PRO DOB II Camera

[Version 2.0]
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[PRO DOB II User Manual]

This document will introduce you to the wonders of the MallinCam PRO DOB II Camera. It will include instructions on how to connect the PRO DOB II to your computer along with explanations of the camera's various settings. Imaging techniques with the various hardware and software options will be covered. The standard Composite Video output will be discussed along with hints and suggestions on how to resolve any problems that you encounter with this camera. Enjoy the adventure with Rock Mallin's PRO DOB II Video camera, which will introduce you to the amazing field of near Real Time video imaging.

Revision History

Version	Date	Revision Description
1.0	6/06/2014	Template Creation and PRO DOB II
2.0	2/25/2016	Updates

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1. Introduction

Welcome to the world imaging with the MallinCam PRO DOB II, a hand-crafted Colour Astronomical Video CCD Cameras with a 1/3 inch 960H EXview HAD II CCD sensor, allowing a choice of a variable shutter with exposures from 1/100000 of a second to 17 seconds. In-camera image averaging of up to 85 seconds are possible when set to 5 frame stacking (NTSC). Included with PRO DOB II is the MallinCam unique 2" C-mount adapter and a 2" MallinCam 0.5X Focal reducer, providing a much wider field of view and allowing the camera to catch the large light cone found on all fast Newtonian/Dobsonians. The MallinCam 2" Focal reducer can be removed allowing a variety of other focal reducers to be attached through the C-mount threads on the front of the camera or the dual 1.25" and 2" filter threads on the end of the C-mount adapter

Your purchase will provide you with years of discovery and adventure as you view, record, share, and broadcast the wonders of the Night Sky. The PRO DOB II captures images that range from brighter Deep Sky Objects to local Solar System favorites, and it does this in near Real Time. You will discover that this camera can be used in urban skies where light pollution normally prevents you from viewing images the sky, to rural locations where you can pull out even those faintest celestial wonders; this camera can do it all.

Custom designed and made by MallinCam from aircraft aluminum and black anodized for durability. The PRO DOB II was designed with a 1/4" thick front mounting plate allowing zero flexure in the system while maintaining perfect focus at all times. A unique "Focus StopGuard" (trademark) will prevent the entire camera from falling inside the focuser, which can cause serious damage to the secondary mirror and primary mirror. The New MALLINCAM PRO DOB II has a smooth and precise 2" diameter camera body that can slide in and out of the focuser to accommodate the precise focus point of the camera without having to modify the mirror mount or cutting truss tubes to bring forward the camera focus point. The rear section of the PRO DOB II has a 2m cable which will provide all connections necessary to control, power and capture the images from the camera.

The PRO DOB II has a BNC video output port (Composite) which can be connected to either a monitor or a computer with video-in capabilities. MallinCam has available all the necessary adapters to allow the PRO DOB II to connect to your equipment. The MallinCam PRO DOB II also has the ability to be controlled from a Windows computer via an optional RS 485 cable assembly.

This manual is in the way the work of the MallinCam PRO DOB II users before me. I have borrowed their ideas and even some of their documents and have placed them in the manual so that we have everything is in one place. Special thanks to Jack Huerkamp for all the preliminary work he has done with this camera.

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

The Contents of the PRO DOB II Package

Depending upon the PRO DOB II Model purchased, the contents may vary, but all PRO DOB II Deluxe cameras include the following standard equipment:

MallinCam PRO DOB II Deluxe Package:

➢ PRO DOB II camera body
➢ C-mount 2" Adapter
➢ 2" Large Format Focal Reducer
➢ 12V car adapter cable
➢ 2m wired remote with (12V DC input, BNC Composite Output, RS485 input)

PRO DOB II Optional Cables:

➢ RS 485 to USB cable assembly
➢ 25 feet Video/Power cable

These attachments will provide you with the ability to connect the PRO DOB II Video camera to your telescope, power it using to a 12V DC power source (a Regulated Power Supply 120 volts to 12 Volts DC 1-Amp Adapter can be used), and displaying your image on any device that accepts analog video via a composite connection. The optional cables will allow you to control the PRO DOB II either through your computer or by the attached remote. See the **Appendix** for a list of other accessories available for the PRO DOB II.

PRO DOB II

PRO DOB II Connections

 C-mount to 2" Adapter with F/R

2" Focal Reducer

The Camera (Just the Facts)

The MallinCam PRO DOB II Camera is a video camera that provides near Real Time images of brighter Deep Sky Objects, Planetary, Lunar, and Solar. This instrument contains the following specifications:

Model	PRO DOB II
Image Sensor	Sony ICX672AKA EXview HAD II plastic ccd
CCD Pixels:	976(H) by 494(V) effective 5.0 um x 7.4 um Pixel size
CCD Size:	1/3"
Video Output Format:	NTSC
Composite Video	BNC Female Connector
Gain Control:	Auto/Manual
Exposure Control:	Auto/Manual
Auto Iris:	AES (Rolling Shutter), ALC
Fix Shutter (seconds)	1/60, 1/100, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000, 1/100000
Extended Shutter (seconds)	1/32s, 1/16s, 1/8), 1/4s, 1/2s, 1s, 2.1s, 4.2s, 8.4s, 17s
Stacking Mode	Up to 85 s
Gamma Selection	0.30 / 0.45 / 0.6 / 1.0
White Balance	-Automatic White Balance Control (ADR) -Auto Trace White Balance Control (ATW)
Digital Zoom	
Communication Protocol	RR485
Operating Temperature	-30°C to 50°C (-4°F to 122°F)
Power Supply	12±1V DC at 1A
Weight	5.0 Ounces (141 grams)

The Camera (its Anatomy)

The PRO DOB II camera is 4.5" with a 2" diameter and weighs in at about 5.0 ounces (141 grams).


StopGuard

2. Making Connections

Connecting the PRO DOB II to the Telescope

The MallinCam PRO DOB II has a smooth and precise 2" diameter camera body that can slide in and out of the focuser to accommodate the precise focus point of the camera without you having to modify the mirror mount.

As each telescope has its own design differences, the following instructions will be a starting point for attaching the PRO DOB II to your focuser. Don't be afraid to make adjustments to match your equipment.
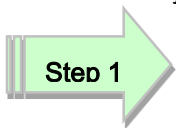
Step 1 Adjust the focuser on your telescope half-way through its travel distance. This will give you some play when trying to achieve focus.
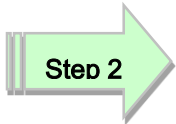
Step 2 Insert the PRO DOB II into the 2" focusers opening, careful not to allow the bottom of the PRO DOB II to hit the Secondary Mirror. The design of the focuser determines the amount of distance in which you are allowed to slide in the camera. Mallincam's "Focus StopGuard" (trademark) will prevent the entire PRO DOB II from falling inside the focuser.
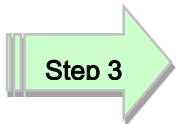
Step 3 Lock the PRO DOB II into place with the tightening screw(s) on your focuser.

When focusing for the first time on a celestial object, you may need to make corrections to the depth at which you have inserted the body of the PRO DOB II. Trial and Error will be your guide until you have determined the location for your setup.

The PRO DOB II Cable Connection Diagram

①   ②

1	Thumb Control
2	BNC Connector
3	12V Power-In (DC)
4	Auto Iris Port (for RS485)

④   ③
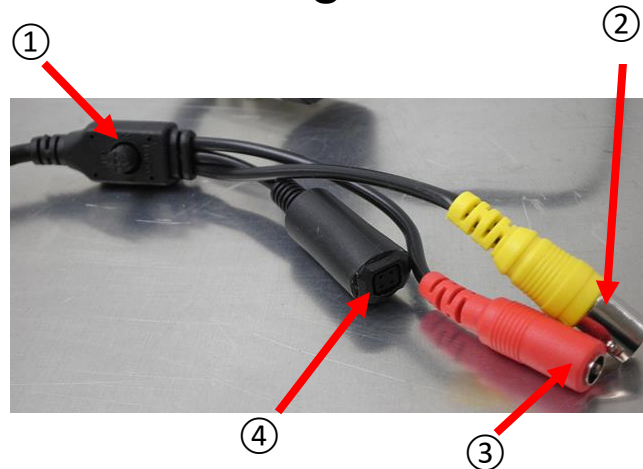
Video Port

The MallinCam PRO DOB II provides a BNC Video Out Ports that allow the video signal to be distributed to Video monitors. This Video Out Port provides standard Composite video out by the BNC connector on the back of the PRO DOB II (② *on the above Connection Diagram*).

Composite

The Composite Signal is obtained by connecting the included MallinCam Video Cable from the back of the PRO DOB II to the Composite Video-In Port on your monitor (*since in most monitors, the Composite Video-In connector is a RCA style, MallinCam can a BNC to RCA adapter to facilitated that connection*).

To connect, just align the two little openings on the BNC cable (*male*) with the two notches on the PRO DOB II's BNC (f*emale*) connector, push and twist so the notches slide into place. This locks the cable to the PRO DOB II.
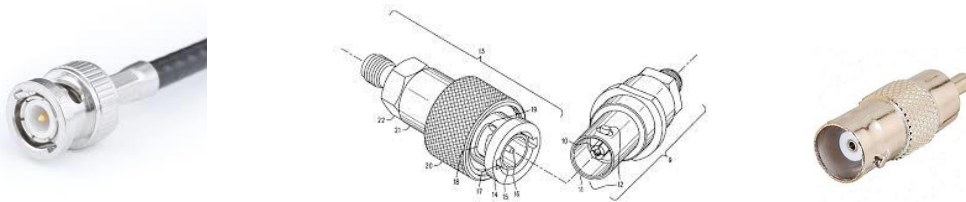
Power

The PRO DOB II requires 12V 1amp power either from an AC to DC converter or 12V DC power supply. Just connect a power adapter into the Power-In Port (Red connector) on the end of the 2m cable on the PRO DOB II Wired.

Connecting the PRO DOB II to your Monitor for Video

Requirements:

> ➢ Monitor with composite input (BNC or RCA input- Port.
> ➢ Video cables.
> ➢ Power for both the PRO DOB II and Monitor.
> ➢ PRO DOB II camera.

To view the image from the PRO DOB II you will need either a computer with Video Input capabilities or a Monitor. We recommend the light weight Mallincam High Resolution LCD 8" monitor for this job as it comes with everything necessary to connect and power the monitor.

Connection

Simply attach one end a composite video cable to the BNC connecter on the end of the PRO DOB II, and the other end of your video cable to one of the yellow RCA inputs on the attached AV cable on the side of the Mallincam Monitor (or **Composite IN** on your monitor).

Power your Monitor and ensure that it has its **Composite Port** as the active video input (usually the **Mode** Selection is set to **Video**).

Remember most monitors also have the ability to adjust the displayed image, so don't be afraid to play with the settings on the monitor to match your personal preference.

Connecting the PRO DOB II to your Computer for Video

Requirements:

- ➢ Computer with video display software such as AMCAP.
- ➢ USB Video capture adapter such as MallinCam MCV.
- ➢ Mallincam dual power/video cable.
- ➢ PRO DOB II AC to DC power adapter.
- ➢ PRO DOB II camera.

Software Requirements:

You will need any software package that can display an image from your video capture device. Some suggestions are:

- AMCAP
- SharpCap
- SplitCam
- ManyCam
- WebCamMax

Each software has its pros and cons, depending upon what you require the software do. Using SplitCam, ManyCam, or WebCamMax will make it easier to broadcast your images on Night Skies Network (see section **Connecting the Night Skies Network (NSN)**) if that will be a direction you are thinking of taking.

Hardware Requirements

- ➢ A **USB Video Capture Device**, such as MallinCam's **MCV.** This device will allow the output from the PRO DOB II (composite) to be captured and displayed by the software (see **Installing the MCV** in Appendix).

Attaching the Video Cable to PRO DOB II

Now you attach the **Composite** cable from the end of the **PRO DOB II's** 2m cable (Yellow BNC) to the USB Video Capture Device (**MCV**) that you are using (see **Appendix D**, **Installing the MCV**) to capture the video signal from the PRO DOB II.

To **USB Port** on **Computer**
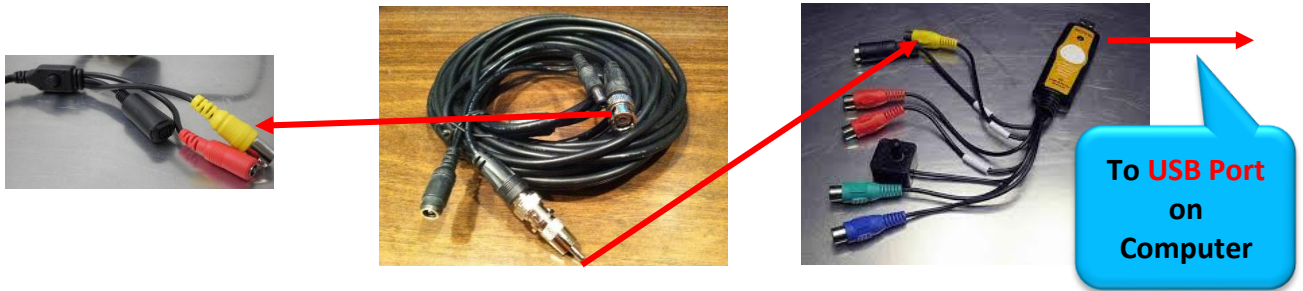
Now all we need to do is start the video display software of your choice to display the image. Remember what ever software choice you made to display the image from the PRO DOB II, it will have an option that allows you to choose the Video Capture Adapter's driver (**x2828** for MCV). Once you chosen the driver, you should now see an image of what the PRO DOB II is capturing.

Checking out the PRO DOB II for the First Time

Now is the time to do a quick check of the PRO DOB II to see if you can obtain a video signal. This walk through assumes you have a monitor with a Composite input capability (*or a Laptop with a Video Capture Device attached and configured along with Video Display Software*). Attach your PRO DOB II to your telescope and keep the lens cover on your telescope and power up your PRO DOB II (start your Video Display Software if using a Computer). It is best to check out your PRO DOB II in the daytime, so you can more easily image an object.

