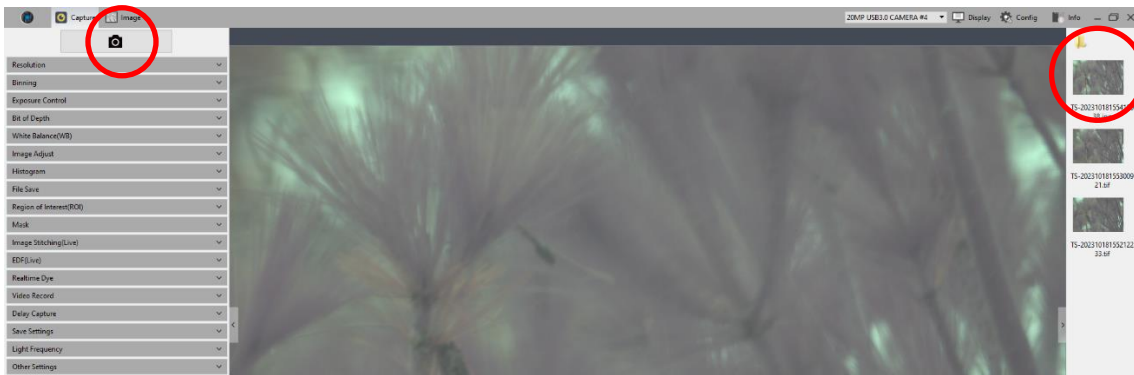
It provides a prominent **Snapshot** button, along with various tabs that allow you to adjust all the camera properties in real time.

Each tab can be expanded by clicking on the down arrow. This will display the controls for that tab.

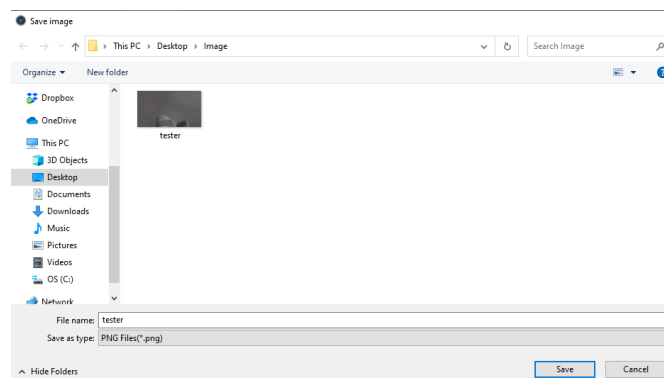


Snapshot Icon

The **Snapshot** icon allows you to take an immediate snapshot image of what the Mallincam **SolarCam 20** camera is displaying. The image will be saved in the location and format of choice as designated in the **File Save Tab** (see below). A thumbnail of the image will appear in the **Image Tray** on the right side of the Window. The latest snapshot images are on the top of the **Image Tray** with previous snapshots underneath.

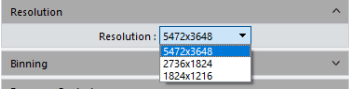


If **Use Dialog** is checked, then a **Save** pop-up window will first appear to ask you for a **location, name**, and format for the image.





It is here in the **Resolution Tab** that you will choose the resolution that you would like for your images. This resolution choice becomes apparent when saving you images in either the File or Video format.

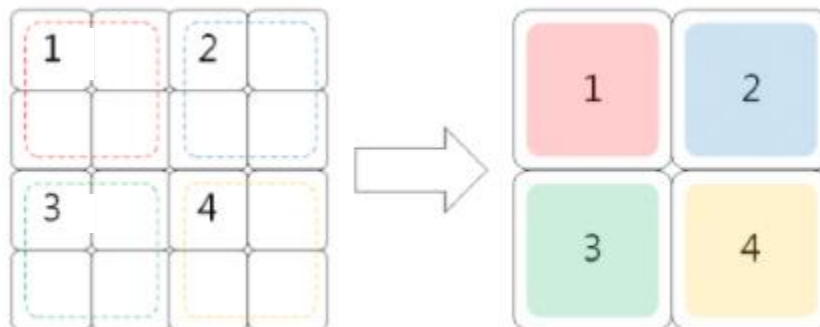
Feature	Title	Usage
	<p>Live Image Resolution</p>	<p>This drop-down selector allows you to choose from 3 resolutions for the SolarCam 20:</p> <ul style="list-style-type: none"> ▪ 5472x3648, ▪ 2736x1824, ▪ 1824x1216. <p>The higher the resolution, the longer it takes the SolarCam 20 to refresh the next real time image. Also, the larger the resolution, the larger the file/video file size when saving.</p> <p>When trying to produce as many images for stacking purposes, a lower resolution may be the better choice as it provides a faster frame rate, thus more images per second in avi video format.</p>

Binning Tab



The **SolarCam 20** provides 4 binning choices for you to select from.

This process allows you to increase the sensitivity of the Mallincam Camera by providing you with 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. The supported Binning available is 1x1, 2x2, 3x3 and 4x4. As an added bonus, binning helps increase sensitivity and reduce noise to some extent by improving Signal to Noise Ratio.



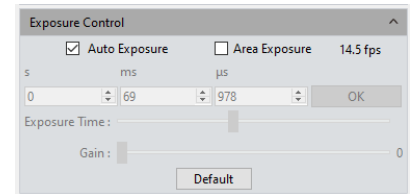
When 2x2, 3x3, or 4x4 binning is selected, **Auto Exposure** is disabled, and you will need to manually adjust the **exposure** and **gain** settings.

As mentioned above, when moving to a higher binning size, you will need to reduce the **Exposure Time** and/or the **Gain** values as we have effectively reduced the number of pixels for the image (you will notice that the image is zoomed in, since reduced horizontal and vertical size). With the reduced number of pixels (since combined), you will also have a faster frame rate.

Feature	Title	Usage
	Binning Adjust	<p>The SolarCam 20 provides 4 binning choices for you to select from:</p> <p>So, from the Binning Tab, we might as well choose the default 1 x 1 to see how our computer and telescope parameters handle this.</p>

 **Exposure Control Tab** Exposure Control

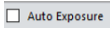
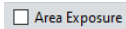

It is here in the **Exposure Control Tab** that you have complete control of the exposure process. You can have the **SolarCam 20** camera pick the best exposure for the current image, or you can take control of the exposure yourself.

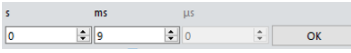

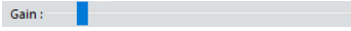



You can adjust the exposure either by entering an exposure value or by sliding the **Exposure Time** bar. This tab also allows you to adjust the **Gain** of the camera.

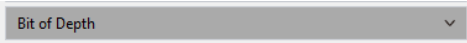


If the **Auto Exposure** and **Area Exposure** are greyed out, it is most likely that you are not in **1x1** binning. Recall: Only **Manual Exposure** adjustments are available in **2x2**, **3x3**, and **4x4** binning.

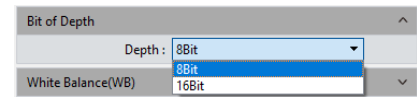
Feature	Title	Usage
	<p>Auto Exposure</p>	<p>When control is checked, the SolarCam 20 camera will attempt to provide the best exposure for the image based on full data from the screen.</p> <p>The control will automatically adjust both the Exposure Time and the Gain sliders to help provide the best image.</p> <p>Once unchecked, the slider settings will remain, but you have manual control to adjust them to your liking.</p>
	<p>Area Exposure</p> 	<p>When control is checked, the SolarCam 20 camera will attempt to provide the best exposure for the image based on the data contained inside the Area Exposure blue box.</p> <p>You can left-click and move the Area Exposure blue box anywhere on the screen, or you can resize the blue box by click-dragging on any of its handles.</p> <p>The control will automatically adjust both the Exposure Time and the Gain sliders to help provide the best image.</p> <p>To regain manual control of the exposure settings, just uncheck the Auto Exposure, as it will automatically uncheck Area Exposure as well.</p> <p>To the right of the Area Exposure control is the current frames per second (fps) capture rate of the camera.</p>

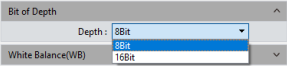
	<p>Manual Exposure Setting</p>	<p>This control allows you to either manually enter the exposure time in the s, ms, and µs box or you can use the up and down arrows adjacent to the boxes to adjust the time.</p> <p>The new exposure will not change until you click on the OK button to the right of the time boxes.</p> <p>The SolarCam 20 has a range of exposure times going from 18 µs to 15 s.</p>
	<p>Exposure Time</p>	<p>This control allows you to use a slider to change the exposure. This control updates the exposure in real time.</p> <p>The Slider will provide you an exposure range from 18 µs to 15 s.</p> <p>The exposure time will automatically be displayed in the above time boxes.</p>
	<p>Gain</p>	<p>Gain is a setting that controls the amplification of the signal from the camera sensor. It should be noted that this amplifies the whole signal, including any associated background noise.</p> <p>Use Left-Click-Hold and Drag method to move the slider to the right to increase the Gain (brighten the image) and to the left to decrease the Gain (darken the image).</p> <p>The Gain is adjusted in real-time and ranges from 0 to 240.</p>
	<p>Default</p>	<p>This control resets the SolarCam 20 back to Auto Exposure mode (it will checkmark the box to indicate the condition). Thus, both Exposure and Gain will be adjusted to the Auto Exposure's full screen current conditions value.</p>

 **Bit of Depth Tab**



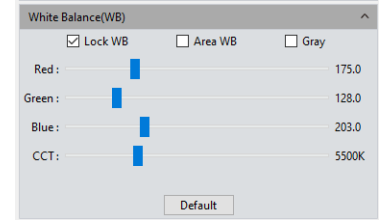
It is here in the **Bit Dept Tab** that you have the ability to choose either **8-bit** or **16-bit** display. Using 8 bit, the image is capable of displaying **256** shades of color per color channel while using **16-bit** allows **65536** shades of color per color channel. Remember nothing is for free, a **16-bit** setting produces a larger file (both memory wise (slower fps), and file size wise) than an **8-bit** image.

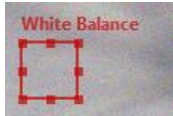



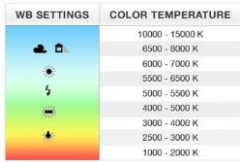

Feature	Title	Usage
	<p style="text-align: center;">Bit of Depth</p>	<p>This drop-down control allows you to either select an 8-bit or 16-bit image.</p> <p>The default is 8-bit.</p> <p>Depending on your image requirements and the post processing software you will employ, these will guide you in the bit depth selection. The 16-bit selection will provide a more discernable color variation in components of your final image.</p>

White Balance Tab White Balance(WB)

It is here in the **White Balance Tab** that you have complete control of the individual color components of the image. **White Balance** is the process of removing unrealistic color casts, so that objects which are white in reality are rendered white in your image. The default setting of the **White Balance** is **Auto-White Balance** (unchecked), but you can manually adjust the ratio of the three individual components of **Red**, **Green** and **Blue** to reflect the true image color under various illuminating conditions. To adjust the values, **Checkmark** the **Lock WB** and then use the sliders to adjust the color ratio to the required values. Do not **uncheck** the **Lock WB** as this will again activate **Auto WB**. **Area WB** will allow an Auto White Balance based on image inside the resizable and moveable red enclosure box.

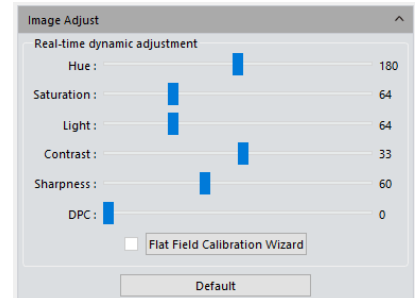


Feature	Title	Usage
<input checked="" type="checkbox"/> Lock WB	Lock White Balance	<p>This control allows you to either use an automatic White Balance or to manually control the White Balance.</p> <p>When unchecked the camera is using automatic White Balance.</p> <p>When checked you have controls to the Red, Green, and Blue sliders to adjust the image balance on the screen.</p>
<input checked="" type="checkbox"/> Area WB	Area White Balance 	<p>When Area WB is selected, a Red Area White Balance box will pop up on the preview Window. The location and size of this red box are adjustable via the mouse via any of the tabs on the red box. Move the Area White Balance Box to any lighter part of the image, then adjust size, and check [Lock White Balance] to lock the current white balance (and remove the red box), which will make white balance calibration more accurate.</p>
<input type="checkbox"/> Gray	Gray	<p>Gray is the control that displays the image in Black and White (Monochrome).</p> <p>When checked the image is in Monochrome.</p> <p>When unchecked the image is displayed in color.</p>


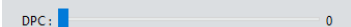
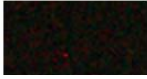

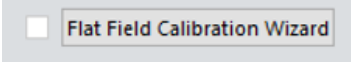
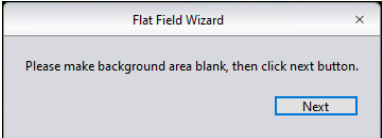
Feature	Title	Usage
	<p style="text-align: center;">Color Control</p> 	<p>When the Lock White Balance is checked, the color control sliders become active. You can now manually adjust the individual color channels to your personal preference.</p> <p>By moving the appropriate color slider to the right, you increase the amount of that color in the image, likewise by moving the slider to the left, you decrease the amount of that color component in the image.</p> <p>When the Lock White Balance is checked, the CCT, the current approximate color temperature, can be achieved by adjusting two sliders which are Red and Blue. It can also be manually adjusted by moving its own slider (CCT) to match the approximate color temperature according to the illuminating image (<i>It will automatically adjust the Red and Blue sliders and set Green to 128</i>). A light image having higher color temperature will have more blue light or larger Kelvin temperature value as compared to lower light, which has a smaller Kelvin temperature value. By calibrating the White Balance sliders, you will more accurately achieve the correct color temperature. The color temperature settings range from 2000K to 15000K.</p>
	<p style="text-align: center;">Default</p>	<p>This control resets the SolarCam 20 White Balance back to its factory defaults which are automatic with a color image.</p> <p>It will set Red to 175, Blue to 203, Green to 128, and CCT to 5500K.</p>





It is here in the **Image Adjust Tab** that you have complete control of the real time image adjustment available for the camera. This tab allows you to adjust the **Hue**, **Saturation**, **Light**, **Contrast**, **Sharpness**, **DPC** (Dead Pixel Correction) as well as **Flat Fielding**.



