

ASTROVID StellaCam EX TM " Bridging the Gap between conventional CCD and Video Imaging"



ACCLAIM FOR THE STELLACAM EX ASTRONOMICAL CCD VIDEO CAMERAS:

MAGAZINE REVIEW - SKY & TELESCOPE FEB. 2003 :

"AFTER SEVERAL NIGHTS USING STELLACAM - EX WITH A VARIETY OF LENSES AND TELESCOPES, I REGARD THE CAMERA AS A GROUNDBREAKING TOOL FOR AMATEUR IMAGING." JOHNNY HORNE

"STELLACAM IS ALSO AN OUTSTANDING PUBLIC OUTREACH TOOL THAT CAN PUT DETAILED LIVE VIDEO OF NEBULAE, GALAXIES, AND COMETS ON A MONITOR SETUP INDOORS." JOHNNY HORNE

"ADIRONDACK'S SPECIFICATION SHEET FOR STELLACAM NOTES THAT THE CAMERA BRIDGES THE GAP BETWEEN VIDEO AND CCD IMAGING. AFTER USING THE STELLACAM EX, I COULDN'T AGREE MORE." JOHNNY HORNE

CUSTOMER ACCLAIM:

Friday night, I had the most exciting observing experience in over twenty years of enjoying the night sky. Mike O'Connor brought over his new, just released Stellacam EX from Astrovid to try it out on the 12" SCT LX200 @ f3.3. The Stellacam EX uses a new Sony video chip with an incredible lux rating of .00005 and a 1/60th to 2 second scan rate. Their web site gives high praise to this new camera, but it in no way prepared us for its unbelievable capabilities. TRISTAN

ASTROVID STELLACAM EX AND STELLACAM NON-EX SPECIFICATION COMPARISON -

- 1. THE STELLACAM EX HAS MORE DYNAMIC RANGE AND IS MORE SENSITIVE BY AT LEAST ONE MAGNITUDE WHEN COMPARED TO THE NON-EX VERSION OF THE STELLACAM.**
- 2. THIS PERFORMANCE IS NOT BASED ON BENCH TESTS BUT ACTUAL TELESCOPE PERFORMANCE!**
- 3. THEREFORE, WE RECOMMEND THE STELLACAM EX OVER THE NON-EX FOR ALMOST ALL CUSTOMERS**
- 4. THERE WAS A POINT IN TIME WHEN THE EX VIEW CCD'S WERE IN VERY SHORTLY SUPPLY. WE HAD THE **NON-EX-VIEW** CAMERAS IN STOCK. WE RECOMMENDED THAT MOST CUSTOMERS WAIT FOR THE EX VIEW VERSION AS THIS WAS THE BEST POSSIBLE PRODUCT FOR THE CUSTOMER INTERESTED IN VIDEO ASTRONOMY! WE ALWAYS PLACE THE CUSTOMER FIRST AND WILL GIVE HONEST ACCURATE ADVICE. WE NEVER PLACE THE SALE FIRST.**

SONY EX-VIEW vs. SONY HAD CCD's:

There is misinformation on the Internet about the issue " SONY EX View vs. SONY HAD CCD chips" from a telescope company that sells video cameras , so I asked Terry Platt, (the designer of the STARLIGHT XPRESS CCD cameras, who has been using SONY CCD's since the mid 1980's) for his comments about the two CCD chips. Here is his reply:

Hi John,

The (ITE report by Mike Palermiti) ... report makes little sense and I can only assume that their measurement technique was flawed. Here are a few lines about SuperHAD and EXView:

Sony CCDs are all based on a patented pixel structure, known as the 'HAD' (Hole Accumulation Diode). The HAD structure has an extremely low dark current and, when combined with a superimposed 'microlens', it can achieve over 50% effective QE in the green part of the visible spectrum. About 3 years ago, Sony launched a new variety of HAD sensor, in which the active depth of the pixel was increased and some microlens improvements added. This is the 'Exview HAD' sensor and has an improved visible light QE (by about 20%), but, more importantly, a much improved near infra-red response. This is achieved by the increased pixel depth, as IR light penetrates much further than visible light before creating an electron-hole pair. The EXView CCD has approximately double the effective sensitivity of a normal HAD sensor when exposed to broad spectrum light (including IR) but has much the same thermal and readout noise, so there is a considerable net gain in performance. As astronomical sources are mostly very broad-band, this increased sensitivity is a considerable advantage for imaging faint stars and galaxies. It also gives the CCD a substantial boost for H-alpha imaging. The Exview device is less advantageous for colour imaging, as an IR blocker is frequently used to give better colour rendering, but even here the IR sensitivity can be used to record a strong 'Luminance' signal for LRGB images.

Regards,
Terry Platt.

INNOVATION AND QUALITY:

1. **THE INNOVATIVE STELLACAM EX INCORPORATES MANY OF THE INNOVATIONS FOUND IN EARLIER ASTROVID MODELS AND THEN TAKES THEM ONE STEP FURTHER!**
2. **ANOTHER VIDEO INNOVATION **FIRST** DEVELOPED BY AVA IS THE PC CONTROL OPTION FOR THE STELLACAM EX. THIS MAKES BOTH INTERNET AND NETWORK IMAGING POSSIBLE ! IT IS PERFECT FOR THE ROBOTIC OBSERVATORY WHERE THE IMAGER OR CLASSROOM IS HALF A WORLD AWAY!**

CLEAN VIDEO TECHNOLOGY (CVT) :

1. **THE STELLACAM EX AND ALL ASTROVID CAMERAS ARE STRICTLY ENGINEERED TO INCORPORATE "CLEAN VIDEO TECHNOLOGY" THROUGH THE USE OF THE PROPER COMPONENTS. "**
2. **"CLEAN VIDEO TECHNOLOGY" WILL GIVE YOU THE HIGHEST QUALITY IMAGES FREE OF NOISE.**
3. **THE PROPER USE OF "CLEAN VIDEO TECHNOLOGY" INCLUDES BOTH THE SELECTION AND DESIGN OF THE ENTIRE SYSTEM. THAT INCLUDES THE POWER SUPPLY, CAMERA HEAD, REMOTE CABLING, CONTROL BOX, CONNECTORS, VIDEO CABLE, WIRING AND GROUNDING.**
4. **THE QUALITY OF OUR STELLACAM EX IS SO EXCEPTIONAL THAT WE HAVE NOT ONLY HAD MANY FIRST TIME USERS BUT REPEAT CUSTOMERS FROM NASA, BOEING, CORNELL UNIVERSITY ETC. THESE DEMANDING CUSTOMERS REQUIRE THE CLEANEST, NOISE FREE IMAGES!**

REMOTE CONTROL BOX:

1. **THE UNIQUE REMOTE CONTROL BOX FOUND IN THE ASTROVID LINE, WAS A GROUND BREAKING INNOVATION **FIRST** DEVELOPED BY AVA SO THAT CRITICAL ADJUSTMENTS COULD BE MADE TO CAMERAS IN THE FIELD WITHOUT DISTURBING THE TELESCOPE.**
2. **NO LONGER IS IT NECESSARY TO FUMBLE WITH TINY DIP SWITCHES AND SCREWS IN THE DARK**
3. **ADJUSTMENTS CAN BE MADE FROM DISTANCES UP TO 300 FEET. THIS MAKES THE STELLACAM EX PERFECT FOR OBSERVATORIES, SCHOOLS COLLEGES ETC.**
4. **OUR CONTROL BOX INCORPORATES THE "CLEAN VIDEO TECHNOLOGY" PROTOCOL AND IS SHEILDED AND GROUNDED TO PREVENT ANY INTERFERENCE.**
5. **THE CONTROL BOX HAS BOTH S-VIDEO AND COMPOSITE VIDEO OUTPUTS**



UNIQUE CONTROL CABLING:

1. ANOTHER INNOVATION (PAT PENDING) DEVELOPED **FIRST** AT AVA IS OUR REMOTE CABLING
2. THE REMOTE CABLE FROM THE CAMERA TO THE CONTROL BOX ALLOWS THE CAMERA TO BE USED UP TO 300 FEET AWAY.
3. THE REMOTE CABLE INCORPORATES THE VIDEO SIGNAL, THE CAMERA CONTROL SIGNAL, AND THE POWER TO THE CAMERA. EACH ONE OF THESE SIGNALS FOLLOWS THE "CLEAN VIDEO TECHNOLOGY " PROTOCOL AND IS SHEILDDED FROM THE OTHER SIGNALS. EACH COMPONENT IS PROPERLY GROUNDED AND GROUND LOOPS ARE ELIMINATED. THIS GIVE CLEAN NOISE FREE IMAGES.
4. THE USE OF ONE SINGLE CABLE WITH ITS GROUNDED AND SHEILDDED DB 15 CONNECTOR PROVIDES AS VERY CLEAN AND SIMPLE SYSTEM IN TERMS OF CONNECTION TO THE REMOTE CONTROL BOX AND CONNECTIONS AT THE TELESCOPE.
5. THERE ARE NO MESSY CAMERA CONNECTIONS, NO LONG EXTENSION CORDS NEEDED, NO EXTRA VIDEO CABLES DANGLING FROM THE TELESCOPE THAT COULD GET TANGLED IN THE TELESCOPE DRIVES. THIS IS ESPECIALLY IMPORTANT IN ROBOTIC OR OBSERVATORY SYSTEMS WHERE THE IMAGER IS NOT CLOSE BY.
6. MISINFORMATION ON THE INTERNET HAS BEEN BROUGHT TO OUR ATTENTION BY ONE OF OUR CUSTOMERS. IT WAS ERRONEOUSLY REPORTED THAT OUR REMOTE CONTROL CABLE IS POORLY DESIGNED AND HAS THE POSSIBILITY OF NOISE BEING INTRODUCED. BE ASSURED THIS IS **NOT** THE CASE. WE HAVE, FOR A LONG TIME WORKED VERY CLOSELY WITH VIDEO ENGINEERS AT THE MAJOR CAMERA MANUFACTURERS TO PRODUCE THE BEST POSSIBLE PRODUCTS. WE STAND BEHIND OUR REPUTATION AND OUR PRODUCTS. THIS STELLACAM CAMERAS ARE THE MOST ECONOMICAL, FULLY SHEILDDED SYSTEMS AVAILABLE THAT PERFORM FLAWLESSLY RIGHT OUT OF THE BOX.

PC CONTROL :

THE LATEST INNOVATION FROM ADIRONDACK VIDEO ASTRONOMY AND A **FIRST IS THE PC CONTROL OPTION FOR THE STELLACAM AND STELLACAM EX CAMERAS. THIS MAKES THE STELLACAM EX THE MOST FLEXIBLE ASTRONOMICAL CAMERA IN THE UNIVERSE.**

- 1. THERE IS BUILT-IN HARDWARE / SOFTWARE CONTROL SO THAT THE CAMERA CAN BE TURNED OFF AND ON ANYWHERE IN THE WORLD.**
- 2. You can control any of the cameras functions over your local network anywhere in the world**
- 3. MAKE and SAVE YOUR OWN FAVORITE OBJECT SETTINGS FOR YOUR PARTICULAR TELESCOPE (ie. MARS on your refractor , MARS on your C-11, MOON on your C-8 etc.)**
- 4. CAN BE NETWORKED, CONTROLLED VIA VNC SOFTWARE, CAN BE USED ON BOTH WIRELESS AND HARDWIRED NETWORKS. INTERNET CONTROLLABLE.**
- 5. PERFECT FOR SCHOOLS ,OBSERVATORIES, PLANETARIUMS, COLLEGES, AND SCIENTIFIC APPLICATIONS WHERE CALIBRATED CONTROL IS REQUIRED**
- 6. TWO SOFTWARE PROGRAMS INCLUDED - SIMPLE AND A SCRIPTABLE VERSION**