Now depending upon the settings of the PRO DOB II camera, your screen may be very colourful with specks dancing around the screen around the screen. Don't worry this is normal as we have not yet adjusted the settings.

Press and release the **Centre Button** (① *on the* ***Connection Diagram***) on the Remote of the PRO DOB II. If everything is connected and powered correctly, you should see the following image with **EXPOSURE** Highlighted. The screen will still be dancing, and the **Highlighted Exposure symbol** may be blue and the other symbols hard to read, but you will have the PRO DOB II menu system displayed on your screen.

Note: The PRO DOB II Remote can be pressed (Centre Button) or rocked Left or Right, or Up and Down. This corresponds to pressing a UP, Down, Left or Right buttons to control a menu system on a camera.

With the **EXPOSURE** selection highlighted (icon is brighter or blue), press the **Centre button** on the Remote to display the exposure settings. Match the settings on the right by using the **UP** and **DOWN buttons** to move from option to option, and the **LEFT** and **RIGHT buttons** to change it.

The highlighted option will indicate what you can adjust with the arrow keys (buttons). The arrow key choices will appear after the option's current vale. For example: in the last image, the **EXPOSURE** setting says **NORMAL**, and it has a **DOWN** arrow and a **RIGHT** arrow after it. This indicates you can change the **EXPOSURE** settings by either pressing the **CENTRE** button (which indicates there is a sub-menu in that setting that you can access by hitting the **CENTRE button**) or the **RIGHT button** (which changes the value of current feature). For our example on **EXPOSURE** if **NORMAL** was selected then pressing the **RIGHT button** will change its value to **BLC**, but now you will see that there is also a **LEFT** arrow option available to use. This way you can use the **LEFT button** to go back to the **NORMAL** setting or press the **RIGHT button** to go to the next value. If you pressed the **CENTRE button** when **NORMAL** was selected, the second menu will appear, but in this example just giving you the option to **RETURN** to the previous menu.

Now we want to set the **SPEED** to **AUTO** (this is just a simple setting, rather than playing with exposures). The **SPEED** setting is inside the **LENS** setting. Select **LENS** with the **UP** or **DOWN Buttons**, Press the **CENTRE Button** to select it, and you will be presented with the **LENS Menu**. Using the **LEFT** or **RIGHT Buttons**, change the speed to **AUTO** (or if you want to experiment, any other value of your choice that matches your current seeing). When set select the **RETURN** option with the **CENTRE Button** to go back to the **EXPOSURE Menu**.

Using the **DOWN** button, select the **EXIT** option and press the **CENTRE** button to close the **EXPOSURE** settings (the screen will now just have the ICONS). Using the **RIGHT** button, select the **DAY&NIGHT ICON**, and press the **CENTRE** button to accept it. In the **MODE** option select **DAY**. Now move to **EXIT** and press the **CENTRE** button to close the **DAY&NIGHT** screen.

Now, I would remove the Lens Cap from my telescope and go into the **ENHANCE** Menu and match the selections on the image to the left. You may want to experiment with the **GAMMA** value to produce an image that is bright enough for your equipment.

Finally, **EXIT** the **ENHANCE** menu and choose the **EXIT** Icon. Using the buttons, select **SAVE/EXIT** from the **EXIT** menu and press the **CENTRE** button. The camera will now save these settings as the default for the next time you use it. After the camera has saved these settings, it will then close the **ICON Menu**.
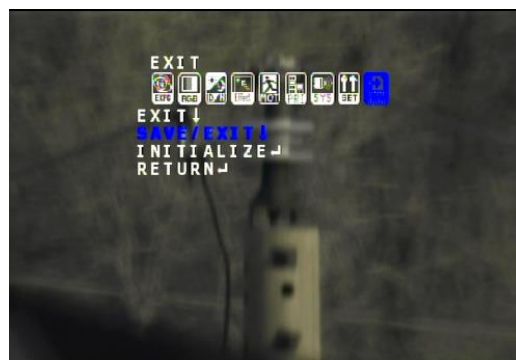
> If you select the EXIT rather than the SAVE/EXIT, the ICON menu will shut down, but the PRO DOB II will reset itself to the last saved settings.

These settings are just a starting point for your observations and you can adjust the settings to match both your equipment and seeing conditions. The next step in your learning should be to read the **OSD MENU** Chapter in this manual to get an understanding what the settings do and how they react to each other. This will save you hours of frustration when you are just adjusting the setting to try to improve your image.

> If you do not press any of the buttons on the PRO DOB II for about 3 minutes, the ICON menu will turn off, and the camera will return to the last SAVED settings.

3. Operating the PRO DOB II

The MallinCam PRO DOB II is an imaging camera whose capabilities are in the hands of the user. As you will discover, when you become more confident with the camera, that your images will be the result of the combination both artistic prowess and scientific skill. Both of these attributes will become enhanced as your journey progresses and suggestions and advice from fellow explorers sharpen your skills and enrich your adventure.

One of the first pieces of advice we can offer you is that every telescope system is different, the variety of optical sizes, and attached accessories combined with the ever changing seeing conditions makes it impossible to determine the precise setting for the PRO DOB II to use with your telescope setup. What we can do is provide suggestions that will get you started in the right direction. We recommend that you experiment and tweak the settings that we offer to see what works best for you. Patience will be your best friend as you learn what the PRO DOB II can do, and what you can adjust. Do not be afraid to visit Night Skies Network or the Mallincam Group on Yahoo and ask questions

Imaging Methods:

The PRO DOB II provides three techniques of exposure control: **Fixed**, **Extended**, and **Stacked**.

Fixed: This technique allows you to set short exposure time from 1/60 of a second to 1/100000 of a second. This method of exposure allows the PRO DOB II to image daytime objects such as the Sun, as well as bright nighttime objects such as the Moon and some planets.

> 1/60, 1/100, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000, 1/100000 of a second

When using **Fixed,** you can either leave the **EXPOSURE** settings in the PRO DOB II in the **NORMAL** exposure mode for daytime objects (or even bright planets), or for objects such the Moon or Sun, set the exposure mode to either **WDR** (for the Moon) or **WLI** (for the Sun). You can also adjust the brightness with the **BRIGHTNESS** control

Extended: This mode allows you to do longer exposures from 1/32 to 17 seconds in fixed steps. This mode allows you to image those fainter planets, along with bright stars. But since the PRO DOB II has no cooling pushing the exposure can introduce noise.

> X2 (1/32s), X4 (1/16s), X8 (1/8s), X16 (1/4s), X32 (1/2s), X64 (1s), X128 (2.1s), X256 (4.2s), X512(8.4s), X1024(17s)

Stacking: This mode allows you perform longer exposures all the way up to 85 seconds. Unlike the **Fixed** or the **Extended** Mode, the PRO DOB II needs to have **AGC** set to **LOW**. You will then have the option of telling the PRO DOB II (by the **3D-DNR** setting) how many images you would like stacked to a maximum of 5. Therefore setting exposure to X1024 or 17 seconds, and when **3D-DNR** is set to 5, we will then see an image with 5x17s or 85 seconds worth of exposure.

Amp Glow and Warm Pixels

When you are using the PRO DOB II in **Extended** or **Stacking** Mode two optical effects will occur due to the way CCD chips are made. The first is called **Amp Glow** and the second are **Warm Pixels**. CCD's operate using the property of silicon to convert light to electrons, but this also operates in reverse, silicon circuits can emit light when operating. At the corner of the CCD array is a high gain amplifier that converts electrons to a voltage that can be measured by the A/D converter. During the exposure this amplifier can emit enough light that it can be seen as a green glow in the corner of the frame in long exposures, this is **Amp Glow**.
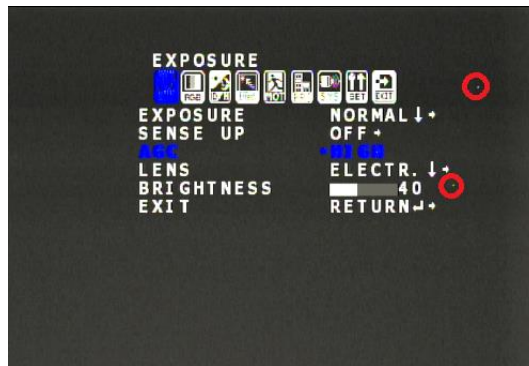
The other effect called **Warm Pixels**, appear as green or purple, or even blue dots on your image (too small to be mistaken for stars). CCD Sensors collect

photons in microscopic wells, called pixels. CCD's do their magic by assigning electric charges to these photons. These charges are read as analog voltages. These voltages are sampled and quantized to make them into digital values. These digital values go through much more digital processing before we get to see them. Leakage currents are electric charges which leak into sensor wells. These excess electric charges increase the voltage at the well (pixel) and make it look brighter than it should.

Manufacturing variations will cause some pixels to have much more leakage current than others specifically as the CCD warms up. Even a few of these few pixels may permanently leak, these pixels are known as **Hot Pixels**, The PRO DOB II has an internal feature (**DPC**) that you can activate that will help eliminate most of the Warm Pixels.

Since this is a property of the physics of the design of the CCD chip, there is no way to stop this from occurring on long exposures. What we can do though is minimize both the amp glow and warm pixel production.

➢ Keep the exposures as short as possible and use a low **AGC** value.

The PRO DOB II has a feature in the **ENHANCE** Menu called **DPC** (**D**ead **P**ixel **C**ancelation) that will electronically try to remove Warm/Hot Pixels when it is activated.

Controlling the PRO DOB II by Hand

You can control the PRO DOB II manually by using the wired remote which allows you to control those menus on the screen, but without actually touching (thus jiggling) the PRO DOB II or the telescope

These instructions will guide you in using the PRO DOB II and obtaining an image using each of the 3 Methods of Imaging. Remember that you may need to adjust your particular settings to obtain the best image. Once you get the hang of changing the settings, it will be worth your time to peruse the Chapter **Understanding the PRO DOB II Settings** to get a deeper comprehension how the adjustments affect your image.

The Moon (Fixed Exposure)
You have the telescope set-up (with it covered) and the PRO DOB II attached to the eyepiece holder, the video cables are attached to a monitor, and power is connected to everything. You are feeling a bit of apprehension and excitement after all you have invested in an amazing scientific tool. So take a deep breath, and let's have some fun.
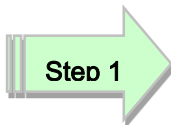
Step 1   With your telescope and PRO DOB II connected and powered up (if you have the PRO DOB II set to **Extended** or **Stacked** as the default, I would initially leave the lens cap on the telescope).

Using your finder scope, point your telescope at the Moon (it's hard to miss).

> The Moon is always the best object to look at when learning how to use a new imaging device.

The recommended starting settings for imaging the Moon are displayed below. The instructions will walk you through setting these values into the PRO DOB II.

EXPOSURE ICON

- ➢ EXPOSURE
  - o **WDR**
  - o WDR MODE: **ON**
  - o WDR LEVEL: start at **10**
- ➢ SENSE UP: **OFF**
- ➢ AGC: **OFF**
- ➢ LENS
  - o **ELECTRIC**
  - o SPEED: start at **1/10000**
- ➢ BRIGHTNESS: start at **40**

COLOR ICON

- ➢ COLOR (RGB): **ATW (auto)**

DAY&NIGHT ICON

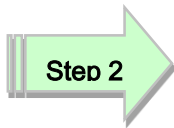- ➢ **NIGHT** for black and white or DAY if you like color

EFFEC ICON

- ➢ SHARPNESS: **20**

ENHANCE ICON

- ➢ GAMMA: **1**
- ➢ 3D-DNR: **0**
- ➢ DPC: **OFF**

So we will adjust the PRO DOB II to match these settings. Remember these settings are just a starting point, you may need to tweak them for your telescope set up.

Step 2 With your Telescope still covered, **Press** the **Centre Button** on the **control** of the **Wired Remote)**. The **< ICON MENU>** screen will appear on your monitors screen.
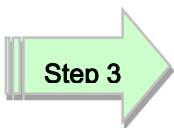
Step 3 With **EXPOSURE ICON** selected, Press the **Centre Button** to display the **EXPOSURE MENU**.
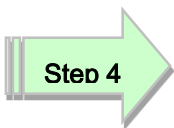
Step 4 With the **EXPOSURE Mode** selected (it may say **NORMAL**), Press the **RIGHT Button** enough times to set it to **WDR.**

Press the **CENTRE Button** to display the **WDR Menu**.

Press the **DOWN Button** to move to **WDR MODE**
> ➢ Press **RIGHT Button** to change its setting to **ON**

Press the **DOWN Button** to move to **WDR LEVEL**
> ➢ Press **LEFT or RIGHT Button** to set to **10**

Press the **DOWN Button** to move to **RETURN**
> ➢ Press **CENTRE Button** to return to **EXPOSURE MENU**

Step 5   Using the **DOWN Button** select **SENSE UP** then using the **LEFT** or **RIGHT Button** ensure its setting is **OFF**

Step 6   Using the **DOWN Button** select **AGC** then using the **LEFT** or **RIGHT Button** ensure its setting is **OFF**

Step 7   From the **EXPOSURE MENU**, use the **DOWN Button** to select **LENS** option then press the **CENTRE Button** to display the **LENS MENU**

Step 8   Using the **RIGHT Button**, select a speed such as **1/10000.** Then move to the **RETURN** selection and press the **CENTRE Button** to return to **EXPOSURE MENU**.

Step 9   Use the **DOWN Button** to select the **BRIGHTNESS** feature and adjust this to your preferences using the **LEFT** or **RIGHT Buttons** (**40** is always a good place to start).

Depending upon your personal preferences we will now adjust the **DAY&NIGHT** Option on the PRO DOB II.

Step 10

While on the **EXPOSURE MENU**, select the **EXIT** choice at the bottom of the menu and press the **CENTRE Button** to close the **EXPOSURE MENU** and Return to the **ICON MENU**.