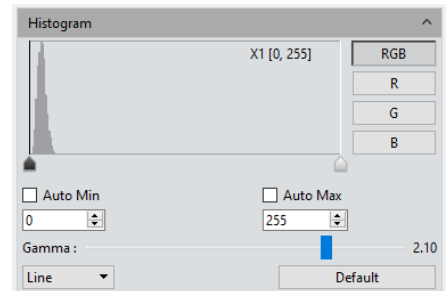
Feature	Title	Usage
	Hue	<p>Hue is the shade of the color, adjusting ranges from 0 to 360. Hues are made up of the three primary colors (red, blue, and yellow) and the three secondary colors (orange, green, and violet) that appear in the color wheel or color circle. When you refer to Hue, you are referring to its pure color, or the visible spectrum of basic colors that can be seen in a rainbow. When Hues are combined with other color qualities, such as Saturation, or Light, then the resulting combination is known as the color's chromaticity.</p>
	Saturation	<p>Saturation is similar to contrast, however instead of increasing the separation between shadows and highlights, it increases the separation between colors.</p> <p>Moving the slider to the right increases the Saturation (makes the color more vibrant), while moving the slider to the left decreases the Saturation (makes the image more monochromatic). It represents the purity of the color, the higher the purity, the more vivid it appears. It ranges from 0 to 255.</p>
	Light	<p>Light is the brightness and darkness of the image. It ranges from 0 to 255. This control works well when combined with Contrast.</p>
	Contrast	<p>Contrast is the scale of difference between Black and White in your images. Without contrast you wouldn't have an image because there wouldn't be any differentiation between light and dark.</p> <p>Moving the slider to the right increases the contrast (makes the image brighter), while moving the slider to the left decreases the contrast (makes the image darker).</p> <p>Contrast has a range from 0 to 63.</p>



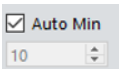
Feature	Title	Usage
	<p>Sharpness</p>	<p>Sharpness can be defined as edge contrast, that is, the contrast along edges in an object in the image. When we increase sharpness, we increase the contrast only along/near edges in the object while leaving smooth areas of the image alone.</p> <p>Moving the slider to the right increases the sharpness (makes the image sharper around the edges), while moving the slider to the left decreases the sharpness (makes the image smoother).</p> <p>The range goes from 0 to 160.</p>
	<p>DPC</p>  <p>Before: DPC=0</p>  <p>After: DPC=1</p>	<p>Dead Pixel Correction is used to detect and remove dead pixels (bright dots) from the active image.</p> <p>Moving the slider to the right increases the aggressiveness of the DPC, while moving the slider to the left decreases the aggressiveness.</p> <p>A higher DPC value can help remove amp glow on long exposures (but can remove some fainter stars).</p> <p>The range of DPC goes from 0 to 3 with the Default being 0.</p>
	<p>Flat Field</p>	<p>Flat Fielding is a process that help remove imperfection in the light path to the sensor (such as dust particles on the lens). Before check-marking the checkbox, we need to create a Flat Field.</p> <p>Set the exposure to manual mode (so it doesn't change) and at an exposure rate so you can see dust bunnies or imperfections.</p> <ol style="list-style-type: none"> 1) Clicking the Wizard button will prompt you to view a blank image. For us, take a blank image of a white area (white t-shirt over telescope, or neutral white background), then Click the Next button. 

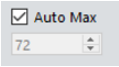

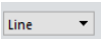

		<p>2) You are prompted to move to another blank area (leaving the t-shirt, just slightly move telescope), and then take another image via clicking the OK Button.</p>  <p>The SolarCam 20 will then apply the Flat Field Correction (notice the checked checkmark box) based on the two comparative Flat Fields taken.</p> <p>The brightness of other areas of the two backgrounds which are used for references of correction should be almost the same except that there are some moving spots (imperfections) on the two backgrounds. These two backgrounds should be consistent in exposure detail.</p> <p>Flat Field Correction requires that the background it use as reference to be a blank one and that the light illumination on it is uniform.</p> <p>Check to activate, uncheck to deactivate without the need to repeat the Flat Field Wizard process.</p> <p>When you exit the Software, the Flat Field is not saved, and you need to repeat the process.</p>
	<p>Default</p>	<p>This control resets the Real Time Dynamic adjustments back to factory defaults.</p> <p>Hue default is 180, Contrast default is 33, Saturation and Light default value is 64, Sharpness default is 25, Flat Field is defaulted to be unchecked, and DPC default is 0.</p> <p>Flat Field is retained and can be reactivated by the checkbox.</p>

Histogram Tab Histogram

It is here in the **Histogram Tab** that you have complete control of the **Live Image Histogram** which allows you to either manually control the **brightness** of each of the color channels or let the software perform this task for you. The color level adjusting means redefine the **R\G\B** color levels in each channel and then re-allocate of the pixel values in among. Adjust the color level (gradation) to increase the range of the highlight area in the image, image becomes brighter, or use the contrary way to make the bright image darker. This allows you to pull out as much detail hidden in the image as you can.

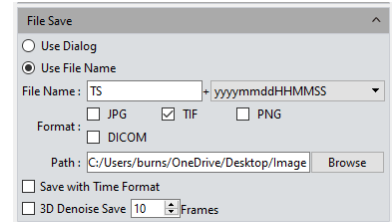


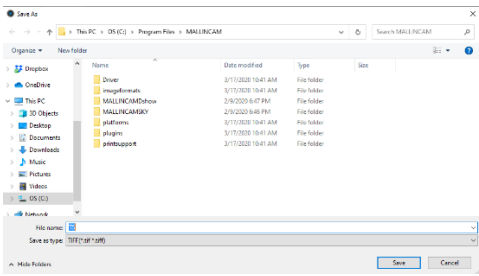
Feature	Title	Usage
	<p>Histogram</p>	<p>You can use the 2 controls to manually adjust the image's dark tones (Left control), and the gamma highlight brightness levels (Right control) to regulate the image's contrast, shading, and image layers to obtain the best balance for the image.</p> <p>Moving the Black control to the right darkens the image and to the left lightens the image.</p> <p>Moving the Gray control to the left brightens the image and to the right darkens the image.</p> <p>The goal is to use as much of the necessary data (the graph) between the two controls without clipping the necessary data.</p> <p>Note: if the Black and/or Grey controls won't move, you most likely have activated the Auto Min and Auto Max (see below).</p>
	<p>Color Channel</p>	<p>This allows you to select either all 3 color channels together (Red, Green, and Blue), or select each color independently to use with the above Histogram controls.</p>
	<p>Left Control</p>	<p>This control allows you to manually enter in a value for the Left Control which represents the amount of pixel value proportion for dark.</p> <p>When the Auto Min is selected, automatically adjust the brightest and darkest pixels in each channel as white and black, and then re-allocates the pixel values in proportion. The software will place the Left control with the minimum value for the color choice (will not provide too much color).</p>

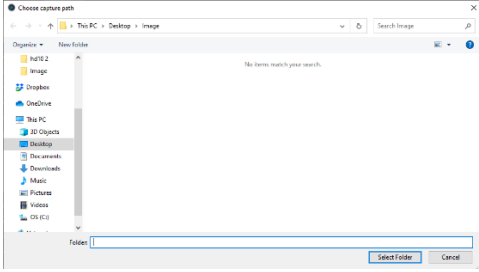
	Right Control	<p>This control allows you to enter in a value for the Right Control which represents the amount of pixel value proportion for bright.</p> <p>When the Auto Max is selected, When the Auto Min is selected, automatically adjust the brightest and darkest pixels in each channel as white and black, and then re-allocates the pixel values in proportion. The software will place the Right Control with the maximum value for the color choice (will not provide too little color).</p>
	Gamma	<p>Gamma defines the relationship between a pixel's numerical value and its actual luminance (brightness). While the gamma setting affects the brightness of a display, it is not identical to the brightness. This is because the gamma adjustments are not linear, like brightness levels are. Instead, the gamma setting applies a function to the input levels, which produces the final output level. Therefore, the gamma setting affects both the brightness and the contrast of the display.</p> <p>Moving the slider to the left darkens the image, while moving the gamma slider to the right brightens the image.</p> <p>Notice what happens to the data in the Histogram while you adjust the Gamma.</p> <p>The range is from 0.64 to 2.55</p>
	Data algorithm	<p>This allows you to select Linear (Line) or Logarithmic (Logarithm) as the mathematical algorithm to display your data.</p> <p>A linear histogram is a representation of how the camera sees the data.</p> <p>A logarithmic histogram is a representation of how our eyes sees the data.</p> <p>Compare the shape of the Histogram graph as you switch from Line to Logarithm.</p>
	Default	<p>This control resets these module controls back to the factory defaults which is, RGB color level adjustments are manual (Black Control at 0 and Grey Control at 255) with a linear representation of the data and the Gamma is set to 2.10.</p>

File Save Tab File Save

It is here in the **File Save** Tab where you have complete control of the **Filename**, **File Format**, and **File location** when you save **Snapshots** or **Videos** of what the SolarCam 20 is imaging. You can save a Snapshot simultaneously in JPG, TIF, and PNG format.

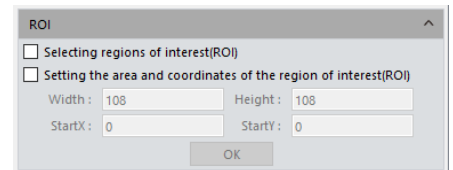


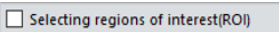

Feature	Title	Usage
<input type="radio"/> Use Dialog	Use Dialog	When this is selected (it is either this or Use File Name), then whenever you take a Snapshot or activate a Video recording, a Save as dialog box will pop up asking for a file name , location , and format . 
<input checked="" type="radio"/> Use File Name	Use File Name	When this is selected (it is either this or Use dialog), then whenever you take a Snapshot or activate a Video recording, the system will use the parameters you have set below to save the image or video.
File Name : TS	File Name	Whatever characters you place in this box will be the first characters of the name. The remaining characters will be what follows from the drop-down list to the right.
<div style="border: 1px solid gray; padding: 2px;"> yymmddHHMMSS yyyyymmddHHMMSS yy-mm-dd-HH-MM-SS yyyy-mm-dd-HH-MM-SS nnnn </div>	Name Drop Down	This control contains the five drop-down name extensions that follow the preceding File Name . Select any from the list to append to the characters from the above File Name .
Format : <input type="checkbox"/> JPG <input checked="" type="checkbox"/> TIF <input type="checkbox"/> PNG <input type="checkbox"/> DICOM	File Format	Use a checkbox to select the graphics format that you want the image to be saved in. Every File Format you check will produce a saved Snapshot in that format, you can check as many formats as you require.

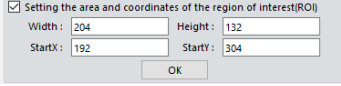
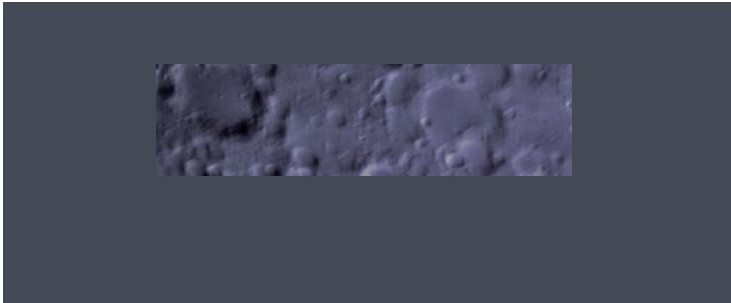
<p>Path : <input type="text" value="C:/Users/Michael/Desktop/Image"/> <input type="button" value="Browse"/></p>	<p>Path</p>	<p>Using Browse will open-up the Windows Directory Window for you to locate and/or create a folder location to save your images or videos.</p> 
<p><input type="checkbox"/> Save with Time Format</p>	<p>Time Stamp</p>	<p>When this checkbox is selected, the saved images will have a time stamp on the lower right side of the image.</p> 
<p><input type="checkbox"/> 3D Denoise Save <input type="text" value="10"/> Frames</p>	<p>3D DeNoise</p>	<p>When this checkbox is selected, you will obtain low-noise images by acquiring and comparing image data of several consecutive frames, and then filtering out non-overlapping information. The number of frames can be customized. The range is 1 to 99, the default is 10. Think of this as a very rudimentary live stacking routine.</p> <p>Note: To get 3D denoise image, so it will take longer time to save a Snapshot than taking a general image.</p> <p>Note: 3D Denoise Save is only suitable for capturing static Snapshot scenes as a moving image will blur.</p>

ROI Tab ROI

It is here in the **ROI Tab (Region of Interest)** where you can select a rectangular area of the whole image to become the only region to display in the **Image Window**. This control allows you to define a **window** area of interest within the effective and sensitive detecting area of the camera sensor and just allow the image information within this defined window to be read out and then show out a localized area of image. A smaller **ROI** area reduces the amount of information and tasks of image transferring and computer processing, which results in an increased frame rate of the **SolarCam 20**.

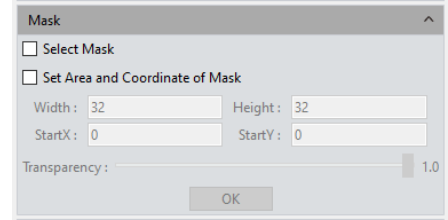


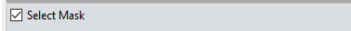

Feature	Title	Usage
	<p style="color: red; text-align: center;">Select ROI</p>	<p>When this is selected via the checkmark (it is either this or using coordinates), you will be able to draw, resize, and relocate a rectangle around your object of interest via the mouse Left-Click and Drag routine. You will then be given a verification choice by selecting an X (to abort) or a green checkmark to accept to size.</p>  <p>Selecting the verification checkmark will remove everything except what is in the ROI box.</p> <p>Placing your mouse inside the ROI box, you will be able to use the scroll wheel on the mouse to Zoom-In or Zoom-Out (if you do not have a scroll wheel on mouse, use the Display Tab located at the top of the screen to zoom in or out).</p> <p>To return to normal view, uncheck the ROI checkbox, or Click on the 1:1 choice if you have <i>resized the image</i> using the Display Tab.</p>

Feature	Title	Usage
	<p style="text-align: center;">Select ROI Coordinates</p>	<p>When this is selected (it is either this or Select Region), you will be able to enter the coordinates of the upper left corner of the rectangle, then enter the width and the height of the region into the boxes provided. Clicking of the OK button will remove everything except what is in the ROI box.</p> <p>Placing your mouse inside the ROI box, you will be able to use the scroll wheel on the mouse to Zoom-In or Zoom-Out (if you do not have a scroll wheel on mouse, use the Display Tab located at the top of the screen to zoom in or out).</p> <p>To return to normal view, uncheck the ROI checkbox, or Click on the 1:1 choice if you have <i>resized the image</i> using the Display Tab.</p> 

Mask Tab Mask

It is here in the **Mask** Tab where you can select a rectangular area of the whole image to highlight a region to display within the **Image Window**. This control allows you to define a **window** area of interest within the effective and sensitive detecting area of the camera sensor and just allows the image information within this defined window to be locked out of **Transparency Slider**. Using the **Transparency Slider** allows you to reduce the brightness of the image outside of the selected **Mask** Frame. This allows you to highlight just the part of the image inside the **Mask** Frame.



