

## Mallincam VSS by Jim Welisek

### Overview:

The short answer on the new Mallincam VSS (Variable Shutter System) is that it is a reasonably priced, top shelf product with top notch support. Actually like the Ethos, the VSS is more of an “experience” than something to “use”. When I buy a product that meets or exceeds my expectations it usually motivates me to write a review and the Mallincam is no exception.

Now the long answer; most of us live with the light pollution of the cities that surround us. Enjoying truly dark skies is usually a rare event involving much time and many miles of travel. Under a dark sky, galaxies are actually bright, detailed objects. On the home turf they are faint smudges with maybe a little contrast difference at best.

A couple of years back this was really hit home to me. My wife was away at a dark sky outreach event. I was at home in the observatory one night when she called on her cell phone. She was looking at M51 with her XX12, so I dialed it up on the C14. She described what she was seeing; bright, detailed arms, the bridge between the two cores, a clearly defined edge to the galaxy. On my end I was looking at two dim smudges surround by possibly some swimmy contrast difference; a typical ‘view’ of M51 from my back yard, not a dark sky 200 miles away.

It reminded me why I pretty much gave up on visual DSO observing and turned to imaging. Does the story sound familiar? There is a solution, it’s called the Mallincam.

I’ll start with an image I took with the Mallincam last night of M51. I also want to stress that all of these images are single frame, raw screen shots. None have been stacked or post processed in any way. Just using a clipping tool to save off the screen shots.



The above image is about equal to what I can see with the C14 at a dark sky site. You can see the bright cores, clearly make out the arms and the embedded stars. The image above even has some color. What's amazing is that this shot was taken in my back yard which is on a red/orange light pollution border. More amazing, this was done with a minimum Hyper2 exposure setting, about 6 seconds. Imagine this as a nearly live image, updating every six seconds. Not bad. I know, you're thinking it's kind of disappointing compared to a true image. Are you ready for the rest of the story?

This was taken about 2:00am, under a **full Moon**. If I was doing visual I wouldn't even be able to find Alkaid let alone M51, yet you can see the structure, arms, color, embedded stars.

Let's take a look and see what the Mallincam can do with no Moon. I won't say "dark sky" because we don't have one. This is a "no Moon" image with an integration time of around 1 minute with an IDAS filter:



Here's another comparison, M27 under a full Moon, 6 second integration.



The “Apple Core” is plainly visible under the full Moon.

And now with more integration time and better conditions.



The old saying is “a picture is worth a thousand words” comes into play here so that’s how I decided to lead off.

Let’s now explore the Mallincam rather than what it can do. The Mallincam VSS is rectangular and can fit in the palm of your hand. The business end had the sensor and the other end has

Five menu buttons and plugs for cable hookups. The VSS also had a dial to set the “Hyper Mode” integration times.

My particular setup is using the VSS in a Hyperstar configuration with the C14. If you are unfamiliar with the Hyperstar, it is a lens that replaces the secondary mirror on the SC. The Mallincam is mounted there on the front of the telescope. It makes it rather difficult to get a photo of the unit itself, so this is an image from the vendor.



The sensor opening is to the right and the integration setting is the knob on the side.



This is the opposite end for all the connections. The brown buttons are for manual on-screen menu control. The center plug-in is for an optional remote serial camera control. If you are using a computer in the field, there is a software application (covered later) that can control the camera, (a serial to USB converter will have to be purchased if you are using a newer computer).

If you are leaving the laptop at home and just using a monitor, there is an optional corded control box that can be purchased that emulates the manual menu buttons.

The VSS has Composite *and* S-video outputs. Both can be used simultaneously and both are independently output so there is no signal degradation. This is a really nice feature. I usually run the S-Video to the computer for broadcasting (yes, you read that right, broadcasting) and the composite to a 19" flat panel LED TV.

The lower plug-in is for 12 volt DC power but the unit comes with an AC adapter. The various lights indicate power, cooler function and image capture.

The casing is made out of metal and is as solid as it looks.