Step 11

Using the **RIGHT Button**, select the **DAY&NIGHT ICON** and press the **CENTRE Button** to display its menu.

Step 12

With the **MODE** choice selected, use the **RIGHT** or **LEFT Button** to select either **DAY** or **NIGHT** depending upon your preference. Now use the **DOWN Button** to select the **EXIT** choice and press the **CENTRE Button** to RETURN to the **ICON MENU**.

We will now set the sharpness value. I like to start at **10**, but you can adjust this to any value that best suits your system. The **SHARPNESS** feature is located in the **EFFECT ICON** Menu System.

Step 13

Using the **LEFT** or **RIGHT Button**, select the **EFFECT ICON** and press the **CENTRE Button** to display the **EFFECT Menu**. Now using the **DOWN Button,** select the **SHARPNESS** choice and adjust to your preference using the **LEFT** or **RIGHT Buttons**. When satisfied, move to the **EXIT** choice and press the **CENTRE Button** to RETURN to the **ICON MENU**.

We will now ensure that the **GAMMA** is set to **1** (again your choice) and that **3D-DNR** is set to **0** and that **DPC** is **OFF**. All of these features are located in the **ENHANCE ICON MENU**.

Step 14 ➡ Using the **LEFT** or **RIGHT Button**, select the **ENHANCE ICON** and press the **CENTRE Button** to display the **ENHANCE Menu**. Now using the **Button,** set **GAMMA** to **1.0**, **3D-DRN** to **0**, and **DPC** to **OFF**. When satisfied, move to the **EXIT** choice and press the **CENTRE Button** to RETURN to the **ICON MENU**.

You should now have the starting settings to image the Moon. You must save these settings by going to the **EXIT ICON** and choosing **SAVE/EXIT**. The screen will jump a bit while the PRO DOB II saves your settings, then the Menu system will shut down.
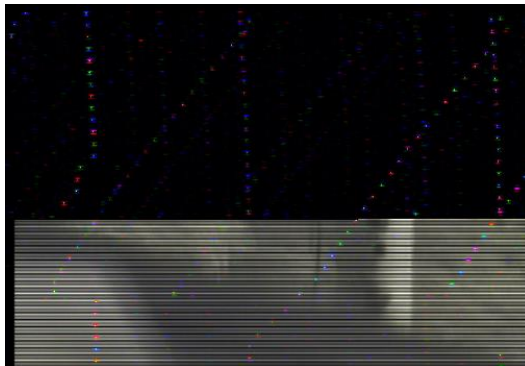
💡 If you do not perform a **SAVE/EXIT** then if the PRO DOB II is left alone for about 3 minutes, the Onscreen Menu will shut down and the camera will revert all of its settings to the last time a **SAVE/EXIT** was performed.

A Bright Star or Bright Deep Sky Object (Extended Exposure)
Now that you have success with imaging the Moon or bright planets, now is the time to jump to the next level, Bright Stars or Bright **D**eep **S**ky **O**bjects.

You have the telescope set-up (with it covered, just in case PRO DOB II was left in the Stacking Mode) and the PRO DOB II attached to the eyepiece holder, the video cables are attached to your monitor, and power is connected to everything. You are feeling a bit more confident with the equipment and using the buttons to select the setting options on the PRO DOB II. Time for some more fun.

The recommended starting settings for imaging bright Deep Sky Objects are displayed below. The instructions will walk you through setting these values into the PRO DOB II.

EXPOSURE ICON
- EXPOSURE
  - **NORMAL**
- SENSE UP: **OFF**
- AGC: **OFF**
- LENS
  - **ELECTRIC**
  - SPEED: **X128** (this is about 2.1 seconds)
- BRIGHTNESS: start at **40**

COLOR ICON
- COLOR (RGB): **ATW (auto)**

DAY&NIGHT ICON
- **DAY**

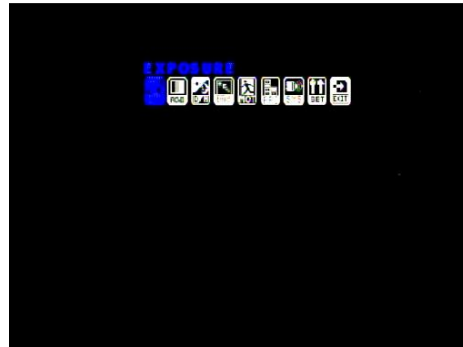**EFFEC ICON**
- SHARPNESS: **20**

ENHANCE ICON
- GAMMA: **1**
- 3D-DNR: **0**
- DPC: **OFF**

So we will adjust the PRO DOB II to match these settings. Remember these settings are just a starting point, you may need to tweak them for your telescope set up.

Step 1 — **Press** the **Centre Button** on the **control** of the **Wired Remote)**. The **< ICON MENU>** screen will appear on your monitors screen.

Step 2 — With **EXPOSURE ICON** selected, Press the **Centre Button** to display the **EXPOSURE MENU**.

Step 3 — With the **EXPOSURE Mode** selected, Press the **RIGHT Button** enough times to set it to **NORMAL.**

Step 4 — Using the **DOWN Button** select **SENSE UP** then using the **LEFT** or **RIGHT Button** ensure its setting is **OFF**

Step 5 — Using the **DOWN Button** select **AGC** then using the **LEFT** or **RIGHT Button** ensure its setting is **OFF**

Step 6　From the **EXPOSURE MENU**, use the **DOWN Button** to select **LENS** option then press the **CENTRE Button** to display the **LENS MENU**

Step 7　Using the **RIGHT Button**, select the speed value **x128.** Then move to the **RETURN** selection and press the **CENTRE Button** to return to **EXPOSURE MENU**.

Step 8　Use the **DOWN Button** to select the **BRIGHTNESS** feature and adjust this to your preferences using the **LEFT** or **RIGHT Buttons** (**40** is always a good place to start).

Step 9　While on the **EXPOSURE MENU**, select the **EXIT** choice at the bottom of the menu and press the **CENTRE Button** to close the **EXPOSURE MENU** and Return to the **ICON MENU**.

Step 10　Using the **RIGHT Button**, select the **DAY&NIGHT ICON** and press the **CENTRE Button** to display its menu.

Step 11　With the **MODE** choice selected, use the **RIGHT** or **LEFT Button** to select either **DAY**. Now use the **DOWN Button** to select the **EXIT** choice and press the **CENTRE Button** to RETURN to the **ICON MENU**.

We will now set the sharpness value. I like to start at **10**, but you can adjust this to any value that best suits your system. The **SHARPNESS** feature is located in the **EFFECT ICON** Menu System.

Step 12 Using the **LEFT** or **RIGHT Button**, select the **EFFECT ICON** and press the **CENTRE Button** to display the **EFFECT Menu**. Now using the **DOWN Button,** select the **SHARPNESS** choice and adjust to your preference using the **LEFT** or **RIGHT Buttons**. When satisfied, move to the **EXIT** choice and press the **CENTRE Button** to RETURN to the **ICON MENU**.

We will now ensure that the **GAMMA** is set to **1** (again your choice) and that **3D-DNR** is set to **0** and that **DPC** is **OFF**. All of these features are located in the **ENHANCE ICON MENU**.

Step 14 Using the **LEFT** or **RIGHT Button**, select the **ENHANCE ICON** and press the **CENTRE Button** to display the **ENHANCE Menu**. Now using the **Button,** set **GAMMA** to **1.0**, **3D-DRN** to **0**, and **DPC** to **OFF**. When satisfied, move to the **EXIT** choice and press the **CENTRE Button** to RETURN to the **ICON MENU**.

You should now have some starting settings to image your bright Deep Sky Object. You must save these settings by going to the **EXIT ICON** and choosing **SAVE/EXIT**.

The screen will jump a bit while the PRO DOB II saves your settings, then the Menu system will shut down.
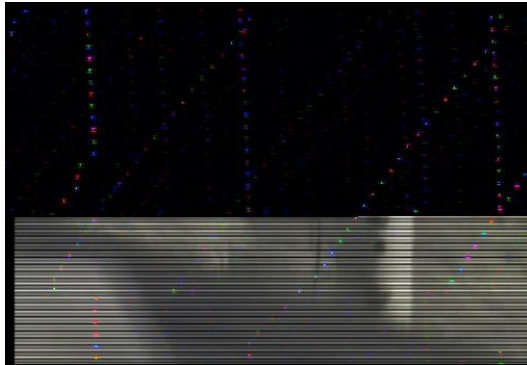
> If you do not perform a **SAVE/EXIT** then if the PRO DOB II is left alone for about 3 minutes, the Onscreen Menu will shut down and the camera will revert all of its settings to the last time a **SAVE/EXIT** was performed.

Deep Sky Objects (Stacking Method)
You have pushed the PRO DOB II to 2.1 seconds or even higher seconds, but now you need to take the plunge and push the PRO DOB II to the edge. We do this by having the camera internally stack the images before displaying them. It is possible to stack five 17 second images to perform an equivalent of 85 second exposure. We will walk through just stacking three 8.4 second exposures.

You have the telescope set-up and the PRO DOB II attached to the eyepiece holder, the video cables are attached to your monitor, and power is connected to everything. You are feeling very confident with the equipment and using the buttons to select the setting options on the PRO DOB II. Time for some more fun.

The recommended starting settings for imaging dim Deep Sky Objects are displayed below. The instructions will walk you through setting these values into the PRO DOB II.

EXPOSURE ICON
 ➢ EXPOSURE
   o **NORMAL**
 ➢ SENSE UP: **OFF**
 ➢ AGC: **LOW**
 ➢ LENS
   o **ELECTRIC**
   o SPEED: **X512** (this is about 8.4 seconds)
 ➢ BRIGHTNESS: start at **40**

COLOR ICON
 ➢ COLOR (RGB): **ATW (auto)**

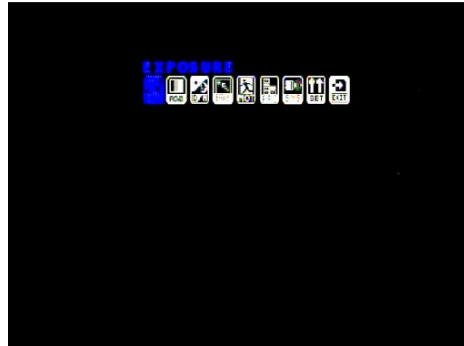**DAY&NIGHT ICON**
 ➢ **DAY**

EFFEC ICON
 ➢ SHARPNESS: **20**

ENHANCE ICON
 ➢ GAMMA: **1**
 ➢ 3D-DNR: **3**
 ➢ DPC: **AUTO**

So we will adjust the PRO DOB II to match these settings. Remember these settings are just a starting point, you may need to tweak them for your telescope set up.

Step 1   **Press** the **Centre Button** on the **control** of the **Wired Remote)**. The **< ICON MENU>** screen will appear on your monitors screen.
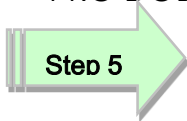
Step 2   With **EXPOSURE ICON** selected, Press the **Centre Button** to display the **EXPOSURE MENU**.
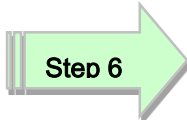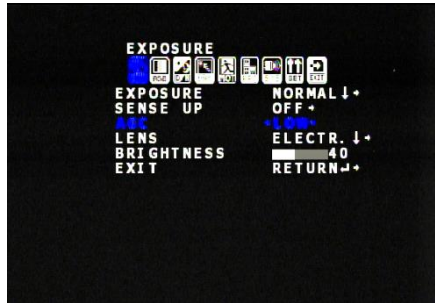
Step 3   With the **EXPOSURE Mode** selected, Press the **RIGHT Button** enough times to set it to **NORMAL.**

Step 4   Using the **DOWN Button** select **SENSE UP** then using the **LEFT** or **RIGHT Button** ensure its setting is **OFF**
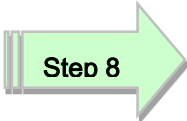
Step 5 Using the **DOWN Button** select **AGC** then using the **LEFT** or **RIGHT Button** set its value to **LOW** (this is required for stacking).

Step 6 From the **EXPOSURE MENU**, use the **DOWN Button** to select **LENS** option then press the **CENTRE Button** to display the **LENS MENU**

Step 7 Using the **RIGHT Button**, select the speed value **x512.** Then move to the **RETURN** selection and press the **CENTRE Button** to return to **EXPOSURE MENU**.

Step 8 Use the **DOWN Button** to select the **BRIGHTNESS** feature and adjust this to your preferences using the **LEFT** or **RIGHT Buttons** (**40** is always a good place to start).

Step 9 While on the **EXPOSURE MENU**, select the **EXIT** choice at the bottom of the menu and press the **CENTRE Button** to close the **EXPOSURE MENU** and Return to the **ICON MENU**.

Step 10 Using the **RIGHT Button**, select the **DAY&NIGHT ICON** and press the **CENTRE Button** to display its menu.

> **Step 11** With the **MODE** choice selected, use the **RIGHT** or **LEFT Button** to select either **DAY**. Now use the **DOWN Button** to select the **EXIT** choice and press the **CENTRE Button** to RETURN to the **ICON MENU**.

We will now set the sharpness value. I like to start at **10**, but you can adjust this to any value that best suits your system. The **SHARPNESS** feature is located in the **EFFECT ICON** Menu System.

> **Step 12** Using the **LEFT** or **RIGHT Button**, select the **EFFECT ICON** and press the **CENTRE Button** to display the **EFFECT Menu**. Now using the **DOWN Button,** select the **SHARPNESS** choice and adjust to your preference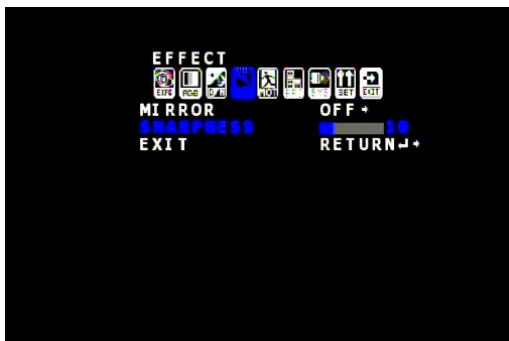 using the **LEFT** or **RIGHT Buttons**. When satisfied, move to the **EXIT** choice and press the **CENTRE Button** to RETURN to the **ICON MENU**.