Feature	Title	Usage
	<p>Select Mask</p>	<p>When this is selected via the checkmark (it is either this or Set Area), you will be able to draw, resize, and relocate a rectangle around your object of interest via the mouse Left-Click and Drag routine. You will then be given a verification choice by selecting an X (to abort) or a green checkmark to accept to size.</p>  <p>Selecting the verification checkmark will accept what is in the Mask box.</p> <p>Placing your mouse inside the Mask box, you will be able to use the scroll wheel on the mouse to Increase or decrease the Mask size.</p> <p>To remove the Mask just uncheck the Mask checkbox.</p>

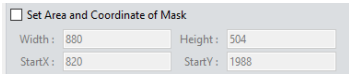

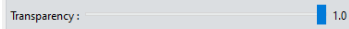
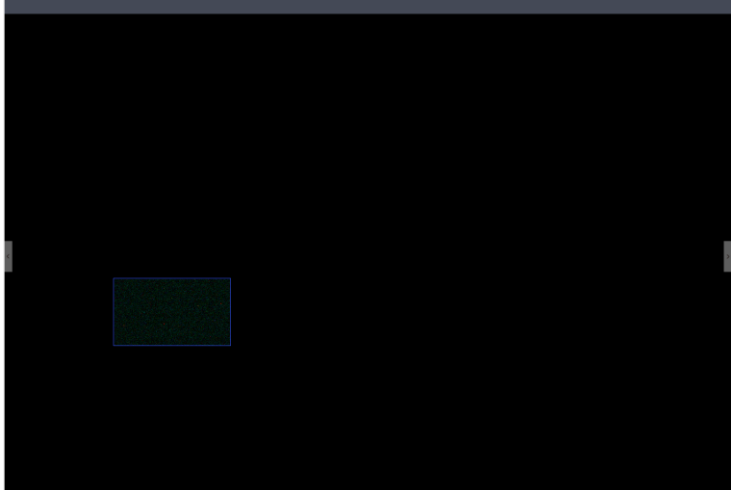
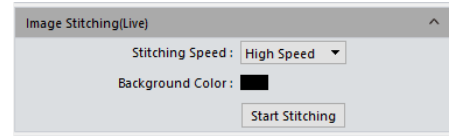
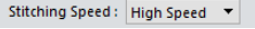
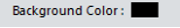

Feature	Title	Usage
	<p style="text-align: center;">Select Mask Area</p>	<p>When this is selected (it is either this or Select Mask), you will be able to enter the coordinates of the upper left corner of the rectangle, then enter the width and the height of the region into the boxes provided. Clicking of the OK button will accept what is in the Mask box.</p> <p>Placing your mouse inside the Mask box, you will be able to use the scroll wheel on the mouse to Increase or Decrease the Mask size.</p> <p>To remove the Mask just uncheck the Mask checkbox.</p> 
	<p style="text-align: center;">Transparency</p>	<p>Using this slider, you manually select the brightness of the unselected area. At 0.2 You have very little brightness change, at 1.0 the image outside the Mask will be completely dark. Thus, allowing you to highlight just what is in the Mask.</p> 

Image Stitching (Live) Tab 

It is here in the **Image Sticking Tab** where you can join overlapping images to create a mosaic of a larger area of an object of interest. This control will have very little use in planetary imaging as the objects as relatively small as compared to the Image Window, but it is great for the Moon and Sun.



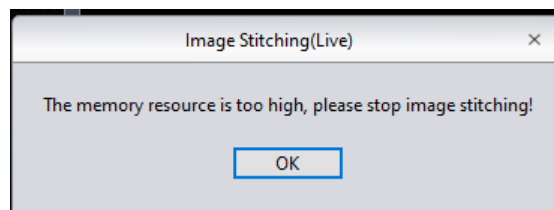
Feature	Title	Usage
	<p>Stitching Speed</p>	<p>This control allows you to choose between High-Speed stitching or High-Quality stitching. The default is High Speed.</p>
	<p>Background Color</p>	<p>Clicking on the color will pop up the Color Pallet Window to choose what color you want the background of the stitched image to have. If you use this control, we recommend using a Black background.</p>
	<p>Start Stitching</p>	<p>Clicking of this command will start the procedure, just follow the instruction presented on screen.</p> <div data-bbox="859 1052 1393 1220" style="border: 1px solid gray; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center; font-size: small;">Image Stitching(Live) ×</p> <p style="text-align: center;">Please control the exposure time within 50MS and slowly move the stage!</p> <p style="text-align: center;">OK</p> </div> <p>You will be prompted to keep the exposure withing a specified range, then the command will display the current Image Window. Now slowly move the telescope so that there is an overlap of the image in the new window. If everything is satisfactory, the software will display the new combined images. Keep repeating the above movement until you have covered the area for the Mosaic. When completed, Click on the Stop Stitching button in the Image Stitching Control. The Image will automatically be saved, and a thumbnail will appear in the Image Tray.</p> <p>It is recommended to conduct a White Balance correction and Flat Field correction before starting the stitching to ensure to achieve the best quality images.</p>

The **navigation display** frame in the **Stitching Window** is **green**, the software will perform one stitching; each time the sample is moved, the software will perform one stitching.

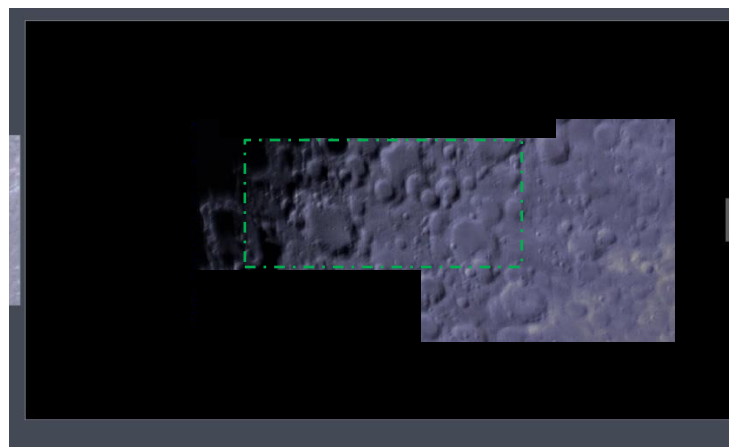
If the **navigation display** frame is **red**, it means that the stitching area is exceeded, and stitching cannot be performed, and the sample area needs to be moved back to the location near the last stitching area.

It will take a few trials before you become comfortable with the procedure, but when you do, the final image will be worth it.

Since the stitched images are in huge sizes and will occupy massive memory of the computer, the stitching process will occupy computer memory, when the processing of stitching can take up **75%** of the computer memory volume. If there is a memory issue you will be prompted with the following Window.

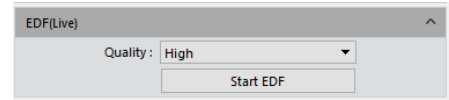


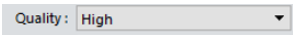
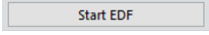
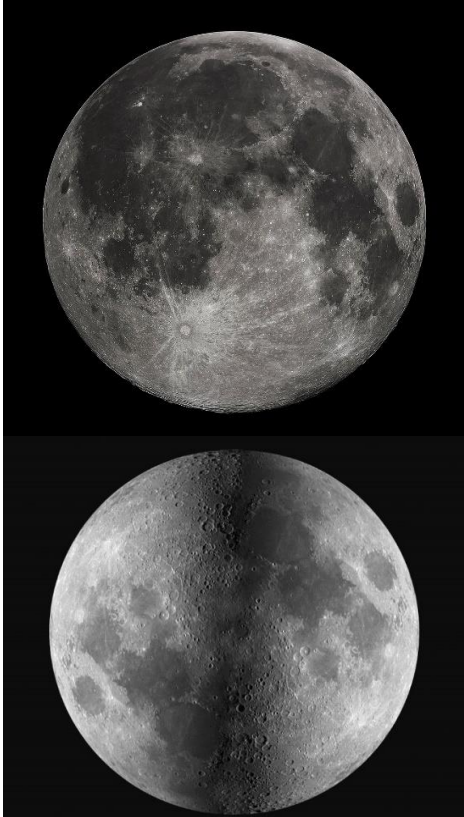
Then shut down some other pieces of software and try again. The stitching procedure will stop working automatically. So, it is recommended to conduct the stitching through a computer with sufficient memory volume.



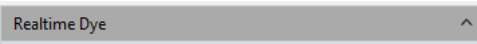
EDF (Live) Tab EDF(Live) ^

It is here in the **EDF Tab** (Extended **D**epth of **F**ield) where you can combine the same image with different focus locations. This control will have very little use in planetary imaging except for the Moon, as most objects will have the same focus location.

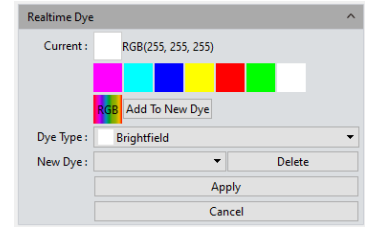


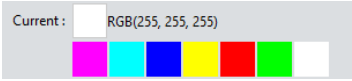

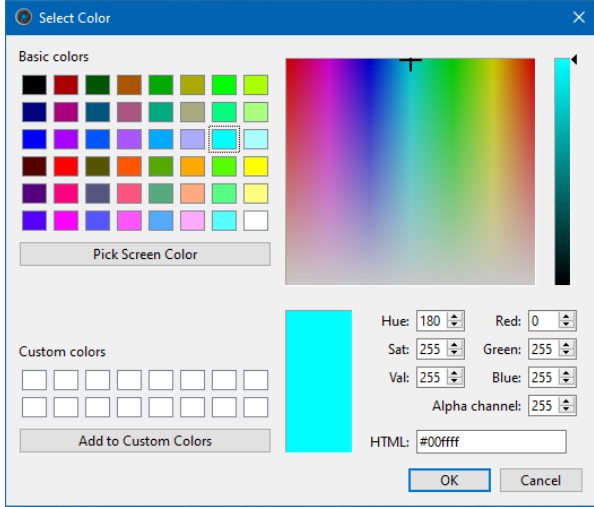
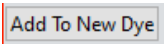
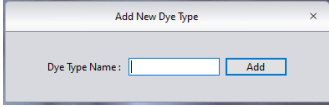

Feature	Title	Usage
	<p>Quality</p>	<p>This control allows you to choose between Low, Medium, and High stitching Quality.</p> <p>This is CPU and time intensive. But it may be worth experimenting with.</p>
	<p>Start EDF</p>	<p>Clicking on the Start EDF will start the process. Just slowly change the focus to bring other areas of the image into sharp focus. When completed, Click on the Stop EDF button. Image will automatically be saved and a thumbnail place in Image Tray.</p> <div style="display: flex; flex-direction: column; align-items: center;">  <div style="display: flex; justify-content: space-around; width: 100%;"> <div data-bbox="1252 1077 1468 1209" style="border: 1px solid black; padding: 5px;"> <p>Focused across the whole image.</p> </div> <div data-bbox="1252 1541 1487 1698" style="border: 1px solid black; padding: 5px;"> <p>Focused across the middle of the image.</p> </div> </div> </div>

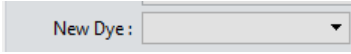
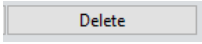
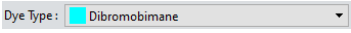
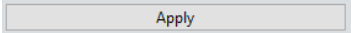
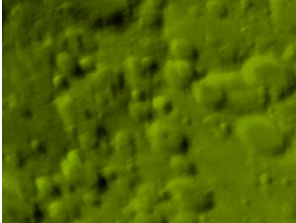
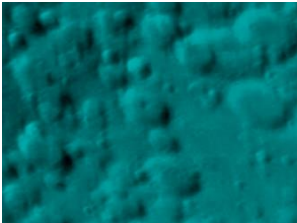
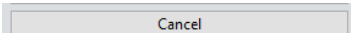
Realtime Dye Tab



It is here in the **Video Record Tab** where you can add a color Dye (a color overlay) to the image (works best for grey images). You can use one of the preset colors or even create and save a color on your own making.

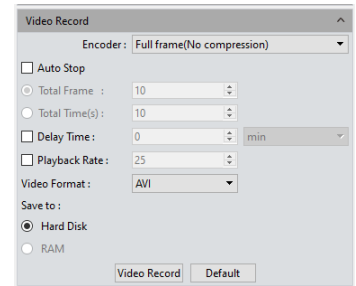


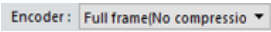

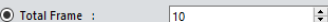
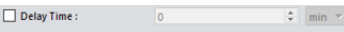
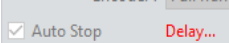
Feature	Title	Usage
	<p>Current</p>	<p>This control displays the quick select color options available, with the current color selection indicated beside the word Current. Clicking on the various colors will place that color in the current box along with the RGB numbers of that color.</p> <p>Note: we have not yet applied the Dye to our real time image, as that is accomplished with the Apply button.</p>
	<p>RGB</p>	<p>This Control will pop open a Window for you to select or create a color of your own.</p> 
	<p>Add New Dye</p>	<p>This control pops open a Window that asks you to Save your new created color in a name of your choice (it will still be available when you restart the software).</p>  <p>The chosen Dye color name will appear in the New Dye pull down list.</p> 

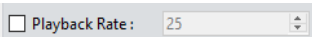
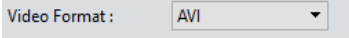
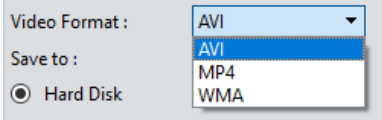

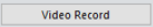
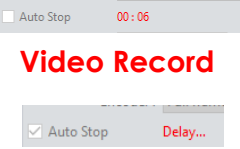
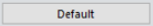
Feature	Title	Usage
	<p>New Dye</p>	<p>This selection allows you to select the Dye Color from your previously created and saved colors.</p> <p>Note: If you select from available color palette, and there is only one created color in the New Dye List, then the software may not change to that color when you hit the Apply button. Just ensure that you have at least two created colors in the New Dye drop down to eliminate this issue.</p>
	<p>Delete</p>	<p>This control will delete a create color from the New Dye List.</p>
	<p>Dye Type</p>	<p>This control provides you with a list of various colors created for you to choose from. Just select from the pull-down list.</p>
	<p>Apply</p>	<p>This Control will apply the chosen color Dye (either your created color in New Dye or any of the colors provided by the software) to your image.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>
	<p>Cancel</p>	<p>This control removes the Dye from your image and reverts to the normal color operations controls of the camera.</p>

Video Record Tab Video Record

It is here in the **Video Record Tab** where you can save the real time videos of what you are imaging. You have full control of how you want the video saved, from **Pausing** before recording to even the **Playback Rate**. Again, the **File Save Tab** must be visited first so you can determine a path location and name for the saved Video recording.