### **First Impressions:**

I had no idea what a MallinCam was. My wife is active with astronomy as well and got involved with a couple of internet sites that do live sky broadcasts. She told me to go out and get a MallinCam. I hate it when my wife pressures me to go out and buy astronomy equipment, but I've learned to live with it. Following the directives of SWMBO ("She Who Must Be Obeyed") I



ordered the Mallincam VSS. I really didn't have a clue what I was ordering, just got what "she" needed for broadcasting.

Like many vendors in the niche market of astronomy there is no huge factory or army of employees. The Mallincam is custom made in Canada by Rock Mallin and distributed in the US by Jack Huerkamp. If you order a Mallincam you will get to know both sooner or later. Both are hugely supportive of the product as well as highly active in astronomy and astronomy broadcasting. They are both top notch when it comes to customer support. They both regularly check the Yahoo news group answering questions or offering advice.

First off, if you are thinking of getting a Mallincam VSS there is about a two month waiting list. A deposit is required to get on the list.

The unit arrived along with the power supply, 1.25" nose piece and some support cables that I ordered. Everything was well packaged. About the only issue I had was that there was no "Mallincam for Idiots" guide. Most of the documentation was 'technical stuff' that I didn't have a clue on what I was reading. What is a TEC? Why set the AGC there? As a matter of fact, what is AGC anyway? What is BLC? Do I use it? Gee, if I turn this on during the day will it fry the chip? Those are the initial questions. If you are like me, all these settings to play with and not a clue what they do. This "confusion" only lasted a few sessions before I started to get the hang of it.

The "manual" is not real clear but more technical. I will say this though, the camera as well as the software is very intuitive and the learning curve was very short. The software has popup "tool tips" that help explain some of the settings. There are also many supportive and helpful people in the Yahoo group, on CN as well as Rock and Jack. Once you get the basic drift of what the settings do and how they control the camera (a couple week learning curve), it's a piece of cake.

One other important vote of confidence, I asked Jack if there was any way to damage the unit. He jokingly said, "Just don't drop it". In other words, short of imaging the unfiltered sun the unit is pretty bulletproof against clueless dorks like me. There are safety limits within the camera that will shut off certain functions to protect it. It does take some finesse to keep the camera from tripping into 'safe mode', but when you don't know what you are initially doing, having a 'safe mode' is a good thing. Generally you just scale back on the gain and sensitivity and the camera in a few minutes will sort itself out on its own.

The camera needs to be controlled, either by the manual button, the serial control box or by a computer software application. I elected the latter. I ordered the control box as a "backup" to the software, but it has worked so well I have never used the control box or pushed one of the buttons on the box itself. Later I will go into more detail on the software package.

### **Imaging Modes:**

For terrestrial, lunar or planetary use the camera has a variable shutter system (hence VSS) that allows exposures from 1/12,000th of a second in increasing increments to 1/100<sup>th</sup> and then to "OFF". This gives a huge flexibility for bright targets.

With the shutter off, the CCD chip has a sensitivity control that can be manually set from 2X up to 128X in factors of two, (2X, 4X, 1X etc). When the shutter off and sensitivity is turned on, the unit automatically goes to 2 second integrations. This is enough to see faint stars and even the core of galaxies and clusters.