We will now ensure that the **GAMMA** is set to **1** (again your choice) and that **3D-DNR** is set to **3** (to stack 3 images) and that **DPC** is **OFF**. All of these features are located in the **ENHANCE ICON MENU**.

> **Step 14** Using the **LEFT** or **RIGHT Button**, select the **ENHANCE ICON** and press the **CENTRE Button** to display the **ENHANCE Menu**. Now using the **Button,** set **GAMMA** to **1.0**, **3D-DRN** to **3**, and **DPC** to **OFF.** When satisfied, move to the **EXIT** choice and press the **CENTRE Button** to RETURN to the **ICON MENU**.

You should now have some starting settings to image your dim Deep Sky Object. You will see noise in your image if you start pushing the PRO DOB II too much. Play with your settings to provide the best image possible.

You must save these settings by going to the **EXIT ICON** and choosing **SAVE/EXIT**.

The screen will jump a bit while the PRO DOB II saves your settings, then the Menu system will shut down.
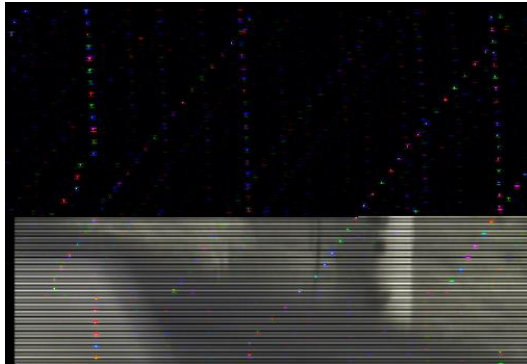
If you do not perform a **SAVE/EXIT** then if the PRO DOB II is left alone for about 3 minutes, the Onscreen Menu will shut down and the camera will revert all of its settings to the last time a **SAVE/EXIT** was performed.

Controlling PRO DOB II by Computer

Requirements:

> ➢ Computer with video display software such as AMCAP.
> ➢ Software to Control PRO DOB II such as Stephane Lalonde's MControlMicro software.
> ➢ USB Video capture adapter such as MallinCam MCV.
> ➢ Mallincam PRO DOB II to USB cable.
> ➢ Mallincam dual power/video cable.
> ➢ PRO DOB II AC to DC power adapter.
> ➢ PRO DOB II camera.

Harware Requirements

A **USB to RS232 Adapter** that attaches to **MallinCam's Optional PRO DOB II cable**. This combination allows software to communicate from the computer to the PRO DOB II.

Software Requirements:

The current software packages are:

Free:

> ➢ MallinCam Control PRO DOB II (or Micro-EX) by Stephan Lalonde that allows you to access the back buttons from the camera, but through software.

Paid:
> ➢ Astrolive by Kyle Goodwin at Astro Precision

Each software has its pros and cons, depending upon what you require the software do, but since most will use Stephane's Control Software, I will demonstrate how to install it and use this piece of software.

Attaching the RS485 Cable

Once the USB adapter is installed and the drivers loaded (see **Appendix D**, **Installing RS485 Communications**) and the MallinCam RS485 cable is attached, it is time to connect it to the PRO DOB II. Locate the small guide notch on both the cable and the AUTO-IRIS Port on the PRO DOB II. Align the notches and plug in the RS485 cable. The fit will be snug so a little pressure will be required to properly seat the cable into the PRO DOB II.

Using MControlMicro Software to control the PRO DOB II

This assumes you have connected the PRO DOB II to your Serial or USB to Serial port on your computer (and you know the **COMM** number assigned to it) and are ready to control the PRO DOB II from the computer rather than the buttons on the back of the PRO DOB II. You have set the **COMM ID** (from the **SYSTEM** Menu on the PRO DOB II) to **1** as the default.

Installing

Visit www.Mallincam.net and select Stephane Lalonde's Mallincam Control software for PRO DOB II (or for Micro-EX) from the Software Downloads of the Support Tab and download the software.

> This is a RAR fie, so you will need some free software that will un-compress the files. A great free piece of software is WinRAR.

Decompress Stephane's software using your RAR software of choice. You will now have a file folder named **mcontrolmicro**. Inside this folder is **MControlMicro**, the software to control the PRO DOB II. Place this folder in a location that is easy to find.

Starting PRO DOB II Software
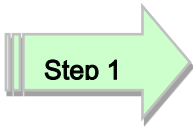
| Step 1 | **Double Click** on the file **MControlMicro** |

Accept any security warnings that may appear in your operating system.

The Stephane's software will open up a window on the computer screen.

You need to prepare the PRO DOB II so that it can be controlled by Stephane's software. **Ensure** that in the COMM ID is set to 1, BAUDRATE is set to 9600 and then DO A **SAVE/EXIT** to make this the default.
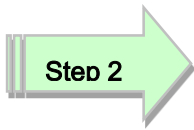
Step 2   On Stephane's software select the **COM** port number so that it matches the Serial Adapter **COM** number assigned by the computer.
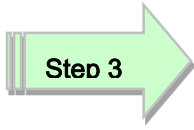
Step 3   Click on **Connect** to start the Software Controlling the PRO DOB II

You can now click on the software buttons and the PRO DOB II will react as if you press on the buttons at the back of the Camera

Note: If you click on the Picture of the PRO DOB II camera, the software will pop-up a color scheme for you to use.
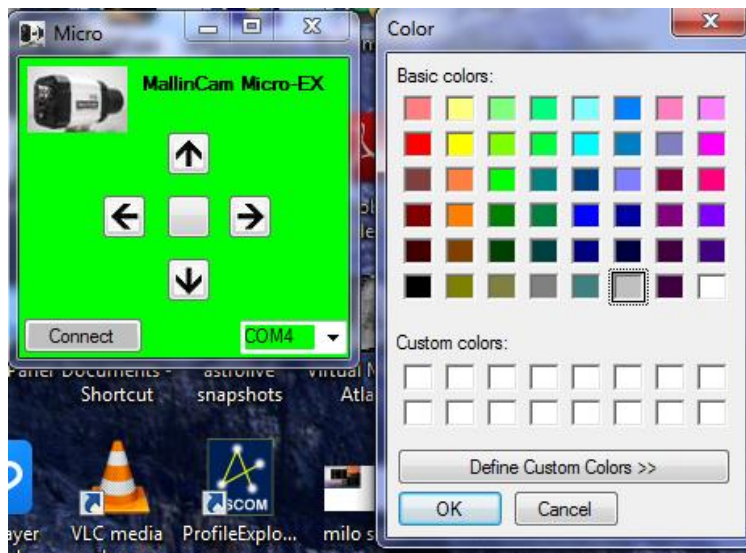
Connecting to Night Skies Network (NSN)

Introduction

I found that when I first started connecting to NSN, things started happening too fast for me to keep track of everything at once. So, pre-planning was the most 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 NSN, feel free to follow them and/or made modification as you deem as necessary.

Note Computer real-estate will be your nemesis. So, depending upon the size of the monitor (laptop), then number of screens that you are using, then number of software programs that using are simultaneously are using, will dictate how you will manage your windows. I will describe how I have organized my windows under a variety of situations (1 computer, 1 computer with 2 monitors, which software packages am I using, and what am I trying to do this session). Remember, it's all about having fun, and *time* and *patience* are your best friends (not to mention all the guys and gals, and the Yahoo – MallinCam site :

http://tech.groups.yahoo.com/group/mallincam/messages

One of the most important decisions you will need to make with broadcasting the image of the PRO DOB II is what Video capture software are you going to use. Some simple suggestions:

You can have NSN grab the image directly off your Video Capture Device (MCV), but I find it more convenient to either use a Video Capture Software such as AMCAP, or SMARTCAP to display my image and then capture my screen by using Splitcam, Manycam, or WebCamMax. Even better Splitcam, Manycam, or WebCamMax can both display and pass along the image to NSN without the need of a Video Capture Software. All three 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 (I can live with the Advertisements, but it has some amazing extras such as the ability to change Video Input from Svideo to composite, a must if you use MallinCam's MCV device with a variety of cameras.

Step 1 **Plug in the PRO DOB II camera into a USB Port (MCV) on your computer.**

Note Always use the same port for your connected devices. I even mark on my laptop which USB port is for which device. I even use a specific **USB** port for my Video input devices (*MCV, PRO DOB II, Dazzle*), and a specific port for by *RS232*, *RS485* devices. For example, if you only have 2 ports, then 1 port is for video input (*MCV*), and the other port is for *RS485* control.

Step 2

Start Manycam/Splitcam/WebcamMax

Note

Size the Manycam/Splitcam/WebcamMax window so that you will have room for your Browser to open. If you have a dual monitor system you can slide Manycam/Splitcam/WebcamMax window to the second monitor.

Step 3

Have Manycam/ Splitcam/WebcamMax Choose your Video Driver as the Source

Note

Once connected, you should have the image of what the PRO DOB II is looking at inside the Window of the software. If you are using a third party Video Display Software, then have Manycam / Splitcam / WebcamMax choose Desktop Capture as the source.
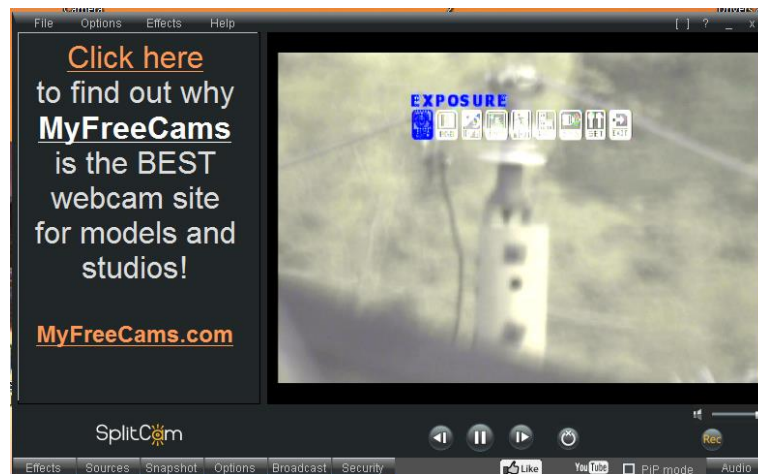
Step 4

Adjust the Resolution and frames/second (fps) value on Manycam/Splitcam/WebcamMax

Note

This will be trial and error; it all depends upon resolution, bandwidth, and what over members on NSN experience from your broadcasted image. You will end up adjusting both on the Manycam / Splitcam /WebcamMax side as well and on the NSN side to get the best image. For me I start at 800x600 and NSN at 800x600.

Step 5

Start your Web Browser of Choice

You may have to play with a number of Browsers to see which one works well with your particular computer setup. I have had success with 3 browsers: *Chrome*, *Internet Explorer*, and *Maxthon*. My current favourite browser to use for NSN broadcast is *Chrome*.

Step 6

Log into Night Skies Network (NSN)

Have your Web Brower go to the location: http://www.nightskiesnetwork.ca
Locate and click on the *Login* button on the top of the Welcome to NIGHT SKIES
NETWORK screen.

The *Login* screen will pop-up and you will be asked to enter your *username* and
password. Enter them and **Click** on **Login Button** to accept.

You will be presented with the **Night Skies Network Channel Lineup Screen**.
Click on the **Login Button** located at the **top right side** of the screen to activate
the **Channel Sign-In Screen**.

You will be presented with the *Channel Broadcast Sign-In* screen for NSN.
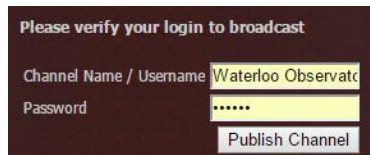
Again enter your *Username* and *Password* and **Click** on *Publish Channel* button.

Step 9
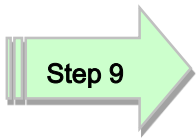
Allow Adobe Flash to use your Video Adapters

The *Adobe Flash Player Settings* window will pop up on your screen asking you for permission to use your camera and your microphone. Select *Allow*.

Step 10
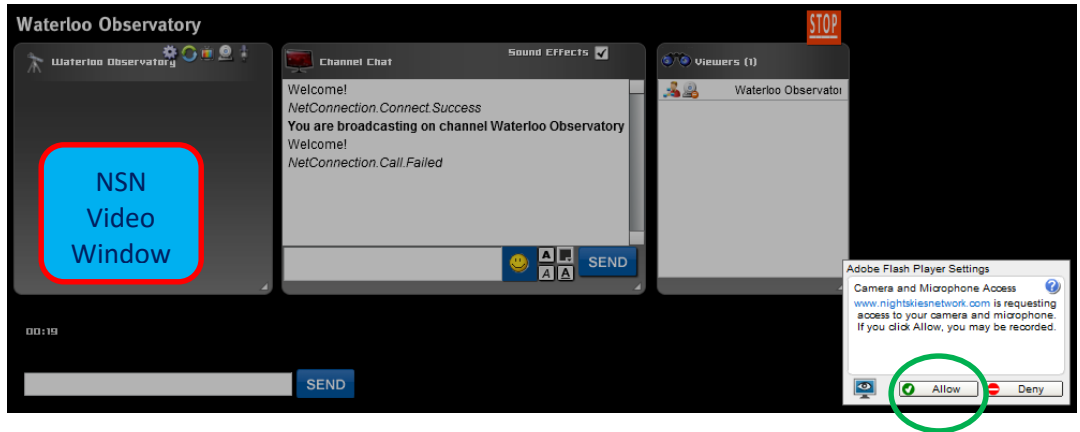
Turn off your Microphone

Until you have your microphone figured out, it is best to initially turn it off. If you do not, the viewers on NSN may hear an extremely loud buzzing (feedback noise). Later on we will look at using the microphone, but until then I recommend *CLICKING* on the little *microphone symbol* on the upper right corner of the NSN video display window to disable the microphone.