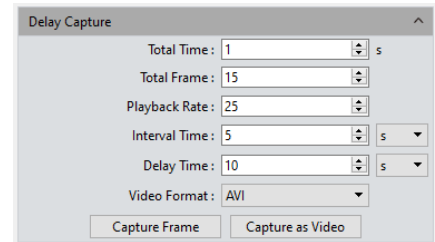




Feature	Title	Usage
	Encoder	<p>This control allows you to choose between No Compression and using MPEG-4 compression.</p> <p>We recommend using Full Frame (No compression) for recording astronomical objects.</p>
	Auto Stop	<p>This control allows the software to automatically stop recording without you intervening.</p> <p>You have two options, stop after a specific number of video frames has been recorded, or stop after a specific time has elapsed.</p>
	Total Frame	<p>With Auto Stop checked, when this button is selected, you can enter a value of the number of frames that you would like to be recorded.</p> <p>You have a range from 1 to 9999 frames.</p>
	Total Time	<p>With Auto Stop checked, when this button is selected, you can enter a value of the number of seconds that you would like to be recorded.</p> <p>You have a range from 1 second to 9999 seconds to use.</p>
 	Delay Time	<p>If you check-marked the Delay Time:, then you can enter the amount of time delay to use before the Mallincam Software executes your Auto Stop settings.</p> <p>Enter a numerical value in the box (or use the up and down arrows), then select a time unit from the dropdown list (minutes, seconds, thousands of a second). Then hit the Video Record button to start the process.</p> <p>Remember you can only use this control if you have selected the Auto Stop control.</p>

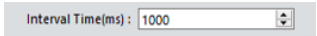
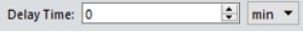
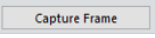
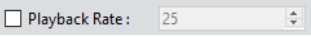
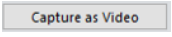
Feature	Title	Usage
	<p>Playback Rate</p>	<p>This control allows you to record your Video as fast as theoretically possible (depends upon hardware and size of frame being captured) to as slow as 1 frame per second.</p> <p>Note: the slower the Playback Rate the larger the Video File, so use caution as files in the Gigabyte range are very common with slow Playback Rates.</p>
	<p>Video Format</p>	<p>With control allows to select, via a drop down, the video format in which you would like the Video saved in.</p>  <p>We recommend using the AVI format as this is a standard format used with other Astronomy Video modifying software.</p>
	<p>Save to</p>	<p>The image data is being loaded and written into the hard drive of the computer during the image capturing process. In this mode, the transmission speed from the camera to computer will reduce due to the computer's loading and writing images data into its hard drive, so this mode is not suitable for capturing the images of quickly changing scenes or backgrounds, but it is suitable for long-time period of capturing.</p> <p>Note: When Auto Stop is checked, then the RAM option is available. This is quicker at capturing video, but it is a memory hog and may cause more problems. Hard disk buffers are fast enough, so RAM option is not Required. Recommend set to Hard Disk.</p>
	 <p>Video Record</p>	<p>Clicking on the Video Record button will start the recording process (recorded duration is displayed beside Auto Stop). To Stop Recording just click on the button again. You Start and Stop using this button unless you have selected Auto Stop, then the software will stop the recording process for you based on your selection criteria (see below).</p> <p>If Delay Time has been checked, then the software will display Delay... until the delay time has been met then recording will commence.</p>
	<p>Default</p>	<p>This control resets these module controls back to the factory defaults which are No Auto Stop, No Delay and No compression.</p>

Delay Capture Tab Delay Capture ^

It is here in the **Delay Capture Tab** where you can delay the capture of multiple Snapshot images with a set interval between each image. You also have the option of combining these snapshots into a Video sequence. This control takes a while to get used to.

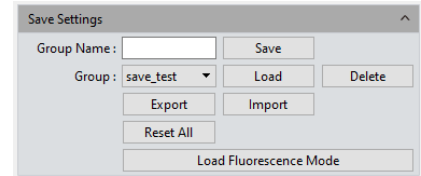


Feature	Title	Usage
	<p>Total Time</p>	<p>With this button, you can select the Total Duration of Video to be taken (not exposure time). This control runs in conjunction with the Total Frame control for Video Recording.</p> <p>The value of Total Time = Total Number of Frames/Playback Rate</p> <p>Note: The Frame Rate is rounded down.</p> <p>For example: If you select 2 seconds as Total Time, the software (depending upon your Frame Rate), may set the Total number of Frames to Capture to 50. When Capture Frame is clicked, then a total of 50 Snapshots would then be captured. If you clicked on Capture as Video, then the total Video length would be 2 seconds.</p> <p>The Duration of each Snapshot/Frame is set in the Exposure Control Tab.</p>
	<p>Total Frame</p>	<p>With this button selected, you can enter a value of the number of Snapshots that you will allow to be taken. Snapshots will be taken one after another unless you enter an Interval Time in which case the Interval Time will be the pause between each snapshot.</p> <p>You can also introduce a Delay Time before the sequence starts.</p> <p>The images will be saved in a format and location set in the information set in the File Save Tab.</p> <p>You have a range from 1 to 9999 Snapshots to use.</p> <p>Note: This control runs in conjunction with the Total Time control. Think about it this way: Total Frame for Snapshots and Total Time for Video.</p>

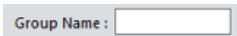

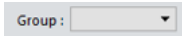
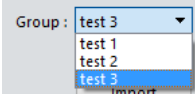
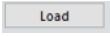
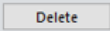
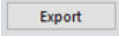
Feature	Title	Usage
	Interval Time	<p>This control allows you to enter the amount of pause the software should take between each Snapshot (entered in the Total Frame above).</p> <p>The time is entered in either minutes, seconds, or milliseconds (1000 ms = 1 s)</p> <p>You have a range from 0 to 120 minutes between each Snapshot.</p>
	Delay Time	<p>With this button selected, you can enter a value for the delay before the first Snapshot is taken. The time can be entered in units of minutes, seconds and milliseconds.</p> <p>The range of the delay is from 0 s to 120 minutes.</p>
	Capture Frame	<p>Clicking on this button will start the Snapshot process. The software will look at the Delay Time, the number of snapshots requested (Total Frame), and the Interval between each Snapshot and then execute the procedure.</p> <p>The Capture Frame button will change its name to Stop Capture, where you can abort the procedure by clicking on the button.</p>
	Playback Rate	<p>This control allows you to record your Video as fast as theoretically possible (depends upon hardware and size of frame being captured) to as slow as 1 frame per second.</p> <p>Note: the slower the Playback Rate the larger the Video File, so use caution as files in the Gigabyte range are very common with slow Playback Rates.</p>
	Capture as Video	<p>Clicking on this button will start the Video recording of the Snapshot process. The software will look at the Delay Time, the Total Time between each snapshot and then execute the procedure.</p> <p>The Capture as Video Frame button will change its name to Stop Video, where you can abort the procedure by clicking of the button.</p> <p>The video will not consist of real time videos from the camera but consists of stills stitched together. For example, it may consist as a 10 second video of two 5 second frozen frames if the time length of 5 seconds and two frames were selected as the number of snapshots.</p>

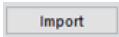
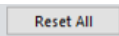
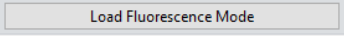
Save Settings Tab Save Settings


It is in this Tab where you can manage groups of parameters. You can save, reload, export and import all of the settings you have created based upon your different imaging scenarios. The settings will consist of every parameter available in the camera (except for the Flat field).



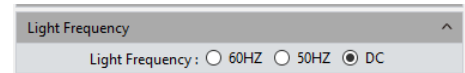
This **Tab** will provide you with the option of Saving the current settings of the **SolarCam 20** to a Group name. You can save numerous different setting scenarios on the computer. Then at a later date, you can reload all of those settings back into the **SolarCam 20** and continue from where you left off. We recommend that you use a naming convention that will make sense to you.

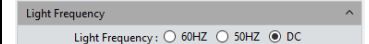
Feature	Title	Usage
	Group Name	Enter the name you would like to give the settings group. Click on the Save button to save this group.
	Save	Once you Click on the button all the current parameters set in the SolarCam 20 will be saved under the Group Name entered above. The Group command (see below will now contain the name of this group for easy access).
	Group	This dropdown box will contain a list of all the previously saved parameter groups. Just select a parameter group from the list then Click on the Load button to import and set all of the SolarCam 20 settings from that Group. 
	Load	Once you Click on the Load button, all the saved settings from the selected Group Name will be loaded and set in the SolarCam 20 .
	Delete	Once you click on the Delete button, the selected Group Name will be deleted from the Group Name Database .
	Export	Once you Click on the Export button, you will be prompted for a file location to save the parameters that will be saved in the config_file folder inside the requested folder (so create a folder name before executing this command). This folder can be sent to another SolarCam 20 users who can import the settings into their own camera.


Feature	Title	Usage
	Import	Once you click on the Import button, you will be prompted for a file location of the config_file folder. The imported group name will be added to your database.
	Reset All	Will reset the current SolarCam 20 internal camera settings to factor defaults. Thus, overriding current group settings. This is a great button to use when you have configured the SolarCam 20 , but you cannot get it back to normal.
	Load Fluorescence Mode	After clicking this button, the Exposure Mode is switched to manual exposure , the Exposure Time is 100ms , and the automatic level is automatically checked .

Light Frequency Tab 

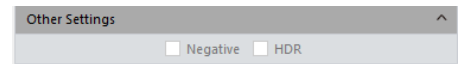
It is in this Tab where you can change the expected input light frequency. But this is not needed for our Astronomical applications.



Feature	Title	Usage
	Light Frequency	Select an option to see if it improves your image.

Other Settings Tab 

Not activated for the Mallincam SolarCam 20



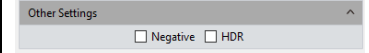
Feature	Title	Usage
	Other Settings	<p>Negative: One Checked, it changes the color of the current image to its inverse color.</p> <p>HDR: Click to achieve a higher dynamic range and more image details for better image quality.</p> <p>Experiment with These controls to see if you like the results.</p>

Image Tab



The **Image Tab** is the control used to activate other image modification controls for adjusting image details of your **Snapshot** images. This Tab allows quick and simple adjustments of a **Snapshot** image within the software, but most of us may use other image adjusting software as well. The **Image Tab** controls become active when you have double clicked on a saved image from the **Image Tray**.

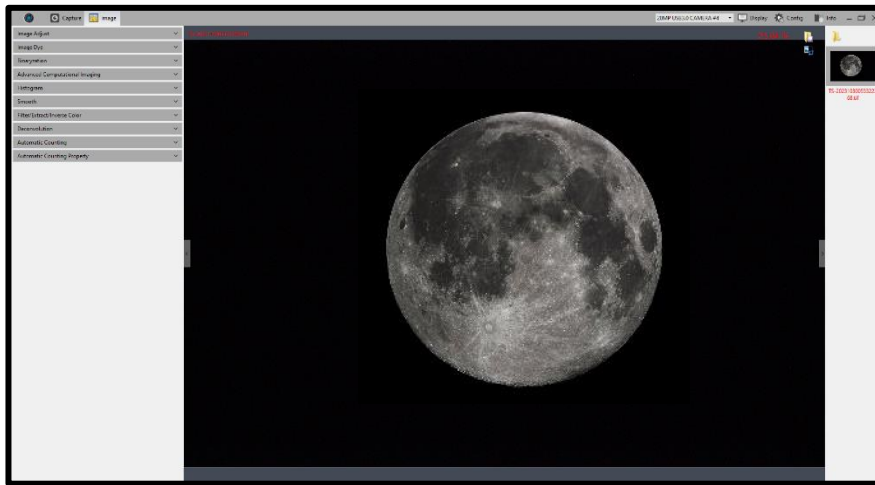
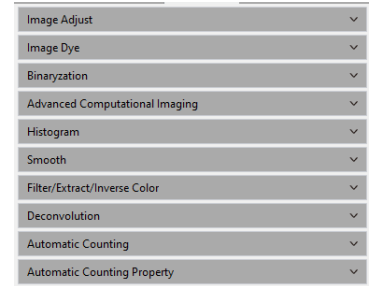

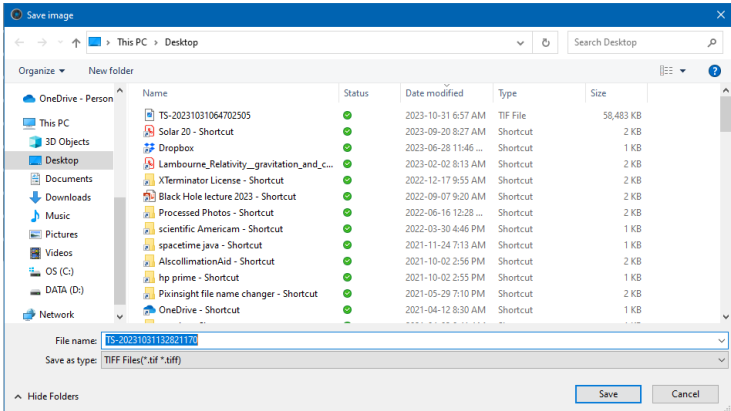


Image Tab Icons

Feature	Title	Usage
	<p>Save image As..</p>	<p>This icon is located on the upper right of the Image Window. Clicking on this icon will open a Directory window where you can choose a location, format, and file name to save your image displayed in the Image Tab.</p> 


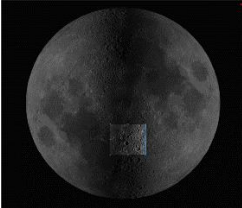


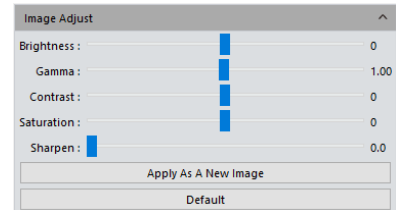
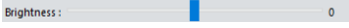

Feature	Title	Usage
	<p>Image Crop</p>	<p>This icon allows you to select a rectangular area of your image and remove everything else. On your Display Window Click on the icon, then left-click-hold and drag to select a rectangle of interest. Now Click on the green checkmark to crop the image. You now can save the cropped image by using the Save Image As ... icon.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>
	<p>Sizer</p>	<p>Clicking on these icons will increase the size of the Display Window either on the left or right by removing the Feature Tab or Image Tray. Again, Clicking on the icon will reduce the Display Window's size by bringing back either the Feature Tab or the Image Tray.</p>

Image Adjust Tab Image Adjust

The **Image Adjust Tab** allows you to adjust **Brightness**, **Gamma**, **Contrast**, **Saturation**, and **Sharpen** on a saved **Snapshot**.