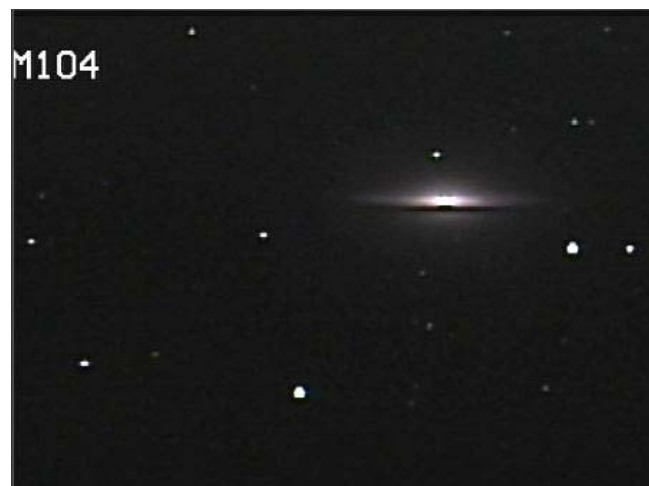
Then there is the "Hyper On" setting. I'm not sure what the circuitry does but I can give you an idea. The first night when I was messing with the camera it was still early spring and M42 was disappearing into the western skyglow. Naturally I selected it as my first target and was "disappointed" with the Mallincam. I could see the Trapezium, and the brighter part of the core, a little bit of the finger, all with a dull red center. This was about the image I remember with a 1 minute exposure with a Meade DSI color unit a friend had. Gee, I wonder what this "Hyper On" setting does? Tick-tock, WOW! OMG! Holy #####! The screen lit up with tendrils reaching everywhere! All you can say is "WOW". It was noisy (3 second exposure on Hyper On), but the signal was strong, just the background sky was noisy. The image was about the equivalent I would get with a Hutech DSLR and a 1600 ISO, three minute exposure with my old LX200 10 inch. And this was three seconds. Then there is "Hyper 2". I don't know what this one does except doubling the exposure time to 6 seconds. It must increase the sensitivity because on bright DSO targets it is 'overkill', easily burning out the core of bright objects like M42 or some galaxies.

Then there is the integration time. "Hyper On" is three seconds and "Hyper 2" is six seconds. The VSS control knob allows you to take the integration time up to a full minute on "Hyper On" and two minute on "Hyper 2". With longer integrations like this you begin to lose the "live sky" feel and proper alignment, tracking and guiding become issues. With my C14/Hyperstar combination integrations over about 30 seconds or a minute are way overkill on most targets. Generally I use integration settings of 10 to 15 seconds on most DSO targets. This preserves the "live sky" feel and gives very respectable images.

The following are some shots done over the last month or so, just screen grabs. I didn't record the exposure times or anything but it is safe to say most are probably well under a minute. The conditions varied as well, cloudy, windy, some were taken with the moon up as well. Most were also taken when using an IDAS light pollution filter and a DVE (Digital Video Enhancer) explained later. Unfortunately I don't have any screen grabs of the Moon, but with the ability to vary the shutter speed and some other settings you can tease out quite a bit of detail there as well.

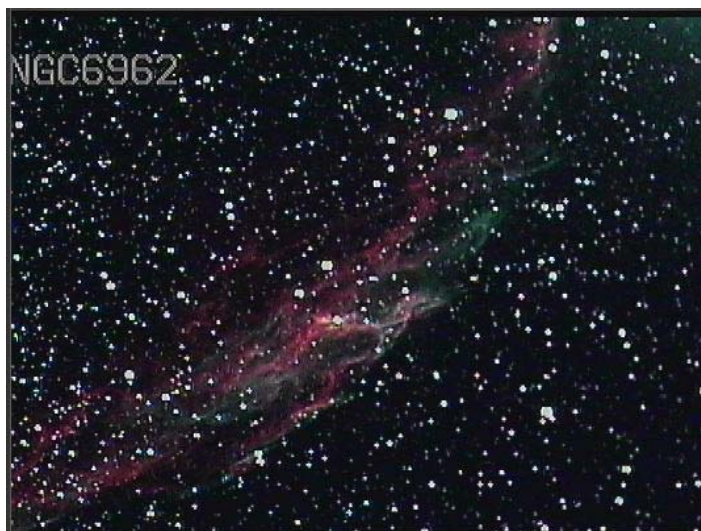
Around here, the dimmest galaxies I can see are about 13<sup>th</sup> magnitude with the C14. With the Mallincam I've found galaxies in the 14-16 range. With the C14 coupled to Starry Nights planetarium and telescope control software I found myself popping galaxies all through the Virgo area that I wouldn't have a prayer of seeing visually or anything short of imaging. You stop by on NGC2903 and "Hey? What's that little guy over there, 14<sup>th</sup> magnitude, maybe he'll be interesting, let's go see". I've been joking with friends about the Mallincam, "So many galaxies, so little time". I'd hit 20 or 30 in a night without cracking a sweat.

