MALLINCAM STARTUP/SHUTDOWN PROCEDURE

1. Turn on the white power bar at the base of the main telescope.
2. Double click the Mallincam Camera icon on the desktop.
3. On the Advanced tab, the camera will count down from 3 minutes.
4. For operating procedures, consult the information in the Mallincam binder located on the observing deck and/or the Mallincam Help icon on the desktop.
5. If necessary, after the camera has completed its countdown, click Video/Device and select the USB video device to show the video control settings and allow images to be previewed.
6. When finished with the camera, click Park on the Config tab. The camera will count down from 3 minutes. **DO NOT TURN THE CAMERA POWER OFF UNTIL A WINDOW APPEARS STATING IT IS SAFE TO POWER OFF THE CAMERA.**
7. Turn off the white power bar.

For assistance with operation of the camera:

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2012/04/27

DEFAULT MALLINCAM SETTINGS

	PLANET	MOON	DEEP SKY OBJECT
SENSE UP	OFF	OFF	128X
ALC	1/350	1/3000	OFF
BLC	OFF	OFF	OFF
AGC	OFF	OFF	ON, MAX LEVEL = 6
W/B	MAN=OFF R=2,B=2	MAN=OFF R=2,B=2	MAN=OFF R=2, B=2
ZOOM	OFF	OFF	OFF
TEC	PRESET = ON	PRESET = ON	OFF
	LEVEL = 8	LEVEL = 8	
	DEW = 60	DEW = 60	

SUGGESTED ITEM SPECIFIC SETTINGS

	SATURN	MOON	M 13	M 3
SENSE UP	OFF	OFF	128X	128X
ALC	1/250	1/3000	OFF	OFF
BLC	OFF	OFF	OFF	OFF
AGC	OFF	OFF	ON, MAX LEVEL = 3	ON, 3
W/B	MAN=OFF R=2,B=2	MAN=OFF R=2,B=2	MAN=OFF R=2, B=2	SAME
ZOOM	OFF	OFF	OFF	OFF
TEC	PRESET = ON	PRESET = ON	OFF	OFF
	LEVEL = 8	LEVEL = 8		
	DEW = 60	DEW = 60		

SUGGESTED ITEM SPECIFIC SETTINGS

	M104	M64	NGC 4565	NGC 4725	M57	M27	M82	M106
SENSE UP	128X	128X	128X	128X	128X	128X	128X	128X
ALC	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
BLC	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
AGC	ON, 2	ON, 2	ON, MAX LEVEL = 2	ON, 2	ON, 2	ON, 2	ON, 2	ON, 2
W/B	MAN=OFF R=2,B=2	MAN=OFF R=2,B=2	MAN=OFF R=2, B=2	SAME	SAME	SAME	SAME	SAME
ZOOM	OFF	ON, 8	ON, 8	OFF	ON, 3	OFF	ON, 4	ON, 3
TEC	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
INTEGRATION	14 SEC	14 SEC	14 SEC	28 SEC	7 SEC	14 SEC	14 SEC	14 SEC

Understanding the Settings on the Mallincam

There are 4 Major components in understanding the application of the Xtreme

1. **The Exposure Engine**.
    The good news is that the camera can take exposures from 1/12000th of a second to several minutes. The bad news is that there are three menus that you have to navigate to make it happen. The relevant acronyms are ALC/ELC, SENSE UP and PRESET/CUSTOM Integration.
2. **Amplifier Gain.**
    This is called AGC.
3. **Image processing**.
    Parameters like white balance, gamma, and something akin sharpening (APC).
4. **Cooling.**
    Cooling is controlled using the Noise Detection (TEC control) menu.

*It is the balance of all 4 of these components that will help produce the desired results. **Don't just use one component without understanding how it affects or is affected by another component**. Understand how all 4 work together before taking your first image. Different equipment and sky conditions will mandate different tweaking of these 4 components.*

Don't forget to have an image available for you to view through a third party software, NSN, or Video Preview in Xtreme

1. The Exposure Engine

Probably the most confusing and somewhat unique aspect of the camera is how the exposure systems are interlocked. There are, sort of, three exposure systems in the camera, and three menus to control them.