Feature	Title	Usage
	<p>Brightness</p>	<p>This slider control allows you to adjust the brightness of the overall image. Moving the slider to the left darkens the image while moving the slider to the right brightens the image. The brightness ranges from -255 to +255 with the default being 0.</p>
	<p>Gamma</p>	<p>This slider control allows you to adjust the Gamma value for the overall image. Increasing Gamma makes the dark areas darker and light areas lighter. Gamma is more like contrast than anything else. The Gamma ranges from 0.01 to 2 with the default being 1.</p>

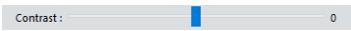

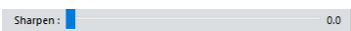
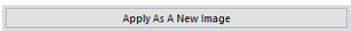
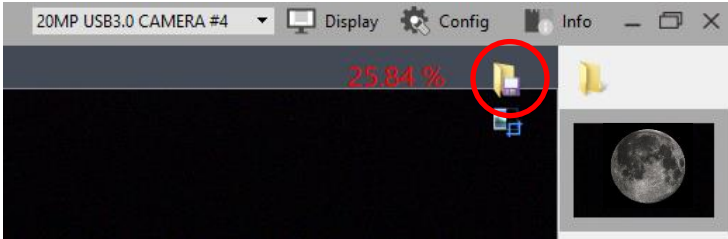
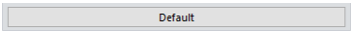
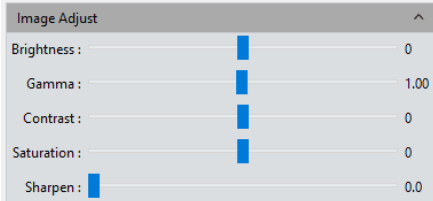
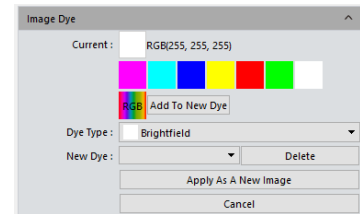
Feature	Title	Usage
	<p>Contrast</p>	<p>This slider control allows you to adjust the Contrast value for the overall image. Increasing the Contrast increases the difference between the dark and light areas. The Contrast ranges from -80 to 80 with the default being 0.</p>
	<p>Saturation</p>	<p>This slider control allows you to adjust the Saturation value for the overall image. Saturation is the intensity of a hue from gray tone (no Saturation) to pure, vivid color (high Saturation). The Saturation ranges from -180 to 180 with the default being 0.</p>
	<p>Sharpen</p>	<p>This slider control allows you to adjust the Sharpness value for the overall image. Increasing the Sharpness value increases the contrast along the edges of an object. The Sharpness ranges from 0 to 3 with the default being 0.</p>
	<p>Apply as a New Image</p>	<p>When clicked, it will create a new thumbnail of the Image with the changes. You will need to Save this image if you want a permanent copy of it (Click on the Save image as ... icon at the top right side of the screen). You will be prompted with a Window Save option for name and location when you would like the updated image saved. The saved image will now appear in the Image Tray with its name. If you forget to Save, and you Click on another image from the Image Tray, it will ask you if you would like to save the previous image.</p> 
	<p>Default</p>	<p>When clicked, this control will reset all adjusted parameters back to factory defaults.</p> 

Image Dye Tab Image Dye

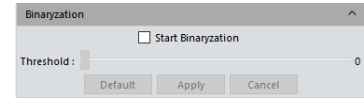
The **Image Dye Tab** allows you to create false color images with a color overlay. Picking a color from the palette will shade the whole image with that color in appropriate intensities.



Feature	Title	Usage
	Current	This displays the current of optional color for the palette. Clicking on any of the colors will shade the image with the color.
	RGB	Clicking of this button will pop-up the Window's color selection palette, so you can choose a color other than the ones provided.
	Add To New Dye	Clicking on this button will allow you to save your newly created color to a palette name of your choice so you can recall it quickly.
	Dye Type	This dropdown list contains the various built in color palettes for you to choose from.
	New Dye	This dropdown list contains the list of your Add To New Dye creations. Select a Dye color from the list to apply to your image.
	Delete	Will delete your current New Dye from Database.
	Apply As A New Image	Will duplicate the original image, but now with the new Dye color. If required, you will need to save this image via the Save Image As ... icon.
	Cancel	The button will cancel Dye color applied to image.

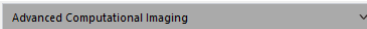
Binaryzation Tab Binaryzation

The **Binaryzation Tab** allows you to set the grayscale value of the pixels from a range of **0** to **255**. The end result of this process is to create an image which is truly **Black** and **White** (no grays).





Feature	Title	Usage
	Start Binaryzation	<p>Check marking this box will start the binary conversion of pixels to either Black or White.</p> <p>The Threshold value (see below) will determine which pixels are converted the Black and which pixels are converted to White.</p>
	Threshold	<p>This slider will allow you to adjust which range of data pixels will be converted to Black and which range of data pixels will be converted to White. Moving the slider to the right will increase the number of pixels being converted to Black. The slider range is from 0 to 255.</p>
	Default	This button will set the Binaryzation value to 14 .
	Apply	This button will permanently apply the Binaryzation to the image. If you need to save this image, use the Save Image as ... icon.
	Cancel	If you have not clicked on the Apply button, you can undo the Binaryzation process on your image.

Advanced Computational Imaging Tab

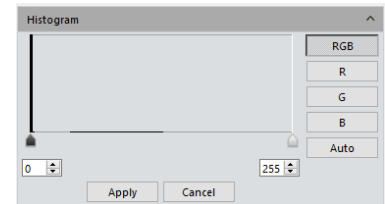



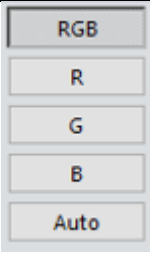
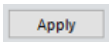
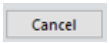
The **Advanced Computational Tab** allows you merge saved images to either improve their **depth-of-view**, **create a mosaic** of the overlapping images, or produce an image with a **High-Dynamic Range**.

Feature	Title	Usage
<input type="radio"/> Extend Depth Of Field (EDF)	<p>Extend Depth of Field</p>	<p>This control will provide you with a directory pop-up so you can select the saved images that cover the same object but with different focus frames. The software will then merge these images together providing an image with a focus across all regions (extends the depth of view). You will have the option of clicking Apply As a New Image to place this merged image on your Image Tray.</p> 
<input type="radio"/> Image Stitching	<p>Image Stitching</p>	<p>This control will provide you with a directory pop-up so you can select the saved images that cover the same object but with overlapping areas. The software will then merge these images together providing an image which covers a larger area of the object that would not otherwise be possible for you due to the restricted field of view of your telescope. You will have the option of clicking Apply As a New Image to place this merged image on your Image Tray.</p>
<input type="radio"/> High-Dynamic Range (HDR)	<p>High Dynamic Range</p>	<p>This control will provide you with a directory pop-up so you can select the saved images that cover the same object but with different exposure times. The software will then merge these images together providing an image which covers the same object but provides details of faint components without blowing out the details of the bright components. You will have the option of clicking Apply As a New Image to place this merged image on your Image Tray.</p> 
<input type="button" value="Apply As A New Image"/>	<p>Apply As a New Image</p>	<p>Use this button if the merged images are worthy of saving as a new image.</p>

Histogram Tab Histogram

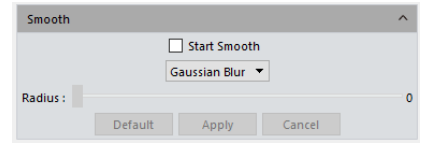
It is here in the **Histogram Tab** that you have complete control of the **Saved Image Histogram** which allows you to either manually control the **brightness** of each of the color channels or let the software perform this task for you. This allows you to pull out as much detail (**Shadows, Midtones, Highlights**) hidden in the image as you can. The **Histogram** provides a quick picture of the tonal range of the image,






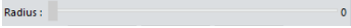



Feature	Title	Usage
	Histogram	<p>You can use the 2 controls to manually adjust the image's dark tones (Left control), and the gamma and highlight brightness levels (Right control) to regulate the image's contrast, shading, and image layers to obtain the best balance for the image.</p> <p>Moving the Black control to the right (or entering a larger number) darkens the image and to the left lightens the image.</p> <p>Moving the Gray control to the left (or enter a smaller number) brightens the image and to the right darkens the image.</p> <p>The goal is to use as much of the necessary data (the graph) between the two controls without clipping the necessary data.</p>
	Color Channel	<p>This allows you to select either all 3 color channels together (Red, Green, and Blue), or select each color independently to use with the above Histogram controls.</p> <p>You can also have the software automatically determine the best Histogram settings for you.</p>
	Apply	<p>This control allows you to apply the changes performed on the image via the Histogram Sliders.</p> <p>If you decide to keep the changes, don't forget to use the Save Image As ... icon.</p>
	Cancel	<p>This control allows you to cancel the changes performed on the image via the Histogram Sliders.</p>

Smooth Tab Smooth

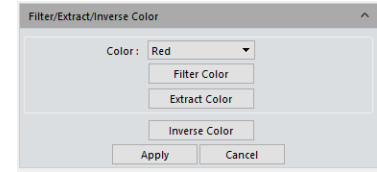
The **Smooth Tab** allows you to apply any of the three techniques of smoothing your image to both reduce the noise and the level of detail. The choices are **Gaussian Blur**, **Box filter**, and **Median Blur**. This control will not be of too much use for astronomical images unless you are using it for artistic purposes.



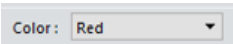
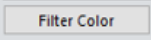


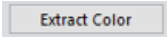


Feature	Title	Usage
<input type="checkbox"/> Start Smooth	Start Smooth	Check Marking this box will start the smoothing of pixels by using the algorithm chosen below.
Gaussian Blur ▾	Gaussian Blur	The visual effect of the Gaussian Blur technique is a smooth blur resembling that of viewing the image through a translucent screen. The Radius Slider below allows you to control the amount of blur. The range is 1 (little blur) to 30 (a lot of blur). 
Box Filter ▾	Box Filter	The visual effect of the Box Filter Blur technique is a smooth blur performed by averaging the pixels around an individual pixel. The Radius Slider below allows you to control the size of the box (thus the amount of blur). The range is 1 (little blur) to 30 (a lot of blur). 
Median Blur ▾	Median Blur	The visual effect of the Median Blur technique is a smooth blur performed by calculating the median of the pixels around an individual pixel. The Radius Slider below allows you to control the size of the box (thus the amount of blur). The range is 1 (little blur) to 30 (a lot of blur). 






Feature	Title	Usage
	Radius	The purpose of this slider is to control the amount the selected algorithm will affect the image. The range is from 1 (smallest effect) to 30 (maximum effect).
	Default	Set the default value for each of the above selected algorithms. The Default value is 3 (little blur).
	Apply	<p>If you like the blurred image and you want to make it permanent, then clicking on this control will do that.</p> <p>If you would like to save the blurred image, remember to use the Save Image As ... icon above.</p>
	Cancel	If you don't like the blurred image and you want to return the image back to normal before applying it, then clicking on this control will do that.

Filter/Extract/Inverse Color Tab



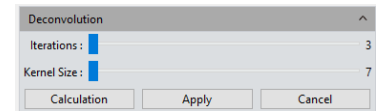
The **Filter/Extract/Inverse Tab** allows you to play with the colors of the image, by either removing a specific color, selecting, or even complementing colors to try to pull out deeper structure in the image.

Feature	Title	Usage
	<p>Color</p>	<p>This control allows you to select a color that you would like to have in enhancing your image via the controls below.</p> <p>The dropdown list provides you with a choice of red, green, or blue.</p>
	<p>Filter Color</p>	<p>This control will filter out the selected color from the pixels of the image. This leaves an image consisting of the combination of the remaining two colors. For example, see below on the right an image of the Moon with the Red channel filtered out.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>
	<p>Extract Color</p>	<p>This control will filter out every color except the selected color from the pixels of the image. This leaves an image consisting of only the selected color. For example, see below on the right an image of the Moon with the Red channel extracted.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>

Feature	Title	Usage
	<p>Inverse Color</p>	<p>This control will invert (reverse) every pixel value of the image to their complementary color. For example, see below on the right an image of the Moon with the Inverse selected. Lights become Darks and vice versa.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>
	<p>Apply</p>	<p>If you like the color changes in your image and you want to make it permanent, then clicking on this control will do that.</p> <p>If you would like to save the color changes in your image, remember to use the Save Image As ... icon above.</p>
	<p>Cancel</p>	<p>If you don't like the color changes in your image and you want to return the image back to normal (as long as you have not applied it), then clicking on this Cancel control will do that.</p>

Deconvolution Deconvolution

The **Deconvolution Tab** allows you use to apply an algorithmic process of reversing the optical distortion that takes place in the an **optical/atmospheric** acquisition process of the telescope, thus creating clearer images.



Feature	Title	Usage
	Iterations	This control allows you to select the number of algorithmic cycles you would like it to try. The Iterations Slider allows you to select from 3 to 5 iterations.
	Kernal Size	This control will apply a deconvolution process to a kernel size, say 7x7 . The first convolutional layer is often kept larger. This is a memory/time intensive process, so the software may indicate that the memory resources are too high to apply the process. <div style="border: 1px solid gray; background-color: #cccccc; padding: 5px; margin: 10px 0; text-align: center;"> The memory resources is too high, can not to process deconvolution! </div> The Kernal Size Slider allows you to select from 7 to 21 iterations.
	Calculation	This control executes the deconvolution process. You will be kept informed by a process bar. <div style="text-align: center; margin: 10px 0;"> </div> <p>Note: After completion, use the Histogram Control to adjust the brightness and contrast.</p> <div style="display: flex; align-items: center; margin-top: 10px;"> <div style="margin-right: 10px;"> <p style="color: green;">Before</p> <p style="color: green;">After</p> </div> </div>
	Apply	If you like the deconvolution changes in your image and you want to make it permanent, then clicking on this control will do that. <p>If you would like to save the color changes in your image, remember to use the Save Image As ... icon above.</p>

Automatic Counting



This control has no real application for us. It allows you to set up a bunch of parameters, then counts objects in the image that matches those parameters. I tried it with **Sunspots**, or **Lunar Craters** but it had no successful count run. So, feel free to experiment this this and the **Automatic Counting Property** control.

Automatic Counting ^

Target Data Settings :

Diameter
 Roundness
 Center X
 Center Y
 Long Axis
 Short Axis
 Direction
 Integral
 Standard Deviation
 Mean Gray Value
 Max Gray Value
 Min Gray Value

Add
Delete
Default

	Data Type	Minimum	Maximum
1	Area	0.000	10000000.000
2	Roundness	0.000	10000000.000
3	Long Axis	0.000	10000000.000
4	Short Axis	0.000	10000000.000

OK
 Draw Target
Export Report

Restart Counting
Back

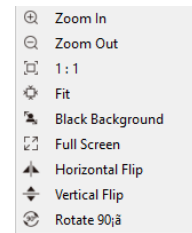
Automatic Counting Property ^

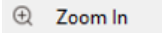

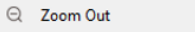



Property	Value
Font	A [Arial, 8]
Font Color	■ [0, 255, 0] (255)
Target Color	■ [0, 0, 255] (255)
Contour Width	1
Precision	3

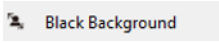

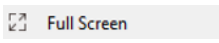

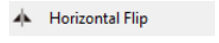

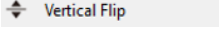

Default

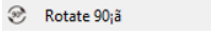


Display Tab

The **Display Tab** allows you to zoom in or out, resize or even reset the real time image screen to its default size. Here you also will be able to flip or rotate the image for your needs.