Step 11

Set a message for the NSN observers

It is a good idea to display a message above the NSN display window, so that the other NSN views understand what you are doing. When initially setting up (which usually takes longer when you are learning), I usually type the message "*Setting Up the Camera*" then *CLICK* on the *SEND* button to have it displayed.

Note

When you are up and running and everything is working as it should, you will change the message to indicate, what telescope, mount, and camera you are using. For that is the most frequently asked question from the NSN viewers.

Step 12   *Select the Camera*

Now is the time to activate the camera, or in our case have NSN driver point to our Manycam/Splitcam/Webcam Max output.

➢ *RIGHT CLICK* inside the NSN Video window to bring up a *Settings Window*
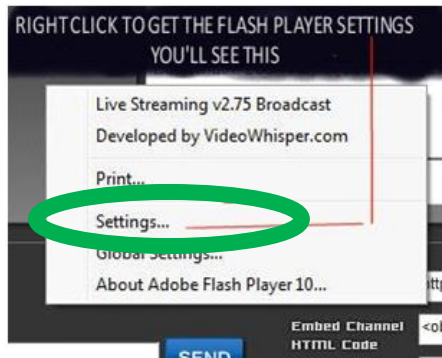
➢ *CLICK* on the *Settings* choice and you will be presented with the *Adobe Flash Player Settings Window.*
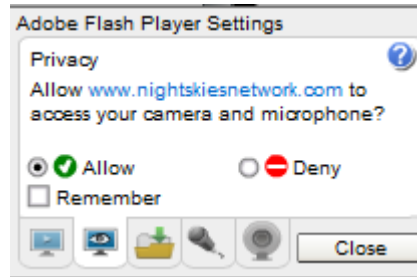
➢ *CLICK* on the *Camera Icon* and you will be presented with a *pull down menu* to select your camera.

➢ *CLICK* on the *Pull Down* list to select your camera of choice.
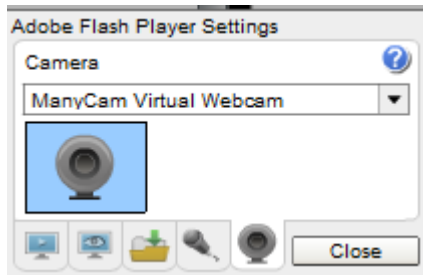
➤ *CLICK* on *CLOSE* to Continue.

NSN will remember what camera you chose from the last visit. So usually you only have to go through this process whenever you want to change what camera device you would like the *NSN flash driver* to use.

Step 13 *Choose your Camera Settings*

We will now select the settings for our camera. We have the option of changing: The *Bandwidth*, *Picture*, *Resolution*, *Framerate*, and even the *microphone rate* (when you are ready). The changes will **not be activated** until you *CLICK* on the Green *OK* symbol in the window.

➤ *LEFT CLICK* inside the NSN video Window to bring up the *Camera Settings Window*.
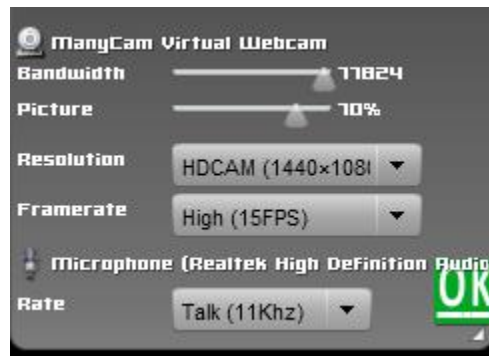
➤ *Use the sliders* for *Band Width* and *Picture* values. I usually have both of my sliders way on the right. Over time you will find the sweet spot for your system.

➤ Select your *Resolution* from the *Pull Down Menu*. Select a starting value of *(640 x 480*) for the system. Again, play with these to see what settings the NSN viewers say is the best.

➤ Select your *Frame Rate*. From its *Pull Down Menu*. I usually leave it at 15 fps, but I have used 30 fps at times. Again trial and error for your system.

➤ *CLICK* on the green *OK* symbol to accept these settings.

That's it, you are done. If everything is working well and the Window's gods are in a good mood, you should be broadcasting whatever object the XTERMINATOR is capturing. You should now enter another Message and **SEND** it out to indicate what system you are using and what object you are viewing.

Note

There is a time delay on what you say (if you have your microphone activated) and do on your computer as compared to what others see (and hear) on the NSN broadcast.

Note

You will freeze (and I don't mean like what Chris does when he broadcasts in winter till 3am), I mean from time to time your NSN connection will freeze for no apparent reason. It happens to us all. When this happens, you can simply terminate the Web browser program (Ctrl –Alt-Del). Then restart your browser and Log back into NSN. This usual is a very quick process. But, sometime we all have to restart our computer (this takes longer for we need to power down hardware and software) and reactivate everything before login back in. Don't worry, the NSN viewers sense what is happening and will keep the conversations going while waiting for you to come back on.

Don't be afraid to ask for advice by typing in on the Video chat window, as we are all learning and are willing to assist whenever we can.

When ready, try activating the microphone (click on the microphone symbol). Other will let you know if they can hear you, or if there is noise. Remember there are settings for the microphone in the **Camera Settings Window** (Right-Click on **NSN Video Window**).

I have become hooked on *Splitcam*. With my dual monitor system, I have Splitcam grab my Video device (*USB 2828x Device*) directly. Splitcam can adjust brightness, contrast, etc. I can also call up the *USB 2828x Device* control panel (located in *File/Video settings*) which gives you some more control of the MCV's image output by again allowing you to change the brightness contrast, sharpness over and above what the Miloslick software does. Since I place Splitcam on its own monitor (the second monitor), I can make it full screen to see all the detail, while my fist monitor has the NSN connection screen with its preview and chat windows.
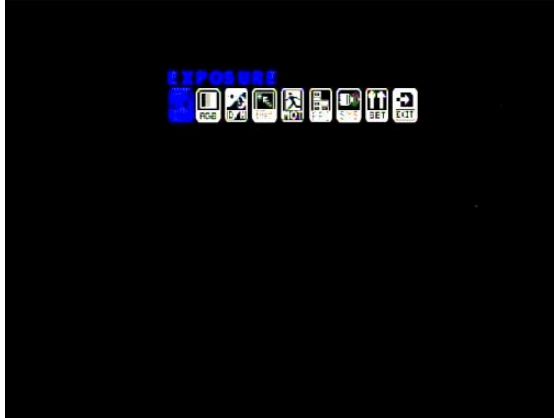
Note

When you are finished with your session, you simply say your good nights to the crowd of NSN viewers to let them know that your session is ending. *CLICK* on the red *STOP* button on your NSN Window and NSN will shut down your channel and you can power down your system and call it an evening (It won't force the NSN viewers off the channel and some viewers will continue chatting long after you have gone to bed).

4.   Appendix

Appendix A – On Screen Display (OSD) Menu

MENU This is the main menu for the PRO DOB II. It is from here that you select which setting you would like to adjust. Menu selections include: EXPOSURE, COLOR, DAY&NIGHT, EFFECT, MOTION, PRIVACY, ENHANCE, SYSTEM, and EXIT	
EXPOSURE MAIN This setting is used to adjust all aspects of the exposure. Settings include: EXPOSURE TYPE, SENSE UP, AGC, LENS, and BRIGHTNESS. It is in this Menu that you will make most of your changes.	
EXPOSURE This control offers you 4 exposure modes: NORMAL, BLC, WDR, and HLI.	**NORMAL** You will use this mode for most of your viewing. It doesn't provide you any options to make adjustments.

BLC (Black Light Compensation)

This Exposure Mode is usually not used in astronomical imaging. BLC does offer the user adjustment Mode settings of 0, 1, 2, and 4.

WDR (White Dynamic Range)

This mode provides you with an opportunity enhance objects with large dynamic range such as the Moon.

When the WDR MODE is set to AUTO you can manually adjust the WDR LEVEL to bring out the best of the displayed image.

When WDR is set to ON, the PRO DOB II fixes the value.

HLI (Highlight)

This mode is ideal for viewing the Sun. You can adjust the HLI LEVEL (from 0 to 40) to produce a chronograph that will obscure the Solar Disk, and thus enhance any visible prominences.

SENSE UP
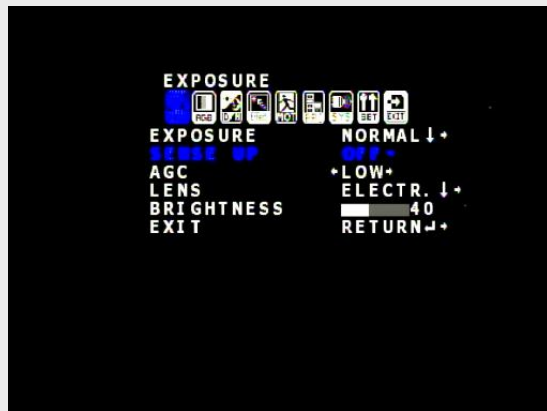
This Setting allows you to adjust the exposure of the PRO DOB II (to a maximum of 17 seconds) by utilizing the HIGH value of the AGC setting. This setting is not recommended for astronomical viewing since it will produce an intense amp glow. The camera provides an alternate setting (**LENS**) to adjust the exposure with minimal amp glow.

Set SENSE UP to OFF

X2 = 1/32 second exposure

X4 = 1/16 second exposure

X8 = 1/8 second exposure

X16 = 1/4 second exposure

X32 = 1/2 second exposure

X64 = 1 second exposure

X128 = 2.1second exposure

X256 = 4.2 second exposure

X512 = 8.4 second exposure

X1024 = 17 second exposure

AGC

AGC or Auto Gain Control instructs the PRO DOB II how much amplifier gain you would like to apply to the signal coming out of the CCD chip (it is equivalent to cranking up the ISO setting on your photographic camera.

AGC has 4 settings:

- OFF
- LOW
- MEDIUM
- HIGH

For Normal viewing of objects set AGC to OFF.

If you need to have the PRO DOB II perform on camera stacking (3D-DNR) then set AGC to LOW

When AGC is set to HIGH, you may notice back ground noise as well as warm pixels showing up.

LENS

EXPOSURE

EXPOSURE   NORMAL ↓→
SENSE UP   OFF →
AGC   →LOW→
LENS   ELECTR. 1→
BRIGHTNESS   ▮▮▮   40
EXIT   RETURN↵→
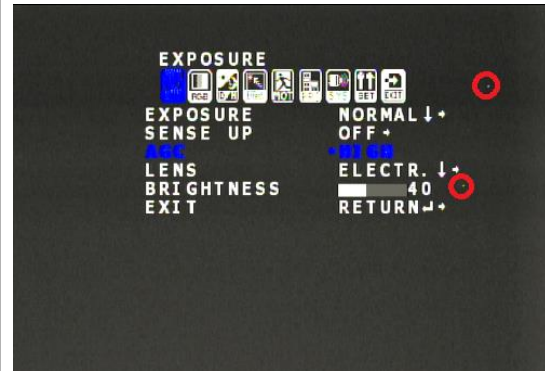
LENS option provides a way of setting **SPEED** values (exposure times) on the PRO DOB II.

It provides two options:

- **Electric**
- **DC Iris**

Since Rock has converted the **Auto Iris Port** to a **RS485 Port,** you will never you're the **DC Iris** setting.

The **ELECTR**IC setting will allow you to adjust your exposure time.

The **ELECTRIC** setting Menu will provide access to the **SPEED** (exposure) settings for the PRO DOB II.

LENS

SPEED   →AUTO→
RETURN↵
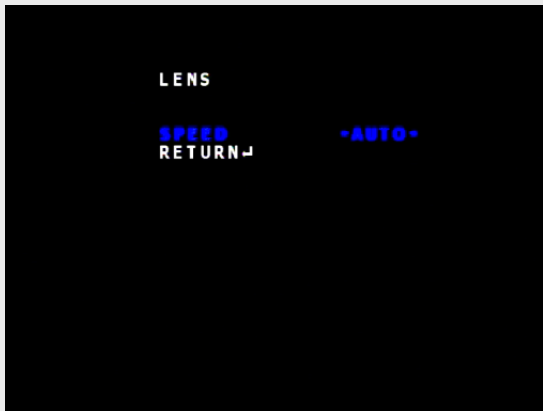
The available SPEED settings are:

AUTO – makes best guess

1/100000 second exposure

1/10000 second exposure

1/4000 second exposure

1/2000 second exposure

1/1000 second exposure

1/500 second exposure

1/250 second exposure

1/120 second exposure

1/100 second exposure

1/60 second exposure

X2 = 1/32 second exposure

X4 = 1/16 second exposure

X8 = 1/8 second exposure

X16 = 1/4 second exposure

X32 = 1/2 second exposure

X64 = 1 second exposure

X128 = 2.1second exposure

X256 = 4.2 second exposure

X512 = 8.4 second exposure

X1024 = 17 second exposure

BRIGHTNESS

This feature allows you to adjust the Brightness of the image. The sliding bar allows you set the brightness value from a low of **0** to a high of **99**. The default brightness value is set to **40**.

There also is an **EXIT ICON** that allows you to turn **OFF** the Menu System.

EXIT

All **ICON MENU** sections will provide an **EXIT** option. With the **EXIT** feature also providing you 3 choices:

- **RETURN** (to previous menu)
- **EXIT**
- **SAVE/EXIT**

EXIT –   Closes the Menu system without saving any changes to the settings you may have adjusted.

SAVE/EXIT – Saves the changes and closes the Menu System

INITIALIZE – Will reset the PRO DOB II to factory defaults. This fill require you to set all appropriate setting back you your preferences.