QUALITY CONTROL:

- 1. WE INSPECT EVERY CAMERA HEAD UPON RECEIPT. IF IT DOES NOT MEET OUR SPECIFICATIONS IT IS REJECTED. ON THE AVERAGE WE REJECT 20-25% OFF ALL CAMERAS. THEY ARE JUST NOT SUITABLE FOR VIDEO ASTRONOMY.**
- 2. WE INSPECT EVERY CAMERA SYSTEM AND RETEST THEM JUST PRIOR TO SHIPPING.**
- 3. WE STOCK A LARGE NUMBER OF COMPONENTS SO THAT IN THE RARE EVENT OF A COMPONENT FAILURE WE CAN QUICKLY REPAIR OR REPLACE THAT COMPONENT AS NEEDED. IN THE PAST WE HAVE OFTEN SERVICED CAMERAS WELL BEYOND THE WARRANTY PERIOD AT NO CHARGE. WE ARE AMATEUR ASTRONOMERS OURSELVES AND WANT OUR CUSTOMERS TO USE THEIR ASTROVIDS AND GAIN THE FULL BENEFIT FROM THEM.**
- 4. AS YOU CAN SEE THE ENTIRE SYSTEM HAS BEEN DESIGNED FOR FLEXIBILITY AND EXPANDABILITY**
- 5. WE BACK UP EVERY SALE WITH FINE SERVICE AND STOCK A LARGE AMOUNT OF ACCESSORIES TO ENHANCE YOUR VIDEO ASTRONOMY EXPERIENCE.**

HIGHLIGHTS:

1. The ASTROVID StellaCam is a highly sensitive video camera capable of imaging both deep sky and planetary objects.
2. This is the lowest light video system available on the market today It has an equivalent 0.0001 LUX rating when accumulating images **and now the StellaCam EX has an equivalent lux rating of 0.00005 when capturing deep sky objects.**
3. Prior to the advent of the ASTROVID StellaCam an Image intensifier was required to capture deep sky objects such as, Nebula, Galaxies, Planetary Nebula.
4. This camera will also perform very well with an image intensifying system such as the Collin's I Cubed intensifier
5. Deep Sky Video Imaging
6. 2. Video Finder for CCD Imaging
7. 3. Planetary, Lunar, Solar Imaging
8. 4. Satellite Imaging
9. 5. Meteor Imaging
10. 6. Camera lens imaging of aurora
11. 7. Very low light security applications. ie. bridges ,tunnels etc.
12. PERFECT FOR BIOMEDICAL & FLOURESCENT DETECTION APPLICATIONS.

CAMERA SPECIFICATIONS:

SONY released the EXVIEW 1/2 inch monochrome 600 line resolution sensor. We wanted to take advantage of this and now have a model of the ASTROVID StellaCam that incorporates this sensor called the StellaCam EX. This CCD is SONY's top of the line Ceramic Dual Inline Package Monochrome Sensor.

LUX VALUES

The following lux values can be achieved with the StellaCam and StellaCam EX. These are true lux values and are not overstated.

Planetary mode 1/60 second : 0.01 lux

Accumulation mode: 0.0001 lux

StellaCam EX \$695.00 (a conservative estimate is that the increase in sensitivity for the StellaCam EX is between 150% and 175% over the standard StellaCam)

Planetary mode 1/60 second : 0.005 lux

Accumulation mode: 0.00005 lux

STELLACAM CAMERA HEAD:



FRONT VIEW - with included 1.25" adapter



BACK VIEW - Using this 15 pin connector allows only one cord to come off of the StellaCam cameras. The cord contains the video, power, and control commands. Available pins within this connector will enable future development of the ASTROVID StellaCam cameras for computer control and other pending operations.

10 BIT A/D CONVERTOR:

The 10 bit CDS/AGC/AD convertor used in the ASTROVID StellaCam and StellaCam EX will give you a much higher quality video image. It will also produce a much higher frame captured image. The main reason to use the 10 bit A/D converter is to give a better gamma (contrast) correction.