Just some general screen grabs.





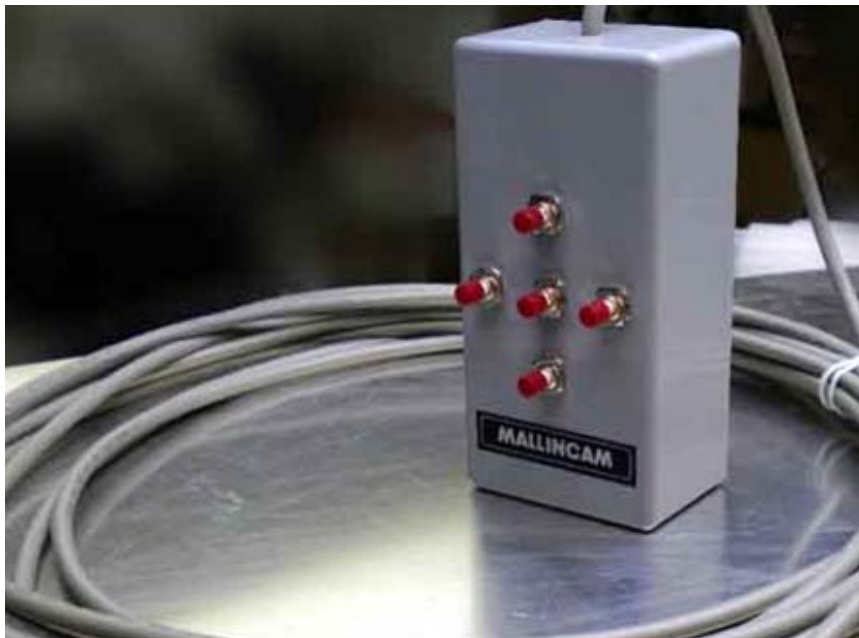






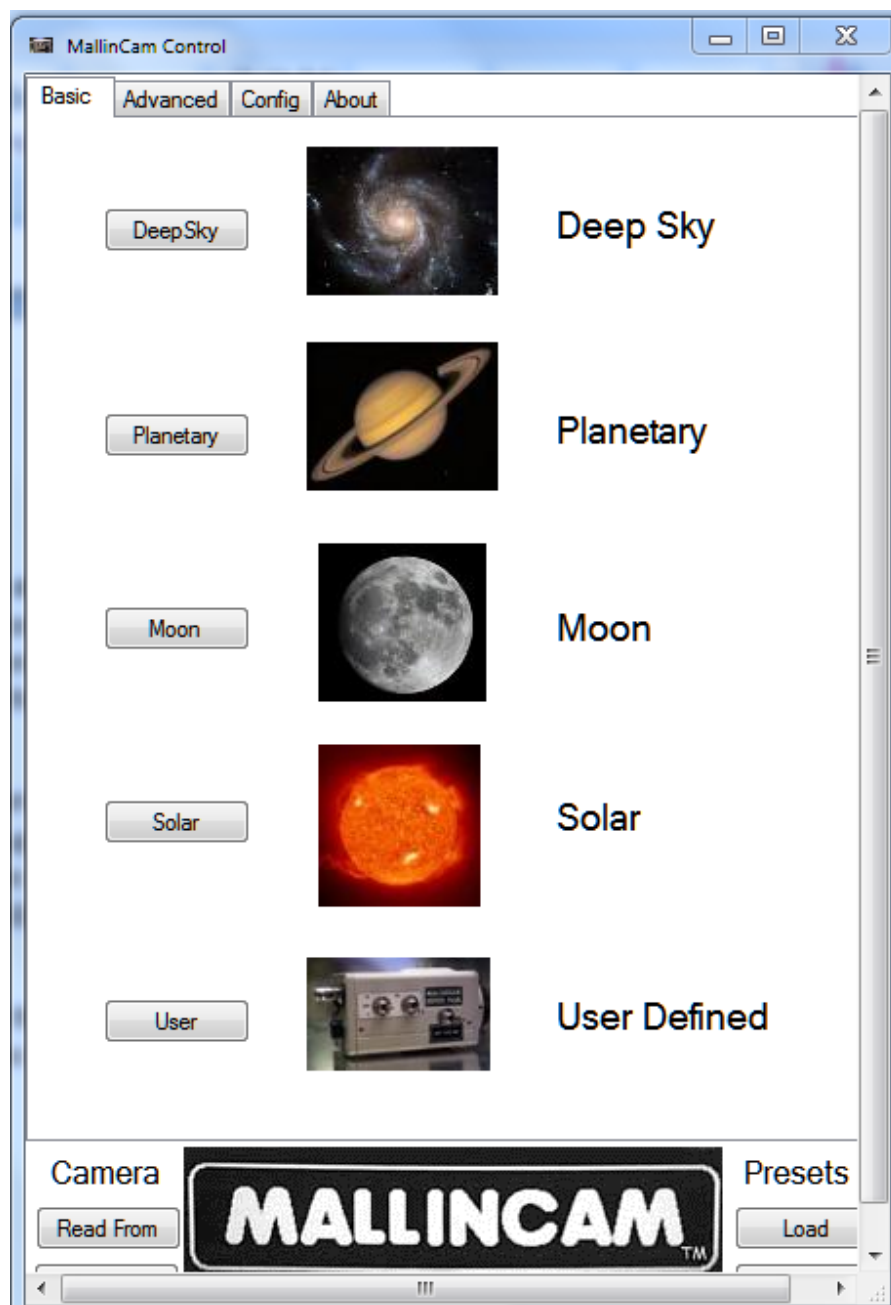
### **Controlling the Camera:**

Basic control uses the menu buttons on the camera itself. There is also an optional control box/cable that can be used, basically it is an extension of the menu buttons. For the VSS it also has the exposure control knob as well. When you enter the standard menu system the menu appears on your monitor. The five buttons are used to navigate around the menu system to change or enter the various settings.