On the right is the main menu of the **Advanced Tab** looks:

The three systems are called:

> ➢ **Sense Up**

> ➢ **Exposure Control** (which contains **ALC** and **ELC**)

> ➢ **Preset/Custom (Integration)**

These exposure systems are selected and modified depending upon the type of object you are imaging no two telescopes are identical.
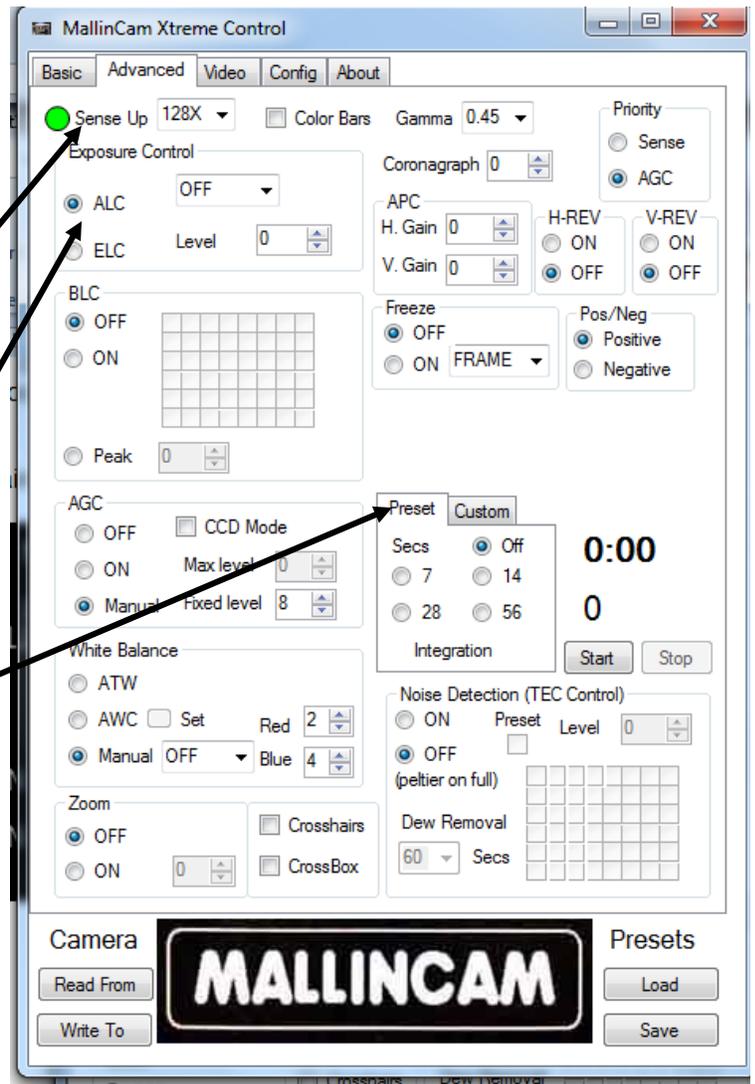
Now you can set the exposure time in three ways:

❖ **Exposure Control: (***This is Used for Planetary Imaging***)**

This mode allows you to control the shutter of the camera. This control is used for Planetary Objects or the Sun and Moon.

ALC (Automatic Level Control)

ALC Shutter Speed: In **ALC** mode, you can select the shutter speed from the following: OFF, 1/100, 1/120, 1/180, 1/250, 1/350, 1/500, 1/750, 1/1000, 1/1500, 1/2000, 1/3000, 1/4000, 1/6000, 1/8000, and 1/12000, sec

➢ When using the **ALC** mode, turn **Sense Up** to **OFF.**
➢ When using the **ALC** mode, turn **Preset/Custom Integration** to **OFF**
➢ If you set the **ALC** shutter to **OFF** you enable the use of the **SENSE Up** menu to set longer exposures from 1/30 up to 2.1 seconds

ELC (Electronic Level Control)

➢ Not used with the Xtreme in normal operations.