Proper Gamma correction is the essential technology needed to create an excellent quality image. Most of the monitor tubes have $1/0.45=2.22$ gamma curve and LCD panel have even worse gamma curve as $1/0.3-3.33$. If a perfect linear video signal is sent to a CRT for image display, the end result will be a very bad image with 80% of the information compressed into only 30% of the gray scale. In other words you have lost much of your image quality and the amount of grayscale information for image processing has also been lost.

During Gamma correction process, the DSP will need 2 to 10 times more information or in another word 2 to 4 more bits of data to provide enough detailed information for processing later on. The perfect way to do Gamma correction is to input 12bit and yield 8 bit after process. with extra 4 more bit ($12-8 = 4$ bit). The DSP will produce a perfect image with all of the possible gray scale information rendered correctly. There will be more grayscale information than can be discerned with the human eye.

Most CCD cameras available only use 9 bit DSP's for the surveillance / security camera market. This only gives 1bit more of information or 2 times more gray scale. The result is that the dark portions of the image will lose a great amount of gray scale detail.

The ASTROVID StellaCam and StellaCam EX use the 10 bit converter. This provides 4 times more gray scale information or 2 bit more data. The result is a very brilliant image with 4 times more grayscale than conventional security CCD cameras such as the PC232.

ASTROVID StellaCam CONTROL BOX



The use of the separate control box and the on-screen display of the camera controls make this camera very easy to use. The outlay of all of the controls make the AstroVid StellaCam very intuitive to use. We also designed the control box with large buttons so that under less than ideal conditions the controls are easily managed. It is possible to control the camera quite efficiently even while wearing gloves.

The functions of the various buttons on the control box are as follows.

MIDDLE BUTTON - IS THE MENU / ENTER BUTTON - This button is used to access the Main Menu. Depressing the middle button for 2 seconds will allow you to enter the Main Menu.

Once in the Main Menu you can also use the Middle Button as an Enter button to enter any of the On Screen Display Camera Controls that are manually controlled.

TOP and BOTTOM BUTTON - SCROLLING BUTTONS - These buttons will allow you to scroll up and down within the main menu and within any sub menu that will have more than one vertical choice.

LEFT and RIGHT BUTTONS - SELECTION BUTTON - These buttons allow you to make a selection either in the main menu (ie. turning titles on or off) or in one of the sub menus. (ie. setting your gain or shutter speed selections)

This may sound difficult at first, but it becomes very intuitive and adjustments can be made very quickly. You can operate in complete darkness. You will not even need to look down at the control box as you make your adjustments.

The control box comes with 12 feet of camera to control box cabling. Highly shield extension cables will be available in 12, 24,50, 75, 100 feet. This will permit remote operation of the camera.

ON SCREEN DISPLAY MENUS

The following pictures will highlight the various camera controls accessed via the on screen display.

MAIN MENU - the main menu can be accessed by pressing the center button on the control box and holding it down for one to two seconds. Settings accessed via the Main Menu



THIS IS A SAMPLE SCREEN OF THE SETTINGS(DEEP SKY) FOR THE ESKIMO NEBULA - this is a single frame grab

Title- allows you to access the title menu to label your video image. Use the right button to select the letter or character. Use the center button to enter the character.

Sense Up - this is the frame accumulation mode used when you want an extended integration time beyond the normal 1/60 of a second video frame exposure. Various frame accumulation rates can be selected up to 128 frames. If this setting is set to off then the normal shutter speed rates of 1-50 -1/120,000 second can be accessed via the ALC / ELC setting also found in the main menu.

ALC/ELC - this is the parameter used for the control of the shutter speeds. ALC is the manual shutter control / ELC is the automatic shutter speed control.

BLC - this parameter is more for terrestrial use, as it compensates for a brightly back illuminated scene.

White Balance - not used on the ASTROVID StellaCam

Sync - synchronization of the camera - setting should be left on INT. or internal.