COLOR
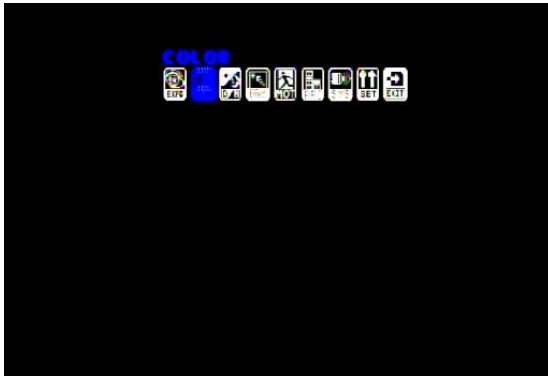
The **COLOR Menu** allows you to adjust the color of your mage (assuming you have set **DAY&NIGHT** to **DAY** which activates color on the PRO DOB II).

The Color Menu provides you 4 options for you to set:

- AWC
- ATW
- MANUAL
- PUSH

AWC (**A**uto **W**hite **C**ompensation**)**
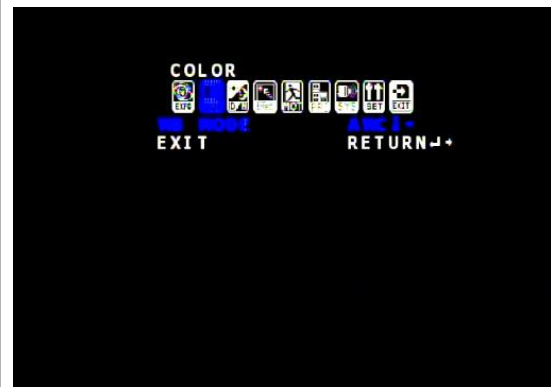
When activated, the **AWC** function detects white in the captured image and adjusts the color/white balance accordingly. You will be able to adjust the **R-Y Gain** (Red Tint) or the **B-Y Gain** (Blue Tint).

ATW (Auto Trace White Balance)
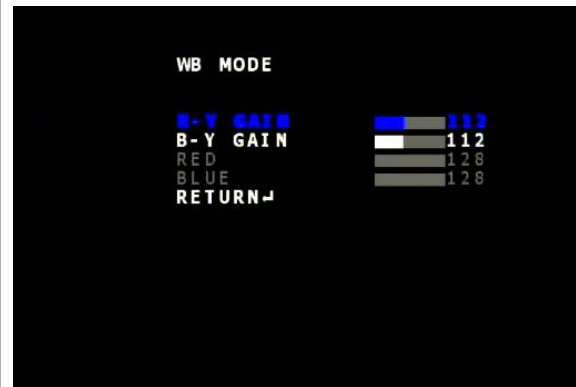
A specific form of **AWC**, **ATW** continually tracks and adjusts the white balance, making it suitable for use in cameras in which the image content and lighting are subject to changes. You will be able to adjust the **R-Y Gain** (Red Tint) or the **B-Y Gain** (Blue Tint).

MANUAL

This mode allows you to adjust the **RED** and **BLUE Saturation** levels in your image. You will notice the Color Balance changing when you adjust the **RED** and **BLUE** Options.

PUSH
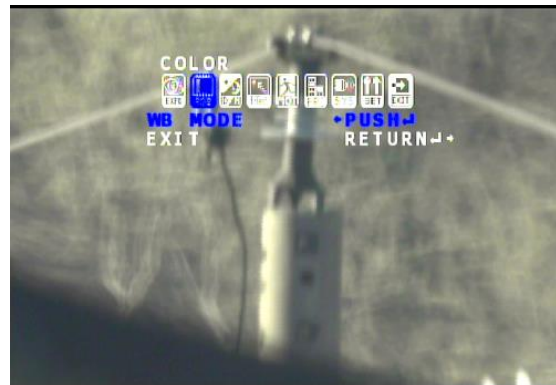
Once pressed, this lets the PRO DOB II measure the current Color Balance and adjusts it to what it believes is the best values.

Before activating **PUSH**

After activating **PUSH**
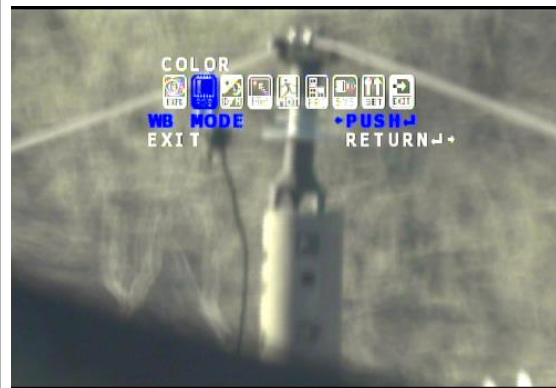
DAY&NIGHT

The DAY&NIGHT feature allows the camera to present the images in either Color (Day) or Black and White (Night).

The AUTO option is also available but it and its adjustments really don't have a role in astro-imaging.

DAY

This setting displays the images (and even a blue menu selection indicator) in color. You can adjust the color images with the settings inside the **COLOR MENU**.

NIGHT

This setting will now display the images in Black and White. When in **NIGHT** Mode, you also have the ability to set the **BURST** to either **ON** or **OFF**. I find **ON** is easier to read the menus but on bright objects you may get some flare as the camera pushes the values.

AUTO

This allows the PRO DOB II to determine if it should go into **DAY** or **NIGHT** Mode depending upon the image. This Mode does allow you some settings to adjust such as how long it should wait before shifting modes and what are the intensity trigger points it should use to determine if it should shift from **DAY** to **NIGHT**.

Day->Night: The value ranges from 0 to 255. The day mode switches to the night mode when the light condition reaches to the value you select.

Night->Day: The value ranges from 0 to 255. The night mode switches to the day mode when the light condition reaches to the value you select

Since the PRO DOB II doesn't have a **CDS** (a photocell) sensor, the **CDS – START** and **CDS-END** options are disabled.

EFFECT

This feature effects how the image is presented on the screen. It provides two options for your to adjust:

- MIRROR
- SHARPNESS

The **MIRROR** option allows you to rotate or flip the screen image either horizontally or vertically.

MIRROR

The Mirror feature provides you with 4 settings:

- OFF
- HOR
- VERT
- ROTATE

OFF Image:

Image is in its normal orientation.

The **SHARPNESS** option allows to make the image softer (low value) or sharper (high value). Note: that a high **SHARPNESS** value can even sharpen the noise and thus bring out artifacts and halos around brighter stars. A good value to start with is **20**, but experiment with this feature to find the best value that balances the detail of the image with the artifacts produced.

The **SHARPNESS** option ranges from **0** to **49**.

HOR Image

Notice how the image is flipped about the Vertical Axis.

VER Image

Notice how the image is flipped about the Horizontal Axis.

ROTATE Image
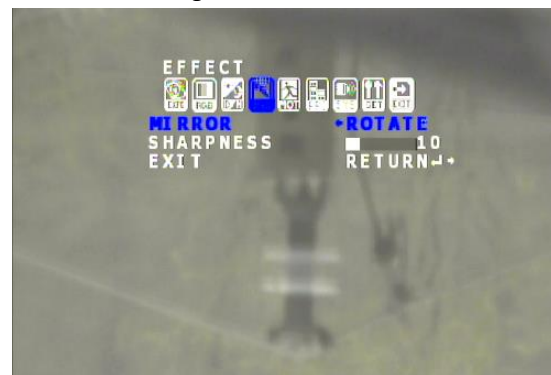
Notice how the image is both flipped about the Horizontal Axis and the Vertical Axis.

MOTION

This feature, Motion Detect, is not used in astro-imaging.

It may be fun to see how the alarm and auto zoom may work when looking at stellar objects. Nothing to lose, someone may actually find an application for this feature.

PRIVACY

This feature allows you to create masks on the screen of various colors, but it takes a while to create masks that can be useful. The Left panel will give the mask settings that will create a simple cross hair on the screen. Experimenting with the values may produce a better cross bar than the one I created below.

Settings for the **X** and **Y** values for the first of the two Masks required for a cross bar.
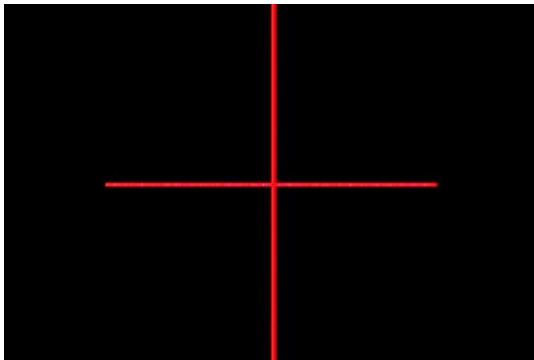
The masks have both an **X** and **Y** value that can be accessed by simply pressing the Centre Button when on the **TOP**, **LEFT**, **RIGHT**, or **BOTTOM** option. This will toggle the X values and the Y values.

Settings for the **X** and **Y** values for the second of the two Mask.
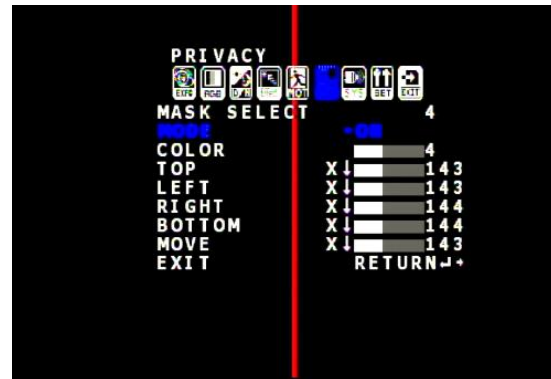
ENHANCE

This feature allows you ENHANCE the image by the use of 4 different options:

- GAMMA
- 3D-DNR
- MONITOR
- DPC

GAMMA

The **GAMMA** feature gives you 4 values to select: **0.3**, **0.45**, **0.6**, and **1.0**. The smaller the value the brighter the image will appear on your screen. Therefore **0.3** will provide the brightest image and **1.0** will provide the darkest image. Choose the value of **GAMMA** that produces the best image for your monitor.

3D-DNR

3D-DNR is a feature that allows the PRO DOB II to internally stack up to 5 images. You select the slider from 0 to 5 to choose the number of images to stack.

Note: you must have a mount that is both aligned well and accurately tracking to get a benefit of this feature. Also note that the camera does not align or register stars, it simply stacks them.

To use this feature set **AGC** (located in the EXPOSURE Menu) to **LOW**, setting the **AGC** to **OFF** disables the **3D-DNR** feature.

MONITOR

This feature allows to select the type of display device you are using either a CRT (old style monitor with a Cathode Ray Tube) or a LCD (computer/HD TV style monitor).

DPC

The **DPC** (**D**ead **P**ixel **C**ancellation) feature when activated will try to eliminate or reduce any hot or warm pixels that appear on the screen. To enable this feature set **DPC** to **AUTO**. To dis-able this feature set **DPC** to **OFF**.

SYSTEM

I would match the above settings, then save them as the default

EXIT

This Exit feature provides 3 options for you to Exit the On Screen Menu:

- **Exit -**revert back all changes made in the Menu system and closes the On Screen Menu.

- **SAVE/EXIT –** tis option will save all the changes you have made and will make you're your default for the PRO DOB II. Then it will close the On Screen Menu.

- **INITIALIZE** – this will revert the PRO DOB II to the original factory defaults (use this as a last measure).

Appendix B – On Screen Display (OSD) MAP

EXPOSURE	◆ EXPOSURE	◆ SENSE UP
	◆ AGC	◆ LENS
	◆ BRIGHTNESS	
COLOR	◆ WB MODE	
DAY&NIGHT	◆ MODE	◆ BURST
	◆ DAY&NIGHT	◆ NIGHT&DAY
	◆ DELAY TIME	◆ CDS-START
	◆ CDS-END	
EFFECT	◆ MIRROR	◆ SHARPNESS
MOTION DET	◆ MOTION DET	◆ ALARM MODE
	◆ SENSI TIVTY	◆ AREA SELECT
	◆ MODE	◆ START
	◆ END	◆ OUTPUT TIME
	◆ AUTO ZOOM	
PRIVACY	◆ MASK SELECT	◆ MODE
	◆ COLOR	◆ TOP
	◆ LEFT	◆ RIGHT
	◆ BOTTON	◆ MOVE
ENHANCE	◆ GAMMA	◆ 3D-DNR
	◆ MONITOR	◆ DPC
SYSTEM	◆ COMM ID	◆ TITLE
EXIT		

OSD user manual

This model is very convenient with the OSD menu function. You could visit and view the menu on screen by operating five buttons at the back of the camera

[O] Press the MENU button to access MAIN MENU, use this button to enter a menu or to select a menu option

[O][O] Use UP and DOWN buttons to move vertically between menus and options

[O][O] Use LEFT and RIGHT buttons to move horizontally between menus and options

Note: You must use SAVE/EXIT else your changes will revert back when the OSD Menu closes.

Menu

EXPOSURE:

EXPOSURE:	NORMAL/BLC/WDR/HLI
SENSE UP:	OFF/X2/X4/X8/X16/X32/X64/X128/X256/X512/X1024
AGC:	OFF/LOW/MIDDLE/HIGH
LENS:	ELECTR/DC IRIS
BRIGHTNESS:	0~99

COLOR:

WB MODE:	ATW/AWB/MANUAL/PUSH

DAY&NIGHT:

MODE:	AUTO/DAY/NIGHT/SMART LED
BURST:	OFF/ON
DAY→NIGHT:	0~255
NIGHT→DAY:	0~255
DELAY TIME:	0~10
CDS→START:	0~255
CDS→END:	0~255

EFFECT:

MIRROR:	OFF/HORI/VERT/ROTATE
SHARPNESS:	0~49

Menu

MOTION DET:

MOTION DET: OFF/ON
ALARM MODE: OFF/MESSAGE/AREA
SENSI TIVITY:0~120
AREA SELECT:1/2/3/4
MODE: OFF/ON
STARE: X/Y 0~15
END: X/Y 0~15
OUTPUT TIME:0~10
AUTO ZOOM: OFF/ON

PRIVACY:

MASK SELECT: 1/2/3/4/5/6/7/8
MODE: OFF/ON
COLOR: 0/1/2/3/4/5/6/7
TOP: X:29~216 /Y:5~153
LEFT: X:29~216 /Y:5~153
RIGHT: X:29~216 /Y:5~153
BOTTON: X:29~216 /Y:5~153
MOVE: X:29~216 /Y:5~153

ENHANCE:

GAMMA: 0.3/0.45/0.6/1.0
3D-DNR: 0~5
MONITOP: CRT/LCD
DPC: OFF/AUTO

Menu

SYSTEM:

COMM ID: 0~254
TITLE: OFF/ON(Supports for up to 16 characters.)