❖ **SENSE UP (Sensitivity) (Short Deep Sky Imaging)**

*This is where the sensitivity of the chip is increased for **D**eep **S**ky **O**bject imaging. **Sense** is increased by a power of two until it reaches 128. Each sense increment takes two seconds. This is why it takes 3 minutes for the sensitivity to come all the way up for **DSO** imaging. While sense is coming up, <u>no other camera operations should be attempted</u> until sense up is fully complete.*

➢ ***While Sense Up is ON (****some value other than **OFF** is selected in the window****) , ALC should be selected and turned OFF****.*
➢ ***While Sense Up is x2 to x96 you cannot (and should not) adjust Preset/Custom (integration)***

In this mode, the final video frame is generated by integrating multiple frames together. The exposure time is expressed as an even multiplier whose value is between is between 2x (1/30th of a second) and 128x (2.1 seconds).

Note: *When **Sense Up** is set to **X128**, the Xtreme needs **3 minutes** to adjust the internal sensors so the countdown timer will automatically be activated.*

➢ *Set the **Sense Up** option to any of the following: OFF, 2X, 4X, 6X, 8X, 12X, 16X, 24X, 32X, 48X, 64X, 96X OR 128X.*
➢ *At 128x, or 2.1 seconds (**Preset/Custom (Integration)** is now active, but is still set at **OFF**, you have enough exposure to see most of the stars you would see in an eyepiece and some of the brighter deep sky objects.*
➢ *Examples of SENSITIVITY are as follows: If **ALC** is **OFF** and **Preset/Custom Integration** is set at **OFF** then: 2X=1/30 second integration, 4X=2/30 second integration, 6X=3/30 second Integration, 8X=4/30 second Integration, 12X=6/30 second Integration, 16X=8/30 second integration, 24X=12/30 second Integration, 32X=16/30 second integration, 64X=1.1 second integration, 96X=1.6 second integration, and 128X=2.2 second integration. These figures are ideal for short DEEP SKY OBSERVING.*

➢ The **Sense Up** must be set 128X mode if you want to increase integration (via **Preset/Custom (Integration)**) in the software beyond the 2.1 seconds. This **Preset/Custom (Integration)** control is used for Long duration Deep Sky Imaging (this used to be called **Hyper** mode in other Mallincam cameras).

❖ *Custom Exposure Integration (Long Duration Deep Sky Imaging)*

This is where you can set either a **Preset** (compatible with previous models of Mallincam) exposure (Integration) time or enter a custom value.

To Use this mode:

➢ **Sense UP** must be set to **X128** (this takes 3 minutes to sensitise the Xtreme, so count down timer will be activated).
➢ **ALC** must be selected(rather than **ELC**) and shutter value set at **OFF**

Select either **Preset** or **Custom**

➢ When a **Preset** time is selected, press **Start** to begin. The Xtreme will continue to take images at the duration time. It will display 999 on the screen to remind you that the camera will continue to take duration shots until you click **Stop**.
➢ When **Custom** time is selected, you can set the time to any value you require along with the number of repetitions you would require from 1 to 999 (leave at 999 for live broadcasts). Press the **Start** button to begin and S**top** button to end

Note*:*   You can modify the current image on the screen through the **Video Tab** (see later), or **Save** the image, or **Freeze** the current image on the screen and modify it at your leisure through the **Video Tab** (see later). When Freeze in **ON** , the camera will continue taking images (behind the scenes) but will not display the updated image on your screen.

Note*:*   If you select the appropriate subject from the **Basic Tab** on the **Xtreme Control Software**, then the camera's settings will be set to the defaults for that object. This is the recommended technique when beginning.

But also note, that the **TEC** setting is incorrect (says **OFF** and it should be **ON**) for **Planetary** and **Moon**. I loaded the **Preset** from the bottom right of the **Advanced Tab** dialog box, changed the **TEC** setting to ON and did a **Save** of the **Preset** and over-rid the file. I did this for both the **Moon** and **Planetary Basic** Presets.

2. The Amplifier Gain (AGC)

AGC or **A**uto **G**ain **C**ontrol

Once we have an understanding about the exposure techniques, the next thing to understand is the gain, or **AGC**. Setting the **AGC** tells the camera how much amplifier gain you would like it too apply to the signal coming out of the CCD. It's similar to cranking up the ISO setting on your digital camera. To change the **AGC** you select an appropriate option from the **AGC** section on the middle left side of the **Advanced Tab** on the **Mallincam Xtreme Control** software.
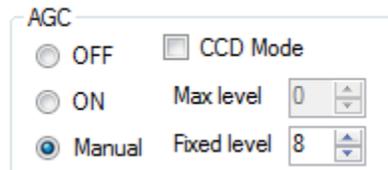
There are two simple rules for setting **AGC**:

1. Set it as low as you can. A lower **AGC** will give you cleaner pictures at the expense of a longer exposure time. A higher **AGC** will let you use shorter exposures at the expense of more noise. Where you set this depends on how well your telescope can track and how long you want to wait for new pictures. I generally place **AGC** to **4** for most **Deep Sky Objects** and set it **OFF** for **Planetary Objects**.