Option - optional functions of the camera accessed via this menu.

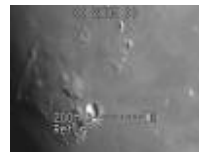
Zoom - this is a 2X digital zoom that allows you to zoom in on your image. The high quality of the image is maintained. This is very useful when you are using a Barlow lens. If your seeing permits, you effectively have the ability to vary the magnification of your barlow lens digitally. This means a 2X Barlow can be varied up to 4X. A 3X Barlow to a 6X Barlow etc.



ZOOM OFF



ZOOM 1X



ZOOM 2X

Exit - SAVE - This allows you to exit the Main Menu and saves all of the settings upon exit.

MODEL NUMBER	AV-STCAM AV-STCAM EX
BROADCAST SYSTEM	AV-STCAM (NTSC, PAL) and AV-STCAM-EX
IMAGE SENSOR Click on pdf links for SONY Sensor Info.	STCAM (pdf) ICX038DLA STCAM - EX (pdf) ICX248AL
CCD TOTAL PIXEL NUMBER	811 (H) X 508 (V) 596 (V) 795 (H) X
SCANNING SYSTEM	525 LINES 60 FIELDS/SECOND NTSC 625 LINES 50 FIELDS/SECOND EIA
SYNC SYSTEM	INTERNAL / VD - LOCK (OPTION)
MINIMUM ILLUMINATION - <u>for detailed info on this value click on this link</u>	STELLACAM Planetary- F/1.2, 5600K, 30 IRE 0.01 lux Integration (Deep Sky) mode - F/0.8 , 5600K, 10 IRE 0.0001 lux STELLACAM EX Planetary - F/1.2, 5600K, 30IRE 0.005 lux , Integration (Deep Sky) Mode - F/0.8, 5600K 10IRE 0.00005 lux
RESOLUTION	600 TELEVISION LINES
GAIN CONTROL	AUTOMATIC / MANUAL GAIN 0-18dB
SIGNAL TO NOISE RATIO	52 dB minimum / 60 dB typical (auto gain control off)

ELECTRONIC SHUTTER (NORMAL MODE)	1/60 - 1/120,000 NTSC 1/50 - 120,0000 PAL
AUTO IRIS	A.E.S. / DC
ON SCREEN DISPLAY	ON SCREEN DISPLAY FOR ALL CONTROLS
ON SCREEN DISPLAY CONTROLS	5 Button - push button separate control box
FLICKER LESS	selected via onscreen display - MANUAL CONTROL
MIRROR FUNCTION	selected via onscreen display - MANUAL CONTROL
BACKLIGHT COMPENSATION	selected via onscreen display - MANUAL CONTROL
IMAGE ENHANCE	selected via onscreen display - MANUAL CONTROL
DIGITAL ZOOM 2X	selected via onscreen display - MANUAL CONTROL
NEGATIVE IMAGE	selected via onscreen display - MANUAL CONTROL
MASKING AREA	selected via onscreen display - MANUAL CONTROL
AUTOMATIC OR MANUAL GAIN ADJUSTMENT	selected via onscreen display - MANUAL CONTROL
FRAME ACCUMULATION (ON- BOARD THE CAMERA)	selected via onscreen display - MANUAL CONTROL from 2 to 128 frames
VIDEO OUTPUT	COMPOSITE AND Y-C VIDEO 1.0 VOLT P-P AT 75 OHM
GAMMA CORRECTION	0.45
OPERATION TEMPERATURE	-20C TO +50C
OPERATIONAL HUMIDITY	WITHIN 85%
POWER SUPPLY	DC 12V + OR - 1VOLT / 180 mA

The StellaCam system includes, Camera, Control box, 12 foot cable from camera head to control box, 25 foot shielded BNC to RCA video cable, 110 volt (220 volt PAL) power supply, c to 1.25 inch adapter, Instructions, One Year Warranty.



LEONID METEOR SHOWER IMAGE

NOTES