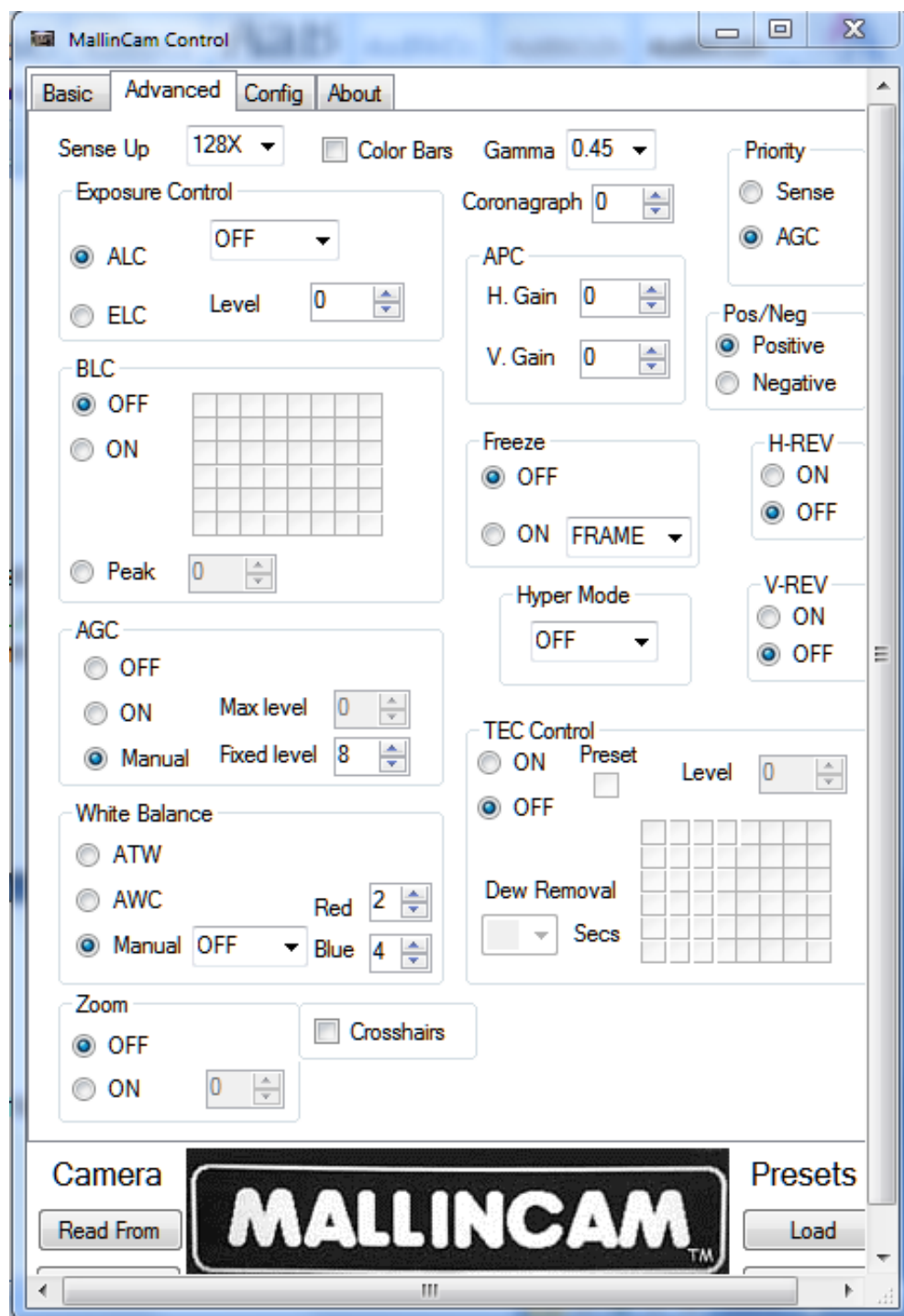


There is also a software package that has been written to control the camera. This came on a CD with the camera but it is also downloadable off the Yahoo users group. A cable will be necessary and this varies depending on what model Mallincam you have. It is a serial cable so if you are using a newer computer without a serial port you will need a USB/Serial adapter (Jack sells any kind of cable that you would need).

The opening screen has a "Basic" settings configuration. Depending on the type of target you are going for, it will adjust the camera for that type of target. No muss, no fuss.



The “Advanced” tab is where you get to play with all the functions. At first it is a little bit of a learning curve, but the proof is in the pudding. “Gee, let’s try this? Opps, worse. Ok, go the other way, better!” About the only caution I would recommend is giving the camera a chance to settle in before trying additional settings. Some take a while (a minute or two) for the camera to stabilize.



I can't cover all the features, (nor do I know them all) but some of the basics:

### **Sense Up:**

This controls the sensitivity of the chip as explained earlier. The dropdown box is used to set the chip sensitivity,

### **Exposure Control:**

This is the shutter setting as explained earlier. The dropdown box is used to set the shutter speed for terrestrial and lunar observing. ELC is not used for regular telescope imaging, it has something to do with lens focus control.

### **BLC :**

This is for back light compensation like a regular camera (dark subject in foreground with bright background). The check boxes allow you to "darken" the areas checked. Some use it to control amp glow at the edges.

### **AGC:**

This is the gain control. It is one of the mysterious areas that will send the unit into "safe mode" if changed too quickly or when Hyper mode is turned on. Basically it takes a few minutes to change, so this is one of those things I leave at the default of "4".

### **White Balance:**

Is just like a regular camera, with an automatic setting, or special setting if looking for IR or if you want to false color the picture.

### **Zoom:**

The camera has a digital 2X zoom capability in eight increments. This is very useful for framing the target.

### **Cross Hairs:**

To the right there is a checkbox for crosshairs. This is useful for aligning, but the lines are thick, blotting out the star underneath. This isn't a major issue as I usually either toggle the crosshairs on or off or just align to a 'corner'.