Feature	Title	Usage
	Zoom in	<p>Clicking on this control will Zoom in on the image. Once activated, your scroll key on the mouse can be used to quickly Zoom in and Zoom out. The Fit Control (see below) will automatically resize the image to fit inside the Display Window. Left-Click-Hold and Drag can be used to move your view in the zoomed window.</p> 
	Zoom out	<p>Clicking on this control will Zoom out on the image. Once activated, your scroll key on the mouse can be used to quickly Zoom in and Zoom out. The Fit control (see below) will automatically resize the image to fit in the Video Window. Left-Click-Hold and Drag can be used to move your view in the zoomed window.</p>
	1:1	<p>Clicking on this control will show the image at 100% of its size (which may be larger than your monitor's window size). See below on how the Fit controls the whole image in the Video Window.</p>
	Fit	<p>Clicking on this control will resize the image so that it fills up your Video Window size.</p> 

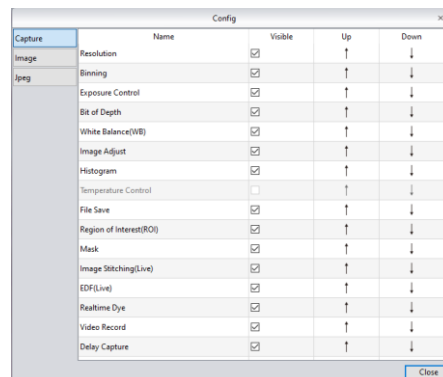
Feature	Title	Usage
	<p>Black Background</p>	<p>Clicking on this control will make your image take up the whole screen (no control tabs visible) with Black panels. You can return to a screen with control tabs by either hitting the ESC key on your computer or clicking on the Curvy Arrow located at the bottom right side of your image.</p> 
	<p>Full Screen</p>	<p>Clicking on this control will make your image take up the whole screen (no control tabs visible). You can return to a screen with control tabs by either hitting the ESC key on your computer or clicking on the Curvy Arrow located at the bottom right side of your image. Identical to Black Background control.</p> 
	<p>Horizontal Flip</p>	<p>Clicking on this control will flip the image so the left side becomes the right side, and the right side becomes the left side.</p> 
	<p>Vertical Flip</p>	<p>Clicking on this control will flip the image so the top of the image becomes the bottom of the image, and the bottom of the image becomes the top of the image side.</p> 

Feature	Title	Usage
	<p style="text-align: center;">Rotate 90</p>	<p>Clicking on this control will rotate the image 90° clockwise. You can apply this control to again rotate the image another 90° and repeat as necessary.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>

Config Tab

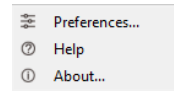


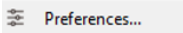


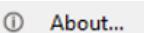
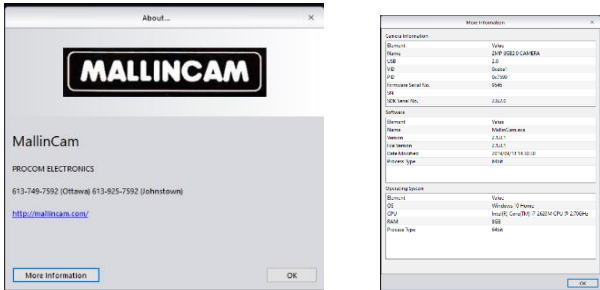
The **Display Tab** allows you to select which controls you would like visible in either the **Capture Tab** or **Image Tab**. You can also configure how your Jpeg image is saved (**we recommend you keep it at the Default**). Finally, you can also change the order in which the control tabs appear in either the **Capture Tab** or the **Image Tab** by moving them up or down the list. **Clicking** on **Close** to save the new format.




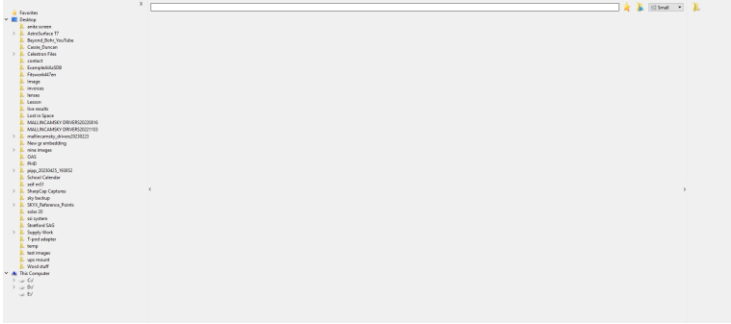

Info Tab

The **Info Tab** allows you to select which language you would like to see the controls in. You can also find the version number of the software currently installed on your computer along with information about the camera.



Feature	Title	Usage
	<p>Preferences</p>	<p>Click on the language you would like to use with the Mallincam software, press the Close button then restart the software and the new Language will be applied.</p> 
	<p>Help</p>	<p>Not installed (after all – you are reading the best help there is)</p>
	<p>About</p>	<p>Provides information about the hardware and current software version.</p> 

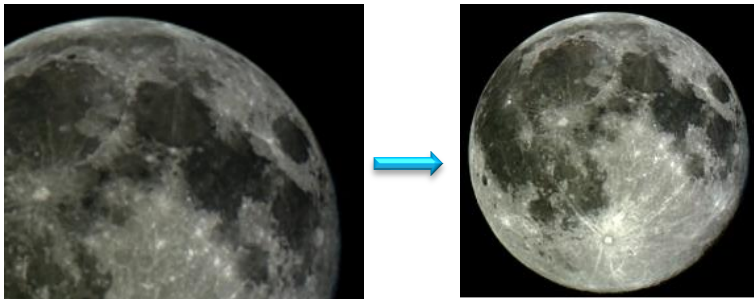
On Screen Controls

Feature	Title	Usage
	<p>Show File Directory</p>	<p>This icon is located on the upper right of the Image Tray. Clicking on this icon will open a Directory window where you can choose a location to load a previously saved image into the Image Tray.</p>  <p>To close this Window, either click on the Capture or the Image control on the top left of the screen.</p>
	<p>Sizer</p>	<p>Clicking on these icons will increase the size of the Display Window either on the left or right by removing the Feature Tab or Image Tray. Again, Clicking on the icon will reduce the Display Window's size by bringing back either the Feature Tab or the Image Tray.</p>

5. Appendix

Appendix A: Using the 1.25" 0.5 x Focal Reduce

A focal reducer is a set of converging (or positive) lenses that cause the light from a telescope to converge at a steeper angle to the focal plane of the SolarCam 20 camera. It is as if it were coming from an objective with a faster (lower) focal ratio and a shorter focal length. When placed in the focal plane in front of the SolarCam 20 or eyepiece, this focal reducer leads to a wider field of view and a brighter image of extended objects, which is important for reducing the exposure times when imaging faint extended objects like the Moon, nebulae or galaxies. You will need to have more in-focus room when using a Focal Reducer.



Attaching the Mallincam Focal reducer

The Mallincam 0.5 x Focal Reducer has a standard 1.25" filter thread on both sides, and can be stacked with filters, such as the Mallincam IR or the Mallincam Polarizer Filters. It is attached by screwing into the 1.25" Mallincam camera nosepieces (or even used with eyepieces), and because the barrel has a 1.25" outer diameter, it can be inserted with the nosepiece into any standard telescope's 1.25" focuser. The focuser comes with a 25mm space if required for your setup to push the reducer further away from the camera.

Appendix B: Using Filters

There are some astronomers who love the unfiltered view from the telescope to sensor (or even eye), and there are those who love to enhance the detail that filters provide. Filters, which are placed in the optical path of a telescope in front of the camera to allow (or block) specified wavelengths of light hit the sensor. Each filter has a job to do, and the more specialized that job, usually the more expensive the filter. For use with the Mallincam SolarCam 20 there are two filters that may be of interest to you.

Mallincam Polarizing Filter

A polarizing filter is like a dimmer switch between the telescope and the camera. It is best for very bright planets and of course the Moon. This filter will provide a better contrast thus revealing more surface detail.



Mallincam IR Filter

The Mallincam cameras are very sensitive across the visual spectrum, as well as in infrared. Telescopes are not designed to block the IR spectrum which can make some of your images, even though focused, look slightly defocused. This blurring effect can cause your images to lose their finer detail. This filter will block that IR while maintaining the color fidelity of the image.



Appendix C: Connecting to Night Skies Network (NSN) using the SolarCam 20 Software

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 make modification as you deem necessary.

Computer real estate will be your nemesis. So, depending upon the size of the monitor (laptop), the number of screens that you are using, then the number of software programs that you are simultaneously using will dictate how you will manage your windows. I will describe how I have organized my windows in a variety of situations (1 computer, 1 computer with 2 monitors, which software packages I am 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:

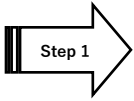
<https://groups.io/g/MallinCam/topics>

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 Mallincam Software is not capable of modifying the Video Image and having that Video Image directly captured by LiveSkies. So, if you want to use all the features of the Mallincam Software and broadcast those results, as well as save screen shots and videos of your images, then we need another program to capture Mallincam Software'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 Mallincam Software to broadcast the images on NSN.

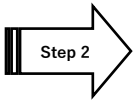
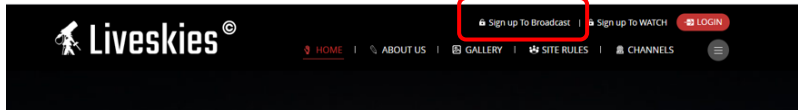
To Broadcast on LiveSkies, you will need to obtain a broadcast account from Rock. Once obtained, you will be able to broadcast, observe other broadcasting channels, and participate in real time discussions.



Step 1

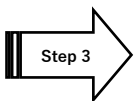
Obtaining a Broadcast Account

Visit <https://liveskies.org>



Step 2

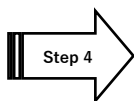
Click on **Sign up To Broadcast** (located at top right of screen)
Remember each channel name will have a unique email address.



Step 3

Complete the Registration Form

*The **Channel Name** and **Username** should be the same with **NO SPACES** and **SPECIAL CHARACTERS** in the name/*

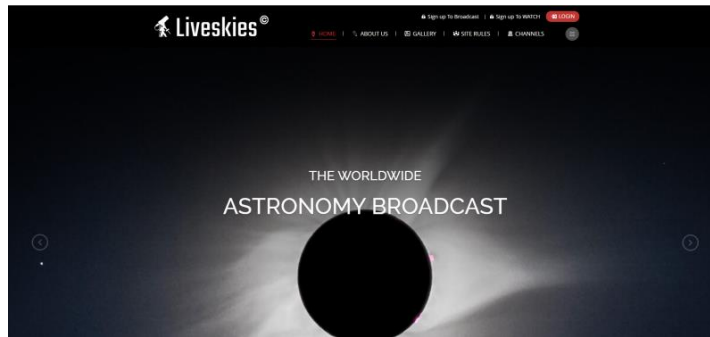


Step 4

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.*

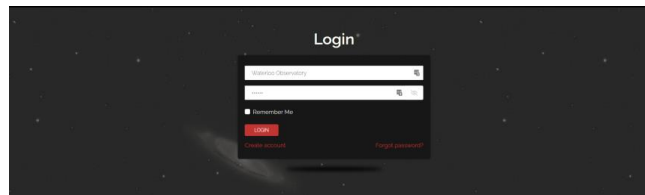
Step 1 Visit <https://liveskies.org>



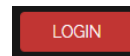
Step 2 Click on the red **Login** button on the upper right of the window.



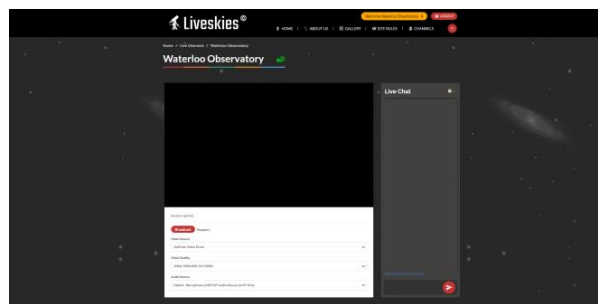
A login window will pop up.



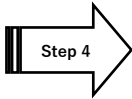
Step 3 Enter both your **Username** and **Password** and click on the red **Login** button.



*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.*



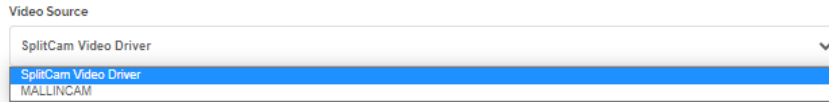
Step 4 **Video Source**

At this point, determine how you would like to broadcast your live video of Mallincam Software. 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 Mallincam Software Window. (See below on how to achieve this).



Clicking on the dropdown list will provide you with the current **DirectShow** options available to you on your computer (depending upon what software you have installed).



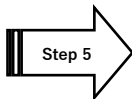
If you have installed the **Directshow** drivers, then Mallincam will be added to the list.



*Note: In using **Directshow**, you will see the image of what the camera is observing, but you will need Directshow software (such as **AMCap**) to control most aspects of the camera.*

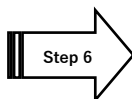
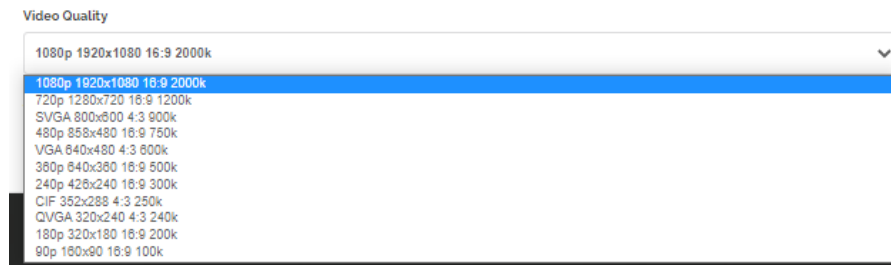
If you have installed **Splitcam** (recommended), you will see **Splitcam Video Driver** in the List. Select your **Video Source** from the list.

Video Quality



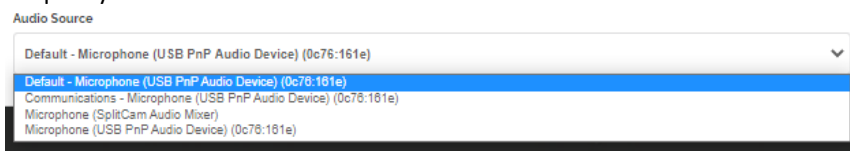
Step 5 From the drop-down list select the best resolution your system can handle.

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.

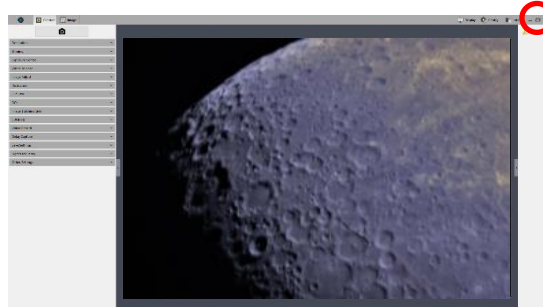


This section explains how to Capture and Broadcast Using either SplitCam or OBS

You will want to stream the **Mallincam** image to the Liveskies server. I will give procedure for two of many options. Once you have activated your choice, just bring the **Mallincam** Window up front so you can control it. If you have multiple monitors, you can leave Liveskies and **Mallincam Software** each on its own monitor, so they are available to control.

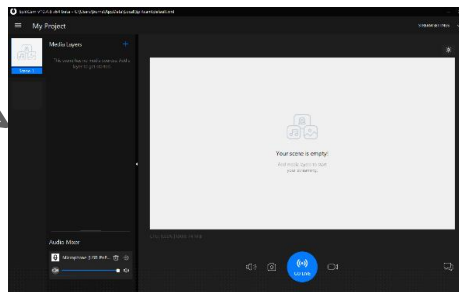
➔ **Using SplitCam** (either visit *Mallincam.net* or *splitcam.com* to download)

Step 1 Start **Mallincam Software** and connect to your camera. Ensure **Mallincam** is active on your monitor.