Appendix C – Installing the MCV

The MCV-1 and the MCV-1e both come nicely packed in its own see-through packaging. The installation procedures will be the same for either package. The following are the techniques I have used on 4 different computers (3 laptops and 1 desktop). Some are 32 bit and others are 64 bit, all run windows 7. I have not encountered any problems installing this way.

Note

Do some pre-planning to minimize frustration that may occur when Windows gets a bit temperamental. I use both the MallinCam PRO DOB II and the MallinCam Signature exclusively with computer control, so I needed to assign one USB port for my video input (MCV) and another USB port for my serial cable (Belkin USB Serial cable). I even label which port is which on my lap-top (just in case I forget). I will always use the same port for each device, so that I will not have multiple versions of the drivers for multiple USB ports (you are just teasing the windows gods if you mix and match, and they will get even).

The MCV-1 and MCV-1e are heavy and depending upon your computer's manufacturer, the MCV may put some strain on the USB port. Therefore, I use a small 6" USB cable extender, and plug the extender into the USB port for and plug the MCV into the other end of the extender.

Step 1

Open the Package

When you open the package you will find:

> ➢ 1 mini CD
> ➢ 1 User's Manual
> ➢ MCV-1 (1e) Do not inset this into **USB port** until instructed

• **Take the instruction booklet and the mini CD and place them on the table. If your computer cannot handle a mini CD (***you cannot physically lock the CD into the centre hole of the CD drive***), then you can down load the software by following the next step**

• **Go to the Mallincam website and download the latest drivers for the MCV device:**

- http://www.mallincam.net/software-downloads.html

Step 2 → *Insert the MCV-1 or MCV-1e*

*Remember the **USB port** you choose for the **MCV**; you will always use this **USB port** for the **MCV**.*

- The **Windows** will find new hardware and will attempt to load drivers. It will most likely fail on one driver. Don't worry that is why you have the driver installation software.
- Either insert the **CD** or run the program **autorun.exe** in the folder of the file you downloaded.
- When you see the green **USB 2.0 HD HV Grabber** screen, CLICK on the option: **Install Drivers**.

- You may receive a **Windows** warning asking you if you want to allow the installation to run, Click **Yes**.
- Follow the instructions on **the Installation of USB Video/Audio Device Driver** Wizard that is displayed on the desktop.
- The installation takes under a minute. Once complete, you will be presented with a notification windows, click **Finish** with the "**Yes, I want to restart my computer now**" option selected.
- The computer will restart. Login in as you normally would.
- You don't need to install any of the other files from the **HD AV Grabber** installer.

Step 3 → *Checking out the MCV-1 or MCV-1e*

It is always a good idea to check out the **MCV-1e** to see if it is running correctly after you have done a first time installation.

- Start the **Image** software that you will using to display your PRO DOB II Video image such as: AmpCap, SharpCap, VirtualDub,..)

- In the **Video Device** menu, you should see a **Video Source** called "**USB 2828x Device**". This is the driver for either the **MCV-1** or **MCV-1e** device. This is the one we want. Select it
- Power up your Signature, and you should be able to see the camera's images on the video window of your software.

Note   *Oh No, the video is not working correctly, strange stuff is happening and it is not my camera*

After you have checked all of the obvious: Power to the PRO DOB II, Software (AMCAP) is pointing to the correct input device on the MCV (remember it has 2 connection types: RCA and SVIDEO).

- Down load the updated **MCV-1** or **MCV-1e** driver from the Mallincam Software Links Site:

http://www.mallincam.net/software-downloads.html

Appendix D – Installing RS485 Communications

RS485 Communications
There are two ways to connect your computer to the Mallincam PRO DOB II. The first way is through a USB direct to MallinCam PRO DOB II cable, and the second way is through a connection path USB to RS232 Serial Adapter -> RS232 to RS485 plug -> PRO DOB II RS485 cable. Both technique works well, and the method of choice depends upon your preference. For more information, visit either The Mallincam Website (www.Mallincam.net) or the Zengineering Website (www. http://zengineering.us/.

USB Direct to Mallincam PRO DOB II cable
This may be the easiest way to communicate between the PRO BOB II and your computer.

- Install the drivers that came with the product.
- Plug in the cable.
- Visit the Device Manager in Windows to check what Com Port the cable will use.
- Match the Com port on Stephane's PRO DOB II
- Connect and use.
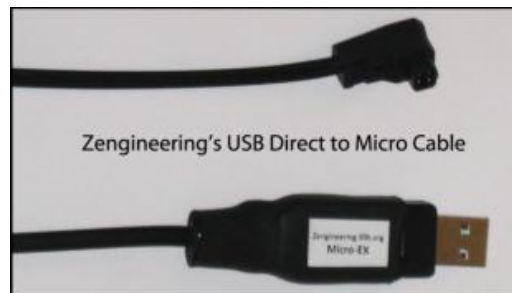
Using a USB to RS232 Adapter
Most of us already have a USB to RS232 Adapter, so this connection path will be the one you may end up using so detailed instructions are provided.

To **USB Port** on **Computer**
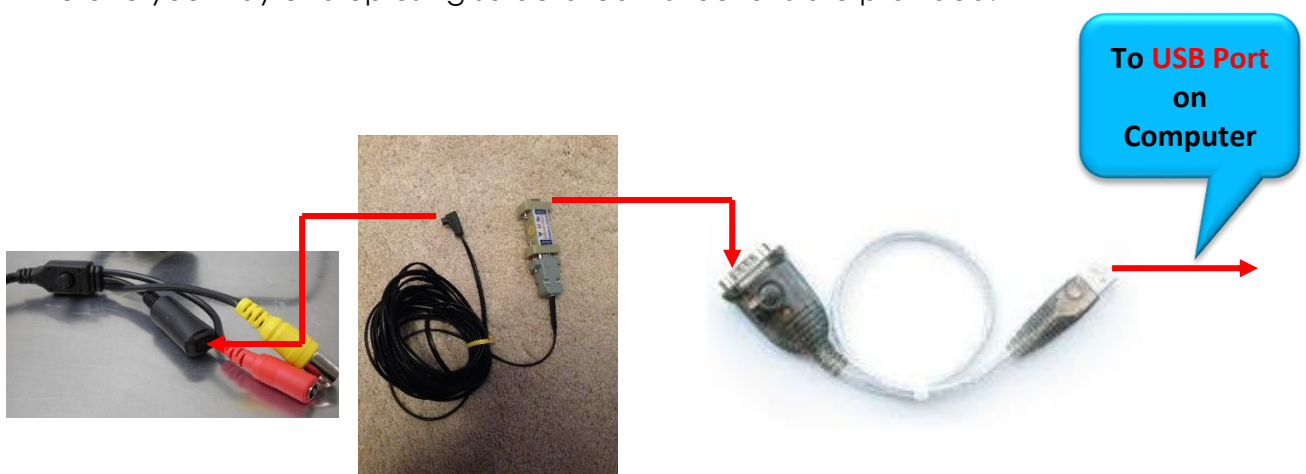
The USB to RS232 Adapter
To control the camera through the PRO DOB II RS485 Port you will require a way to communicate through a USB Port on your computer. This is done through a RS232 Adapter Cable.

The ideal **USB to RS232 Adapter** is usually computer specific (and sometimes Operating system specific).

When you purchase a USB to RS232 adapter, purchase a brand name one that specifically states that it is 100% compatible with your operating system. There are some cheap prolific chip set knock offs that are incompatible with updated drivers (Error -10 (failure to load drivers). MallinCam users have had no issue with USB to RS232 Adapters with the FTDI chipset.

> On the Macintosh, excellent results with adapters from Tripplite (formerly Keyspan), IOGear, FTDI and TrendNet, since these manufactures provide up-to-date drivers compatible with most versions of Mac OS X

Step 1

Installing the USB to RS232 Adapter (Windows 7/8 Specific)
Most USB to RS232 Adapters come with a CD that contains the driver for the adapter. I recommend using that CD as a last resort, as Windows Operating system (Windows 7, Windows 8, Windows 8.1) usually goes a fine job in automatically downloading the latest drivers for your adapter.

Insert you USB to RS232 Adapter into a free USB Port on your computer

Windows will beep to recognize that an adapter has been inserted into a USB Port. After a few seconds the following message singular to the one below should appear on the bottom right of your Windows screen.
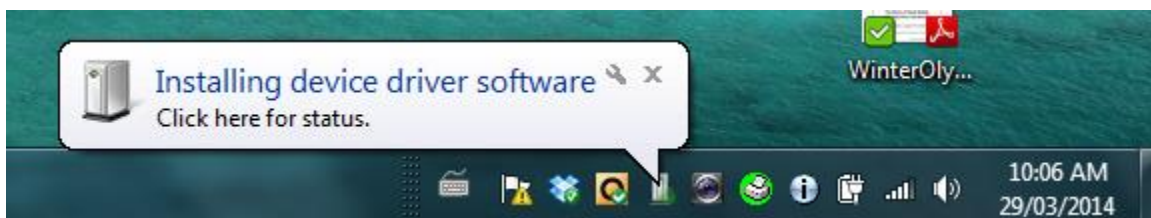
The little green shade will move around the icon that the Installing device driver software message is pointing to while the driver is being installed (may take about a minute).

Once completed, the following pop-up message should appear (name of driver may be different, depending upon which USB to RS232 adapter you are using)
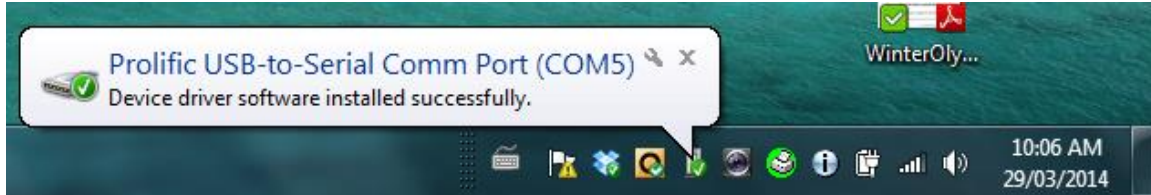
The driver has been successfully downloaded and installed. Make note of both the Port that you have used for your USB to RS232 Adapter (you should always use the same Port) and what COM value Windows has assigned for this adapter (5 in image above).

As a fast check to ensure everything is setup correctly, go into the **Device Manager** on Windows and ensure that your adapter has the same settings as below (COM Port number may be different)
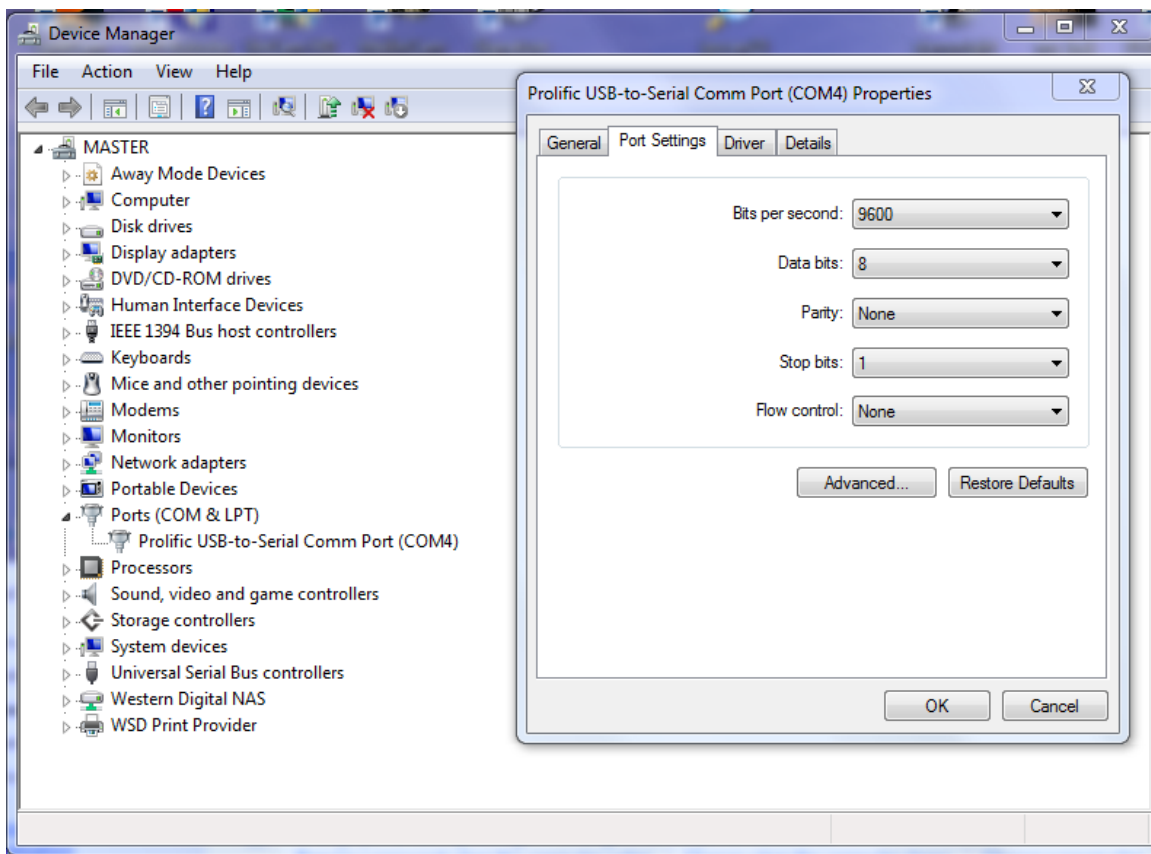
Oh No, Driver did not install correctly.
Sometimes the Window's gods are having a bad day and they decide to take it out on you. Don't Panic. If you check the **Ports (COM & LPT)** or **Other devices** list

item in the **Device Manger** from the **Control Panel**, you may see a yellow warning beside the Adapter, this indicates the current driver is incompatible.