2. You cannot reset the AGC while **Preset/Custom (Integration)** mode is **on** and the camera is going an extended exposure. You must stop the integration and turn it **OFF** from the **Preset/Custom (Integration)** control. Then set your new gain level and then re-enable the **Preset/Custom (integration)** mode. If you don't do this, the camera can get into any number of odd states, at which time you must reboot it (turn it off for 10 seconds).

Important Points to remember about the **AGC:**

➢ Changing the **AGC** from **OFF** to either **ON** or **Manual** will activate requires the 3 minute safety countdown timer.
➢ Changing the **AGC** from **ON** to either **Manual** to **OFF** will activate requires the 3 minute safety countdown timer.
➢ Changing the **AGC** from **Manual** to either **ON** or **OFF** will activate requires the 3 minute safety countdown timer.
➢ Enter any value in the **AGC** or Click the Arrow to modify the **AGC** value will activate the 3 minute safety timer. So if you have to change the **AGC** value, just enter a value rather than click the arrow a couple of times.

Note: By checking the **CCD Mode** box, you effectively turn the Xtreme into a CCD camera since it disables both the **AGC** and **APC**. If you also set the **Integration Quantity** to 1 (*see **Custom** tab*) this will allow you to take a single shot. The **Freeze** feature will automatically be set to capture the single image.

3. Image Processing

There are a few controls that let you improve the appearance of the image. These controls control the camera, there also are software controls (located in the **Video Tab***: Brightness, Contrast, Gain, Hue Saturation, Sharpness, and White Balance*) that allow you to change the visual appearance of the image, these are cosmetic effects and do not change any internal camera settings.

Color balance is controlled with the **White Balance** menu. This menu has two automatic states and one manual state. The automatic states are called **A**uto **T**race **W**hite Control (**ATW**) and **A**uto **W**hite **C**ontrol (**AWC**) This **Manual** State also lets you set what I guess is Infrared (3200K) or daylight (5600K) preset white balances.

White Balance
- ○ ATW
- ○ AWC ☐ Set   Red [2 ▲▼]
- ◉ Manual [OFF ▼] Blue [4 ▲▼]
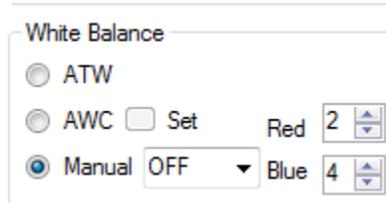
ACW: Colors are adjusted automatically. This is ideal for most viewing

AWC: Allows the Xtreme to set the White Balance based on image that is currently on the screen. Press the **Se**t to activate.

Manual: the most important feature of the White Balance on the Xtreme used when viewing Deep Sky Objects

- ➢ **3200K** allows Xtreme to capture in the near inferred
- ➢ **5600K** allows Xtreme to capture in the visual range
- ➢ **OFF** allows for adjusting the Red and Blue color
  - o By adjusting either the blue or the red you can change the color to compensate for light pollution and other seeing conditions. This is mostly used for imaging

The **AWC** is for calibrating the white balance on the target you are viewing. If you change targets, you will need to recalibrate again **or** leave it on **ATW,** since **ATW** will auto track the white balance you previously calibrated on. It should allow changing the **AWC** on the fly while exposure is active and armed.

Just do a **AWC** at the start and then leave it in **ATW** for the rest of the night or go between **ATW** and **Manual**.

APC (Advanced Pixel Control)

The **APC** controls the amount of internal digital signal processing. If the values are too high then the stars look too blocky or may have Halos around them. **APC** lets you manipulate sharpness and the rendering of fine detail. The effect is much like unsharp masking.