### **Color Bars:**

On the VSS (as well as the DVE) color bars can be generated for proper hue and contrast on the monitor.

### **Gamma:**

Gamma has two position settings, .45 and 1. Generally for light polluted skies, a setting of 1 works the best, darkening the background.



**APC:**

This controls the amount of enhancement processing the camera does on the image. The higher the values, the more intense the halos around stars but the greater detail in galactic arms. Generally these are off for clusters but set higher for galaxies, the Moon and nebulae.

**Freeze Frame:**

Never used it, but it is self explanatory.

**HREV, VREV, POS/NEG:**

These are used to manipulate the image, to flip it horizontally or vertically or display a negative image to pick out faint detail. These are useful when trying to match pictures or star charts.

**Hyper Mode:**

As explained earlier, this is the switch that kicks in the DSO circuitry. Sense has to be at 128X. There is "Off", "Hyper On" and "Hyper 2". The Hyper modes vary depending on target brightness, sky conditions, integration time, gamma and gain settings and the (optional) DVE setting.

**TEC:**

This stands for "Thermo Electric Cooler" to reduce noise and dark current. The MallinCam has a very unique cooling system on it. The grid allows where you want it to be actively canceling noise on the chip. There are 8 settings that alter the amount of time the noise is sensed. There is also a dew removal option for the chip as well.

The bottom of the Advance tab also has a couple of command buttons that allow you to read from or write to the camera. Basically as you change a setting it is sent to the camera but sometimes there is a question as to whether the camera and application are talking to each other. You can read or write all control settings to the camera with these buttons. A fast way to see if you are communicating with the camera are to turn on either the crosshairs or color bar. These happen pretty much instantaneously.

On the configuration tab there is a reset button, camera selection, and on the newer version of the software, a "night mode" option.

One of the nicer features is a 12 character label field so you can name the targets as shown in my photos above.

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**S-Video and Composite images:**

The basic VSS has both S-Video and composite output. Both are on separate circuits so there is no signal degradation. S-Video is an older technology but uses a separate channel for luminance. Composite output is basically your standard analog TV output. S-Video is supposed

to have a superior image but a lot depends on the monitor or TV being used and the length of the cable run. I haven't noticed much difference with either since one is going to the computer and the other to the 19" TV.

Having the dual output is very nice for outreach as the telescope and camera can be controlled by the computer and the second output can be to a viewing area for spectators.

### **The DVE (Digital Video Enhancer)**

This is another aftermarket product you can order from Jack or Rock. It takes the input signal from the camera (composite or S-Video) and offers six different 'enhancements' as well as a color bar. The settings are Normal, Enhanced 1 and 2, Dark and black and white. This item costs an extra hundred or two, but allows one more layer to manipulate the image. Depending on the target it will tease out additional detail or reduce noise

### **Dark Adapting?**

One of the interesting things with the Mallincam and looking at a monitor/TV is that your dark adaption is pretty much blown. In an urban environment with all the ground lights and sky glow, you can't really dark adapt and if you do, you can't see any detail anyway. With the Mallincam you really don't need dark adapting because the images you are seeing are better than what you could see visually. I've dark adapted in my observatory and still been able to see the inside just from the sky glow coming in from the open shutter.

I've actually found it kind of nice to be able to turn the lighting "up" in the observatory when using the Mallincam. The one thing to be aware of is that since it is so light sensitive in hyper mode stray observatory light sources can affect it. I run a dew shield on the C14 and the cables for the Mallincam run through holes in it. I plugged the extra space with foam so there is no light bleed to the sensor. However when I slew the scope I have to remember to take the camera out of hyper mode or simply going along the black dome wall (if the dome rotation doesn't keep up with the telescope slew) is enough to put the camera in safe mode.

The Mallincam is excellent for outreach events. Most of them are not serious on dark adapting and one Mallincam can service more people than a single eyepiece with it; focusing issues. The crowds can be kept away from the equipment which is another plus.