There could be many reasons for the driver not to install, the most common being that there already is an old incompatible driver already in the system, or Windows could not locate the driver for you particular USB to RS232 Adapter.

<p style="color:red; text-align:center">Check to see if you already have a driver installed and remove it if necessary from your system.</p>

With the USB to RS232 Adapter still inserted in a USB Port.

➔ From the **Control Panel**, go into the **Device Manager**, and click on **the Ports (COM & LPT)** arrow.
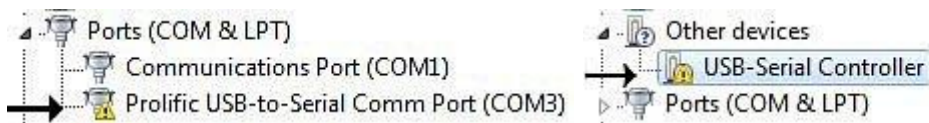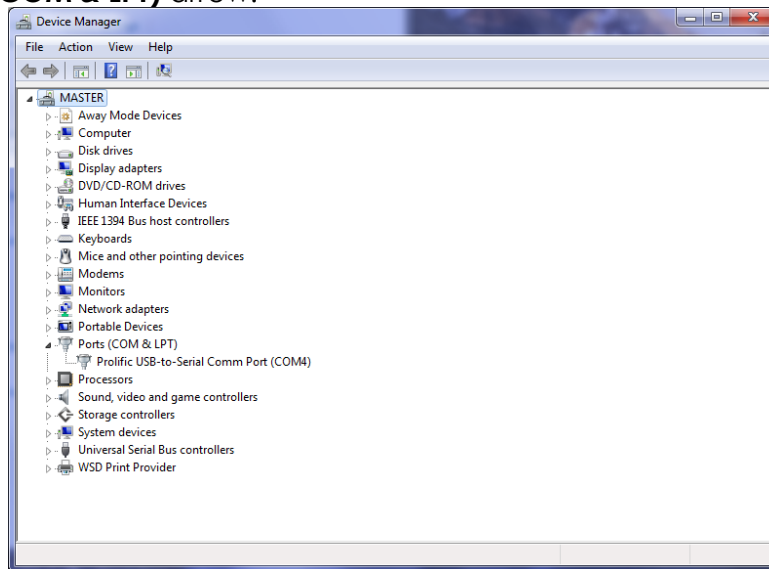

➔ Right Click on the driver name (*Prolific USB-to-Serial Com Port (Com4) in my image above*) and Choose **Uninstall** when Pop-up List appears.
➔ Let Windows do its uninstall thing and when completed, remove the USB to RS232 Adapter from the Port.

<p style="color:red; text-align:center">Download and install latest driver specifically for your Device (or use the installation CD that came with the Adapter)</p>

➔ Now visit the site of the USB to RS232 Adapter you own and download the latest driver and follow the installation instructions from the site. (*If you are using the CD, follow the instruction that came with the Adapter*).
➔ The Final step in either the download or CD option you chose will be to reinsert the USB to RS232 Adapter back into you USB Port, and windows should finish the installation process and then display success popup menu with the COM Port it has assigned to your Adapter.

Step 2
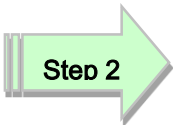
Connect the USB to RS232 Adapter to RSR232/RS485 Connector

You now need to connect the **RS232 Adapter** to the RS232 end of the **RS232/RS485 Connector** that came with your kit. It will only connect one way.
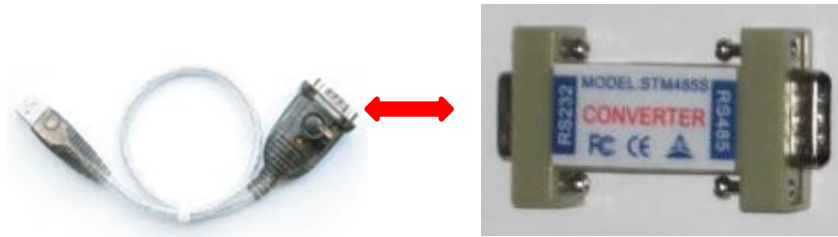
RS232 Adapter   **RS232/RS485 Connector**

Step 3
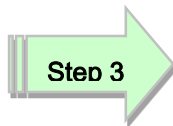
Connect the PRO DOB II to the RS232/RS45 Connector

Now connect the RS485 end of the **RS232/RS485 Connector** to the **provided PRO DOB II Cable** and insert the IRIS end of the cable into the IRIS port on the PRO DOB II. Your communications path is now complete and you should be able to control your PRO DOB II through software.

As mentioned in the Connecting PRO DOB II to Computer section. You must ensure that the PRO DOB II has the **COMM ID** is set to **1** and that this is saved as the default for the camera.

Appendix E – Accessories for the PRO DOB II

Upscaler

Digital View Finder

Digital View Finder Kit

8" Monitor

12" and 15" Monitor

2" c-mount adapter

MCV-1 (MCV-1-E)

Appendix F – First Aid for the PRO DOB II

The Image from the PRO DOB II is jumping all over the place

Diagnosis: The camera is not getting a proper video signal.

Cure: Check to make sure that the video cable is snuggly connected
from the PRO DOB II to the Computer.

The Software Does not Control the PRO DOB II.

Diagnosis: The computer communication settings do not match that of the
PRO DOB II.

Cure: Ensure that the correct connections are made between the PRO
DOB II and the computer. Make sure that both the computer and
the PRO DOB II are communication at 9600 Baud. Make sure that
both the computer and the Software are using the identical com
Port number. Make sure that the PRO DOB II is set to **COMM ID: 1**
and that this is the default by issuing a **SAVE/EXIT** from the PRO DOB
II **O**n **S**creen **D**isplay.

**When I have my Video Software connect to my Mallincam through my MCV-1
adapter I only see a Blue screen.**

Diagnosis: The MCV-1 or other adapters can have multiple video input
connections. For example, the MCV-1 has both composite and S-
video. The cause of this symptom is that MallinCam is looking at one
of those input ports, while the camera is sending the image through
the other. Your Video Display software then just gives a Blue screen
to say that I see nothing at the MCV-1 source.

Cure: Set the video to use the Composite port on the x2828 (MCV)
video driver. Note: Miloslick/Splitcam/AmCap can change
the port choice of the MCV-1. Just go into the **Video Tab** and
in the Drop Down list choose **Video Input**. Inside this drop
down will be the choice of input ports.

My MallinCam is frozen, or the commands do not seem to be working correctly, the camera is acting strangely.

Diagnosis: Somehow the MallinCam internals have become corrupted (power surge, static, cosmic ray) and all we need to do is reset everything back to factory settings.

Cure: The first thing you should do is turn off MallinCam for about 30 seconds, then power it up as you normally would (this fixes about 95% of the issues). If this didn't help, you can reset the MallinCam PRO DOB II to its Initial Factor Settings by following this sequence:

- Press the **Center Button** so the Menu appears.
- Select the **EXIT** Option
- Now Select the **INITIALIZE** option and press the **Centre Button**

Appendix G – Suggested Item Specific Settings

Fantastic work from Jim K (SkyGazer)

Menu / Parameter	Deep-Sky (brighter objects)	Deep-Sky (dimmer objects)	Solar Ha (See Note)	Moon/Wht Lt Sun (See Note)	Planets (bright comets)	Comments (as of: 19 Mar'14)
1. Exposure						
Exposure Options	Normal	Normal	**WDR (or HLI)** On (HLI = 40)	**WDR** On	Normal	HLI dims bright areas
Sense Up	- - -	- - -	Off	Off	- - -	WDR Auto=0-20 / HLI=0-40
AGC	Off	Off	Off	Off	Off	Rarely Changed
Lens	Off	**Low**	Electric	Electric	Electric	Not to be Changed
Speed*	Electric **X128**	Electric **X512**	**1/10,000 - 1/2000**	Electric **1/10,000 - 1/4000**	Electric **1/1000 - 1/60**	**Depends on Optics/Object**
Brightness	~ 40	~ 40	~ 40	~ 40	~ 40	(0 - 99) Rarely Changed
2. Color (RGB)	ATW (auto)	ATW (auto)	ATW (auto)	ATW (auto)	ATW (auto)	(Manual, AWC to capture/freeze)
R(-Y)/B(-Y)	- - - / - - -	- - - / - - -	- - - / - - -	- - - / - - -	- - - / - - -	(0 - 255 if adjusting needed)
3. Day & Night	Day (color)	Night (bw)	Night (bw)	Night (bw)	Day (color)	(use only Day - Night - Auto)
4. Effect						
Mirror	As Needed	As Needed	As Needed	As Needed	As Needed	(Off - Hor - Vert - Rotate)
Sharpness	~ 10	~ 10	~ 20	~ 20	~ 20	(0 - 49)
5. Motion	- - -	- - -	- - -	- - -	- - -	Not Used/Not to be Changed
6. Privacy	- - -	- - -	- - -	- - -	- - -	Not Used/Not to be Changed
7. Enhance (Sys)						
Gamma	1.0	1.0	1.0	1.0	1.0	0.3 = bright / 1.0 = dark
3D-DNR	- - -	**As Needed**	- - -	- - -	- - -	(0 - 5 stacked frames)
Monitor	As Needed	As Needed	As Needed	As Needed	As Needed	(CRT-LCD) Rarely Changed
DPC	Off	Auto	Off	Off	Off	for auto hot pixel correction
8. System (Set)						
Comm ID	1	1	1	1	1	0-254 (As needed for cable use)
RS-485	Pelco-D	Pelco-D	Pelco-D	Pelco-D	Pelco-D	Not Changed (for cable use)
Baudrate	9600	9600	9600	9600	9600	Not Changed (for cable use)
Title	As Needed	As Needed	As Needed	As Needed	As Needed	(up to 16 characters)
Language	English	English	English	English	English	Change if Needed (to Chinese)
Sync	Internal	Internal	Internal	Internal	Internal	Not to be Changed

Menu Parameter			Comments
1. Exposure			
Exposure			
Options			
Sense Up			
AGC			
Lens			
Speed			
Brightness			
2. Color (RGB)			
R(-Y)/B(-Y)			
3. Day & Night			
Setting			
4. Effect			
Mirror			
Sharpness			
5. Motion			
6. Privacy			
7. Enhance			
Gamma			
3D-DNR			
Monitor			
DPC			
8. System (Set)			
Comm ID			
RS-485			
Baudrate			
Title			
Language			
Sync			

Another Great Template from Jim K (SkyGazer)

OBJECT		OBJECT	
DATE		DATE	
CONDITIONS:		CONDITIONS:	
TELESCOPE (Aperture / FL)		TELESCOPE (Aperture / FL)	
Reducer / Barlow		Reducer / Barlow	
Spacer Rings		Spacer Rings	
Filter Used		Filter Used	
EXPOSURE	Normal / WDR= / HLI=	EXPOSURE	Normal / WDR= / HLI=
Sense Up	Off	Sense Up	Off
AGC	Off / Low / Medium / High	AGC	Off / Low / Medium / High
Lens (Electric) Speed		Lens (Electric) Speed	
Brightness		Brightness	
COLOR (RGB)	ATW / ATC / Manual R= B=	COLOR (RGB)	ATW / ATC / Manual R= B=
DAY & NIGHT	Day (color) / Night (bw) / Auto	DAY & NIGHT	Day (color) / Night (bw) / Auto
EFFECT - Mirror	Off / Hor / Vert / Rotate	EFFECT - Mirror	Off / Hor / Vert / Rotate
Sharpness		Sharpness	
ENHANCE - Gamma	0.3 / 0.45 / 0.6 / 1.0	ENHANCE - Gamma	0.3 / 0.45 / 0.6 / 1.0
3D-DNR		3D-DNR	
Monitor	CRT / LCD	Monitor	CRT / LCD
DPC	Off / Auto	DPC	Off / Auto
COMMENTS:		COMMENTS:	

OBJECT		OBJECT	
DATE		DATE	
CONDITIONS:		CONDITIONS:	
TELESCOPE (Aperture / FL)		TELESCOPE (Aperture / FL)	
Reducer / Barlow		Reducer / Barlow	
Spacer Rings		Spacer Rings	
Filter Used		Filter Used	
EXPOSURE	Normal / WDR= / HLI=	EXPOSURE	Normal / WDR= / HLI=
Sense Up	Off	Sense Up	Off
AGC	Off / Low / Medium / High	AGC	Off / Low / Medium / High
Lens (Electric) Speed		Lens (Electric) Speed	
Brightness		Brightness	
COLOR (RGB)	ATW / ATC / Manual R= B=	COLOR (RGB)	ATW / ATC / Manual R= B=
DAY & NIGHT	Day (color) / Night (bw) / Auto	DAY & NIGHT	Day (color) / Night (bw) / Auto
EFFECT - Mirror	Off / Hor / Vert / Rotate	EFFECT - Mirror	Off / Hor / Vert / Rotate
Sharpness		Sharpness	
ENHANCE - Gamma	0.3 / 0.45 / 0.6 / 1.0	ENHANCE - Gamma	0.3 / 0.45 / 0.6 / 1.0
3D-DNR		3D-DNR	
Monitor	CRT / LCD	Monitor	CRT / LCD
DPC	Off / Auto	DPC	Off / Auto
COMMENTS:		COMMENTS:	

Appendix H – Notes