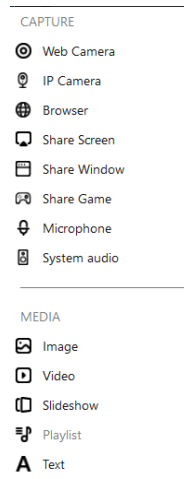
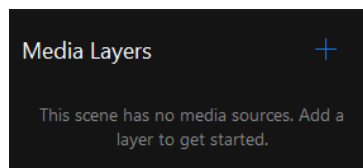


Step 2 Start **Splitcam** (I will illustrate with the latest version)

*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 **Mallincam Software**.*



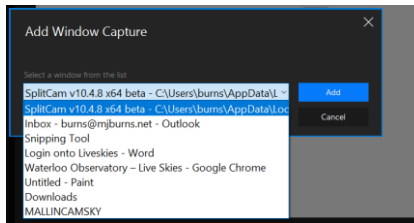
➔ Click on the blue **+** beside **Media Layers** to select what part of the screen you would like **SplitCam** to capture.



The new window will offer you many choices, but the two best choices will be either **Share Screen** or **Share Window**.

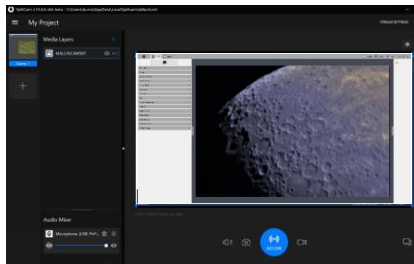
- **Share Screen** allows **SplitCam** to capture the whole screen.
- **Share Window** allows **SplitCam** to capture only a specifically running piece of software (such as **Mallincam**). We recommend using **Share Window**.
 - You will not be able to annotate over **Share Window**.

When **Share Window** is selected, a drop-down box will provide a list of programs currently running.



➤ Choose **MALLINCAM**

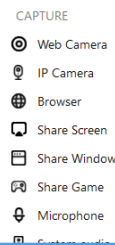
You will now have **SplitCam** displaying the **Mallincam's** window in its display window.



I recommend setting the resolution to 1920 x 1080 in SplitCam's General Settings (the 3 horizontal lines beside My Project on the SplitCam screen.

Step 3

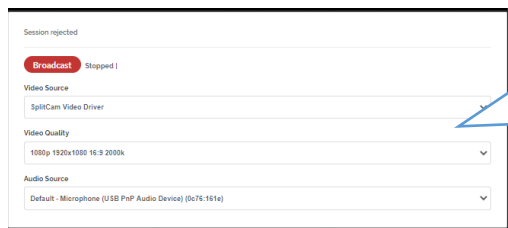
Splitcam will choose a default microphone for you, but you can delete it, and (or include system audio) by again clicking on the **+** in **Medial Layers** and **system audio** and select your choice.



choose another microphone selecting **microphone** or

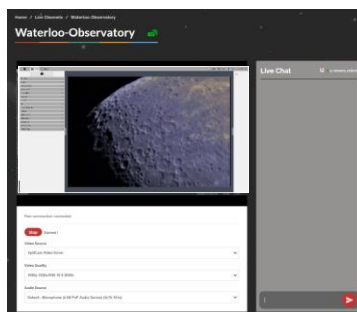
Step 4

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**.

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).



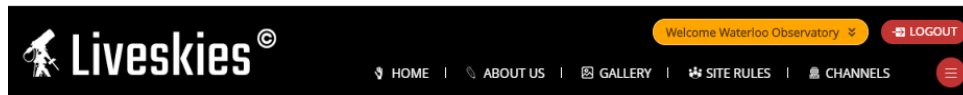
⇒ Live Chat

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

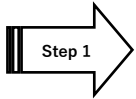
When you are finished with your session, just click on the red **LOGOUT** button at the top of the Liveskies screen, then shut down **SplitCam** and the **Mallincam Software**.



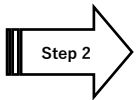
*To control **Mallincam Software**, just bring it to the front. If you have a small sized monitor, you may want to reduce the size of the **Mallincam Software** Window so you can also view the **Liveskies** window and participate in the chat process.*

*Having multiple monitors gives options of placing the **Liveskies** window on one monitor while **Mallincam Software** is on the other monitor.*

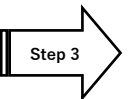
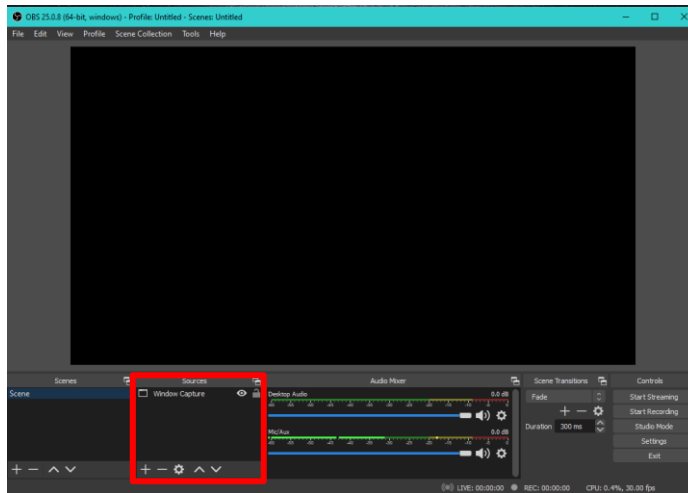
Using OBS (Open Broadcast Software) – This is a more challenging process to initially setup



Step 1 Start the **Mallincam Software** and connect to your camera.



Step 2 Start **OBS**

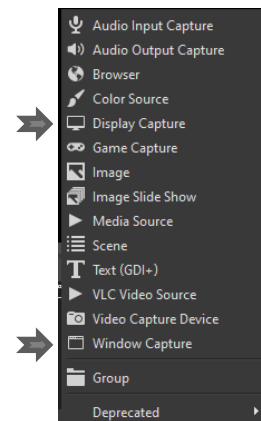


Step 3 Click on the **+** in the **Sources** box to select a source for **OBS**.

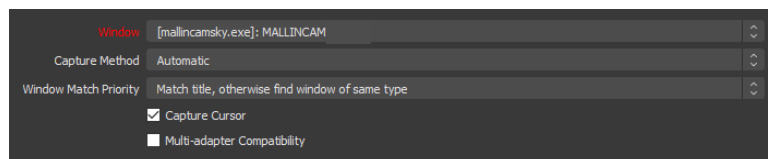
A new Window will open up where you can select from a list of possible sources.

*Two two best choices are **Display Capture** and **Window Capture**.*

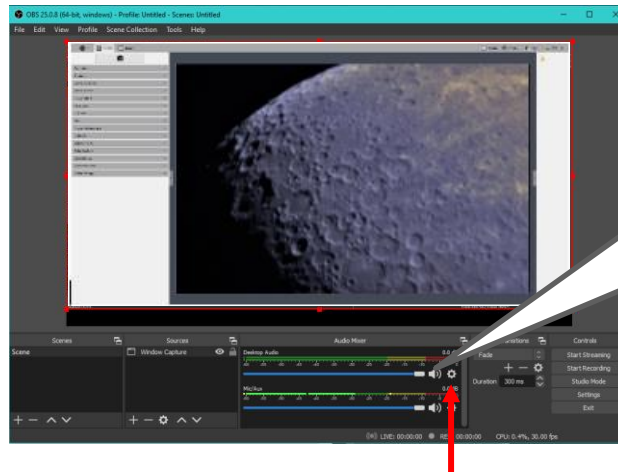
*We recommend **Window Capture**.*



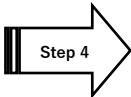
When the **Window Capture** selection appears, use the dropdown list to select **Mallincam**.



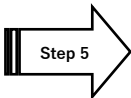
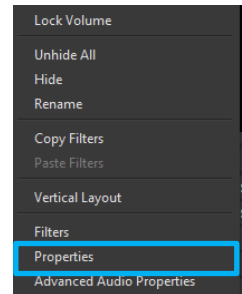
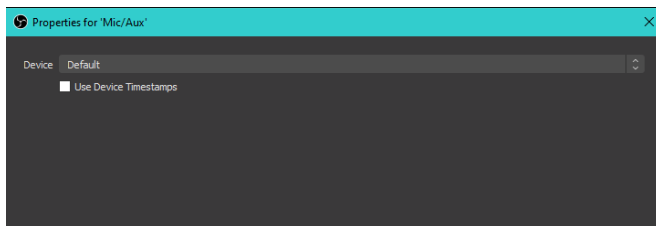
You will see the **Mallincam Software** screen in **OBS's** display.



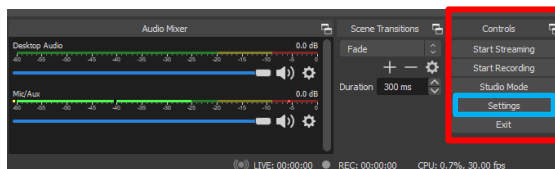
If you have the **Desktop Audio** setting too high, then you will catch your voice on that as well and this can lead to repeated echoing.



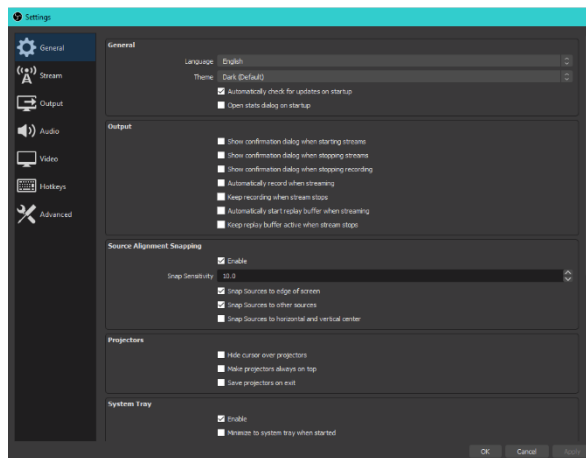
Click on the **Gear** symbol in the **Mic/Aux** box and then select **Properties** to choose a microphone for broadcasting from the drop-down list. (You can test the microphone by speaking and watching the green level bar change).

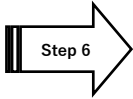


Now click on the **Settings** tab in the **Control** box.

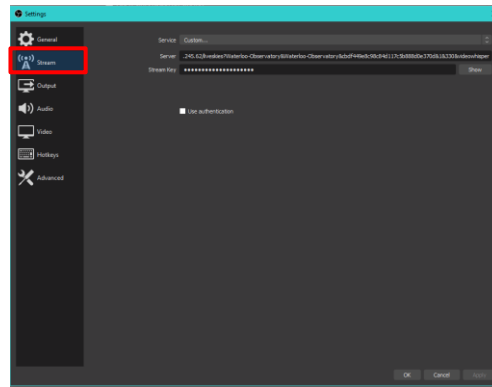


*This will open-up the **Settings** selection for **OBS**.*





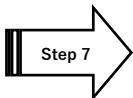
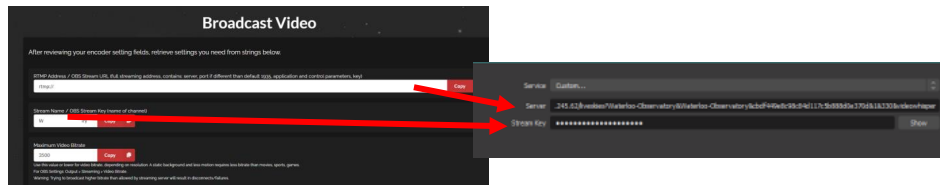
We want to **Stream** the **Mallincam** Window, so select **Stream** from the selection on the left column.



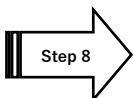
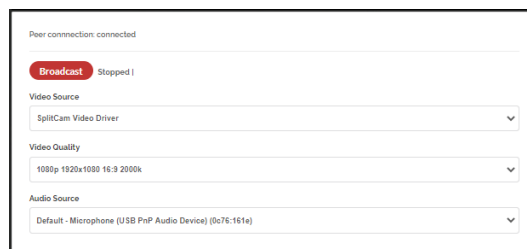
OBS will now require 3 pieces of information.

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

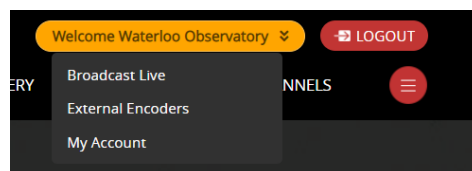
*Both the **rtmp** address and **Stream Key** are located in the **external encoders** window on **Liveskies***



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)



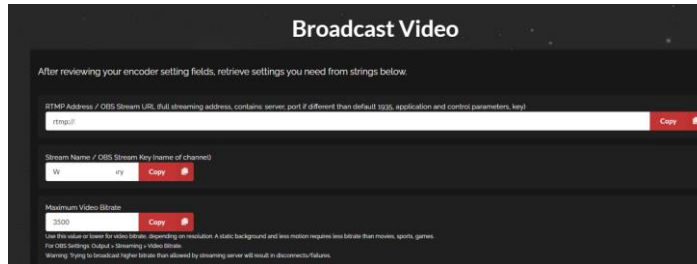
We need to tell **OBS** (and give permission) where to send the **Mallincam's** live video image. In the **Liveskies** window, place your mouse over the orange name of your channel. A pop-down list will appear.



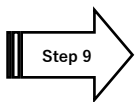


Move the mouse to select **External Encoders** on **OBS** Drop Down

*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.*

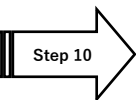


Click on the red **Copy** button next to the **RTMP Address** box.

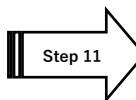


*This copies the **rtmp** address information.*

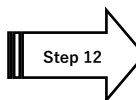
Go back to the **OBS** window and paste (Ctrl-c) the location into the **Server** box.



Go back to the **Liveskies Window** and click on the red **Copy** button for the **Stream Name**



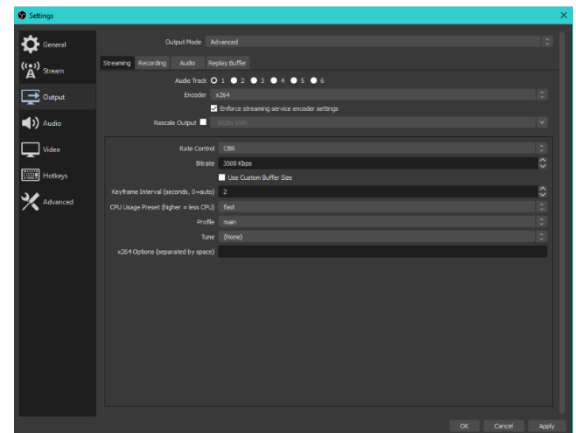
Go back to the **OBS** window and paste (Ctrl-c) the location into the **Stream Key** box.



Now click on **Apply** to **OK** these address locations on **OBS**.