The control sets the level or horizontal and vertical signal processing that is performed ranged from **0** to **12**. The higher the level the more "blocky" stars look but the higher settings can tease details out of faint galaxies and nebula. Generally higher settings are best used for lunar and planetary targets, medium levels for galaxies or nebula with structures and **APC: 0** on stellar targets like open or globular clusters. **APC** can be changed on the fly. When using CCD more, **APC** is disabled.

Gamma

Gamma affects the darkness of the displayed image. There are two settings **0.45** and **1**.

➢ A gamma of **1** darkens the image thus increasing the contrast on brighter targets by darkening the background. This setting is best used when you have sky glow. In this setting, you will most likely need to increase the **AGC** (you loss some Gain by choosing the1 setting). Also set the Horizontal and Vertical settings in **APC** to **1**
➢ A gamma setting of **.45** will give the best detail but also brightens the background. It tends to wash out faint targets in light polluted skies.

Typically the **0.45** setting is used when viewing on a RGB monitor while the 1 setting is used when viewing on a lcd monitor.

Priority

This is one of those controls that pretty much is left in **AGC** mode. About the only time **Priority** may have an advantage is under very dark sky conditions.

BLC (Back Light Compensation)

Tells the Xtreme where to compensate the CCD's chip location to augment or reduce the gain. This can be used to help reduce the amp glow in the upper left hand quadrant of the chip.

This control has three settings: **OFF**, **ON**, or **Peak**

By turning **BLC**: **ON** and having set the **Peak** this will allow you to check any of the 48 grid locations where you would like the **BLC** to compensate.

➢ Select **OFF** to turn off **Back Light Compensation**
➢ Select **ON** to enable **BLC** and also to enable the grid for area selection. Place a check mark in the boxes where you would like **Back Light Compensation** to affect. This can be useful for reducing amp glow in Hyper Mode.
➢ Select **Peak** to adjust the amount of total Back Light Compensation instead. You can manually adjust the level from 0 to 8. Either press the up/down arrows or type in the desired amount and press enter.

4. Cooling

TEC (Thermal Electric Cooler)

The **TEC** control helps with noise reduction and thus helps reduce warm pixels, the control provides two simple choices **ON** or **OFF**. These choices refer to whether noise detection is turned on or not, rather than the cooler itself. When noise detect is turned **ON**, the current frame is analyzed for noise. If noise is then detected the Peltier cooler is turned on during the next frame. If noise is detected on that frame, then the cooler stays on, if not the cooler is turned off.

ON: Should be used for short duration lunar and planetary integrations with the its **Preset** checked (which activates the dew removal for the entire CCD chip). It is recommended that you set the **Dew Removal** to **60 seconds** and the **Level** to **8** which is the most sensitive noise detection setting.

You can also manually change the duration time and chip location for **Dew Removal.**

OFF: For longer integrations like DSOs, the noise detect should be turned **OFF**, (which means the cooler runs continually for every frame). Any integration over **14 seconds** should have the **TEC** turned off so the cooler runs continuously for every frame.

While waiting for the camera to be fully functional, I always make sure the **TEC** is set to - **noise detect**: **ON**, with **Preset** checked, **Level** is at **8** and dew removal set at **60 seconds**. I will usually have this pre-set from my previous session when powering down the camera.

Summary

The following Table give the settings for the three modes of Exposure

Application	*Sense Up*	*ALC/ELC*	*AGC*	*TEC*	*Preset/Custom (Integration)*	*Exposure Duration*	*Image Display Time*
Planetary, Lunar or Solar	*OFF*	*1/100 to 1/12000*	*OFF*	*ON*	*OFF*	*1/100 sec to 1/12000 sec*	*Instantaneous*
Brighter Deep Sky Objects or used for aligning up the telescope with the Xtreme	*X2 to X128*	*Set to ALC* *ALC:OFF*	*Manual* *Level: 4*	*OFF*	*OFF*	*1/30 sec to 2.1 seconds*	*1/30 sec to 2.1 seconds.* *If X128 then 3.00 minute reset time activated*
Fainter Deep Sky Objects	*X128*	*Set to ALC* *ALC:OFF*	*Manual* *Level: 4*	*OFF*	*Either Preset or Custom*	*Desired Value*	*3.00 minute countdown timer activated.* *Desired Value*