A star party may be a different situation. I don't mind blowing my own dark adaption to use a Mallincam but I don't want to fry anyone else's. I have red screens for the computer and TV but they kill off enough detail to make the images not pleasing. Some thought are to have a separate light-proof 'viewing tent' or enclose the TV screen in a box with a 'peep-hole' type arrangement, (probably with a disclaimer written above it, "Warning, viewing here will be hazardous to your dark adaption and probably your wallet because you will want a Mallincam).

The real positive advantage of the Mallincam is that you can get better than dark sky "live" views without having to travel 200+ miles to a dark site. For those dark site vacation adventures the Mallincam may not make the trip but it sure is great around urban light pollution.

## **Broadcasting with the Mallincam**

The way my wife got into this and told me to buy a Mallincam is because she started to watch Mallincam broadcasts. Basically what you are seeing on your screen, you can broadcast live and real-time on the internet. Some folks just broadcast whatever they are looking at, some put together actual tours.

The most active site is [NightSkiesNetwork.com](http://NightSkiesNetwork.com)

It is free to use, either to view or to broadcast. To broadcast you have to request a channel and affirm a disclaimer you won't use the sight for something bad. After that you get a named channel to use and a password. You have to have Adobe Flash on your system but that is easy enough as a free install.

If you are a viewer, just go to the web page and look at the channels listed. If they are in red than they are broadcasting. Click on the link and give it a minute or two to get connected. You'll see an image of what the person is broadcasting and a chat line box to communicate to them. If they have voice capability on their end they may be broadcasting voice as well as the image and whatever they type in the chat line box.

As a viewer, about the only trick to know is that whatever you type for your first chat line entry becomes your user name. In other words, you want to type your 'handle' first.

On any given night there are usually a couple of people broadcasting for a while. Since most broadcasters are in North America evening is the best time to look. If you look during the day, don't surprised if you see someone broadcasting solar images or night sky images from the other side of the Earth.

To broadcast your Mallincam images you will need a converter to go from the analog TV signal to digital. These gizmos are pretty easy to find, I'm using a "Dazzle 100" that cost about \$50 bucks. So the camera signal passes through the DVE and into the Dazzle where it is converted to USB input to the computer. You start your channel and select the Dazzle as the input device. It's as easy as that to be broadcasting. There are a couple of other settings to change the resolution and sound, but it's all pretty straight forward. The first night I tried it I thought I would be fighting with software for hours and to my surprise, within 15 minutes I was broadcasting. If you have voice capability (a wireless headset is great) you can communicate with those watching directly by talking and they can communicate with you via a chat line window. You can also use the chat line window as well, but the headset is much easier. There have been nights where I'm had five or six personal friends on plus an equal number of active watchers from around the country or world, plus five or six just silently enjoying the show. It really is a 'virtual' star party. Quite often Jack and Rock are on too. If they aren't broadcasting themselves they are offering suggestions or answering questions on other channels.

If you are thinking of getting a Mallincam, a picture is worth a thousand words. This is one of the few astronomy products where you can actually see how it works 'first hand' through these broadcasts to determine if it is right for you.

Well, I've had the Mallincam for about three months now with no major issues. I like to get to 'know' a product before I write a review. In a way, the Mallincam is kind of a weird product. You're not really doing live viewing at an eyepiece, but at the same time you're not really imaging either with all the stacking and post processing. If you are in an urban environment and want to see DSO's without driving a hundred miles, the Mallincam is the way to go. If you'd like to capture some of what you see but prefer snapshots vs. three hours of tracking, imaging and stacking, the Mallincam may work out for you. The Mallincam is in kind of a "netherworld" between live viewing and imaging but it fills that niche well.

The only real issue I've had over this whole Mallincam thing is that I have to fight my wife for time in *my* observatory now!

**Info on the Mallincam:**

**Rock Mallin's site:**

<http://mallincam.tripod.com/index.html>

**Jack Huerkamp's site:**

<http://www.mallincamusa.com>

**Mallincam Broadcasts:**

<http://www.nightskiesnetwork.com/>

**Yahoo User's group:**

<http://tech.groups.yahoo.com/group/mallincam/>