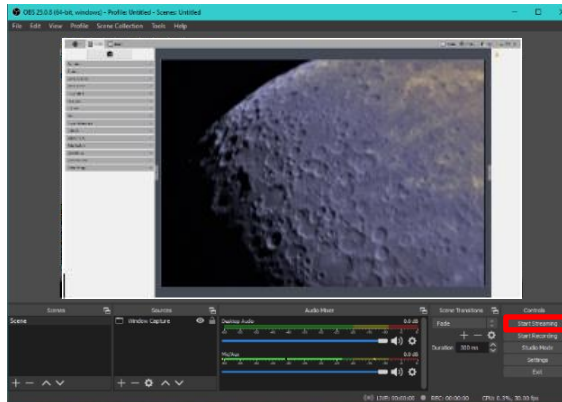
*Liveskies has a maximum video bandwidth of **3500**, so you will want to ensure that you do not exceed that in **OBS** via the **Settings>Output** control. If your computer has a dedicated Video card, see if there is a hardware encoder in the **Encoder** dropdown box. If soo try it to see if you get 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 appearing on the bottom of the OBS window.



To stop streaming, just click on the **Stop Streaming** button in the **OBS control box**.

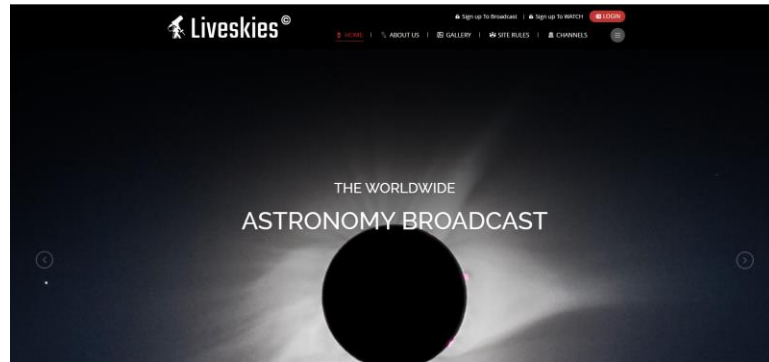
Comments about using OBS (or other streaming software)

- 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 Mallincam Software as you normally would. But, since you have not logged in, you will NOT be able to use **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**.

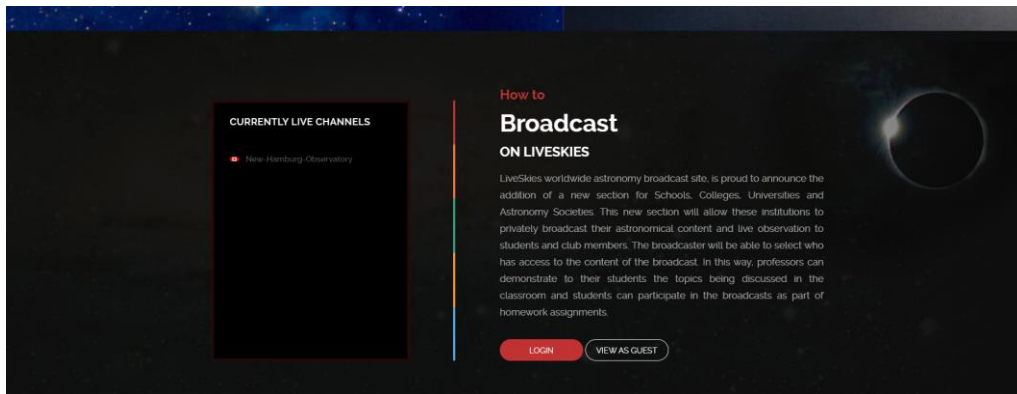
➡ Viewing a Live Skies Channel

➡ 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.

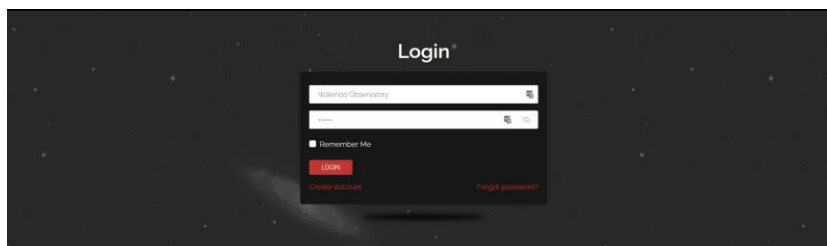
➡ If you want to participate in the Live Chat

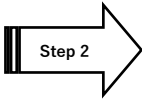
Step 11

Click on the red **Login** button on the upper right of the window.



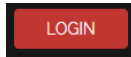
A login window will pop up.



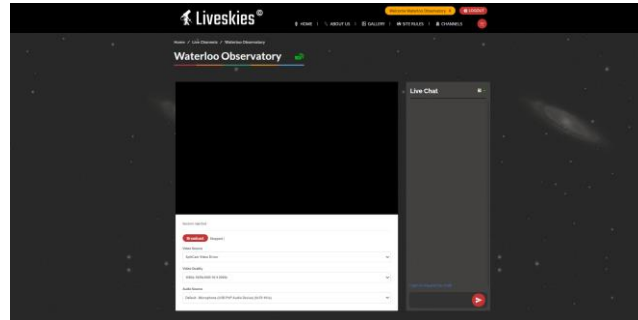


Step 2

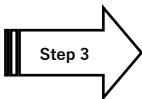
Enter both your **Username** and **Password** and click on the red **Login** button.



*You can have **Liveskies** remember your credentials.
When you have successfully logged in, you will be presented with the main display and control window.*

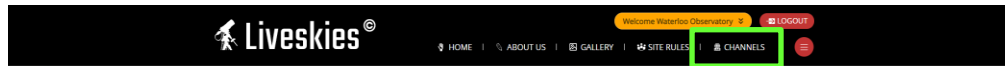


If you have previously broadcasted, Liveskies may automatically activate your broadcast channel.

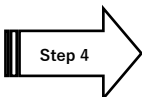
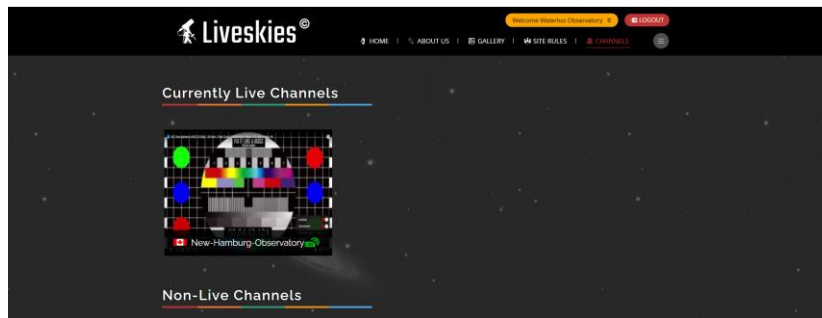


Step 3

Click on the **Channels** button at the top left of the Liveskies window.

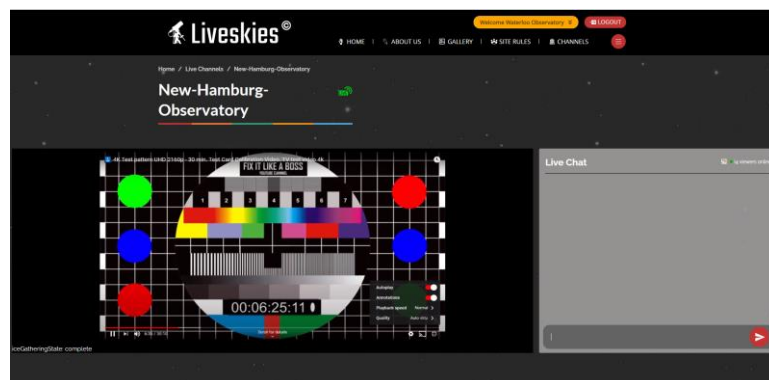




A list of available channels will be displayed.



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 gives me the 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.

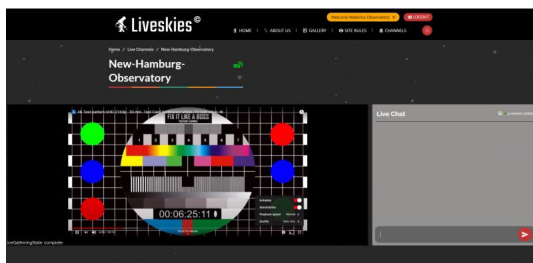
Clicking on it again, closes the Views List.



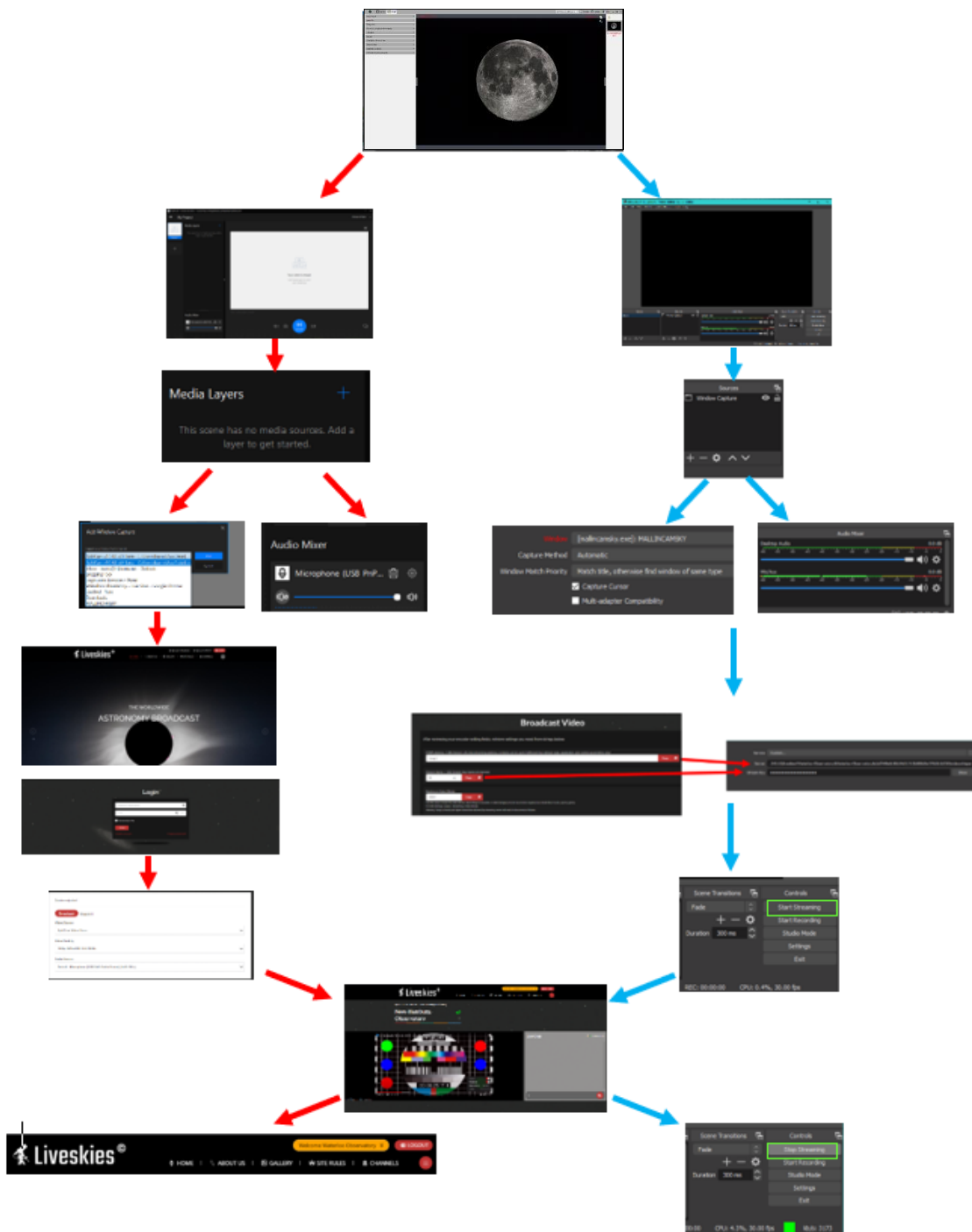
➔ **To exit**

➤ 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 change the channel if you require.



⇒ One Page Broadcast Summary



Appendix D – First Aid for the SolarCam 20



The SolarCam 20 Software is not Working

Diagnosis: This software automatically looks for the **SolarCam 20** camera when it starts. If it cannot locate the camera attached to a USB 3.0 Port, all controls will be inactive.

Cure: **First step:** Make sure the LED light on top the camera is lit. If not, reseal the USB cable into both the computer and the **SolarCam 20** camera (also check power).

- Restart the Software (**the second LED should start to flash**)

Second step: Verify that in **Device Manager** that the driver for the **SolarCam 20** doesn't have a **yellow exclamation** mark beside it.

If Yes, then Windows is having issues with the driver (too many possible issues to explain all) so first reboot the computer to see if that resolves the issue.

- If not: uninstall software, reboot, reinstall software, reboot, check camera.
- Still not: try another USB 3.0 Port (I had difficulties with using my USB 3 Port).
- Still not: do a malware check, there may be viruses and other ugly stuff on your computer.
- Still not: check with the MallinCam User group to see if others can assist.



My Image is all White.

Diagnosis: The **Exposure/Gain** setting is too high for the current object being imaged.

Cure: Go to the **Exposure Tab** and lower the exposure all the way down. Give the system some time to get caught up (if your exposure is set to 10 seconds, it will take 10 seconds before it can lower the exposure). Now the image should be black, so you can now increase the exposure until you start seeing the object appear in the display window. Also check to see if the **Gain** setting is too high.



My Images is looking all wrong, colors, blotchy.

Diagnosis: The SolarCam 20 software can control so many aspects of the camera that sometimes we get lost in making adjustments, we need to put everything back to normal.

Cure: Go to the **Save Settings Tab**, locate and **Left-Click** on the **Reset All** Button. This will reset all control settings back to their defaults (from **Exposure to Image Adjust**).

 **When I save my AVI Video it only saves part of the Video.**

Diagnosis: This is a limitation with the AVI format in Windows. Microsoft's Video for windows has some hardwired limitations that impose a maximum video file size of 1-2GB depending on the version of the RIFF parser code in the MCI/AVI driver.

Surprisingly enough, much video software was written to these standards, and this is where much of today's incompatibility stems from.

The AVI file header is 32-bits in length. As a result, there is a 4GB limitation in its file size.

Cure: Make sure your Windows environment is up to date.

 **My SolarCam 20 is frozen, or the commands do not seem to be working correctly.**

Diagnosis: Somehow the **SolarCam 20** internals have become corrupted (power surge, static, cosmic ray) and all we need to do is reboot the camera and software.

Cure: The best advice is to close the **SolarCam 20** Software Window (if possible, remember the **Ctrl-Alt-Del** process to bring up the **Task Manager**). Now reboot the computer and reconnect to the **SolarCam 20** camera to see if the issue is resolved.

 **My Image on the Screen is great, but when I try to Modify it, the image is all White.**

Diagnosis: This most likely is caused by you trying to modify (under the **Image Tab**) the image before you have saved the image. You can adjust the properties of the live view in the **Capture Tab**, but if you want to modify the image in the **Image Tab**, you must first save the Image, then select the Image from the **Image Tray**.

Cure:

- **Left-Click** on the **Snap-Shot Button** in the **Capture Tab** to save the image (it will now appear in the **Image Tray**).
- **Left-Click** on the **Image Tab** (the screen may be White).
- **Left-Click** on the **Saved Image** in the **Image Tray** (it will now appear on the **Display Zone**).

You can now use the **Controls** in the **Image Tab** to adjust the image properties.

