Operating Manual
AllSky-340 and AllSky-340C
CCD Cameras

Note: This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.
• Increase the separation between the receiver and the equipment.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

Shielded I/O cables must be used when operating this equipment. You are also warned, that any changes to this certified device will void your legal right to operate it.

_____

TABLE OF CONTENTS

Introduction and Overview:

SBIG's new All-Sky camera, the AllSky-340, is SBIG's third version of a weatherproof AllSky camera for monitoring weather conditions. The first had to be obsoleted when we stopped production of the ST-237A, and the second went obsolete when the lens we were using became unavailable, with no suitable replacement. The third version is our best one yet! The sensor is the Kodak KAI-340 CCD, with 640x480 pixels, 7.4 microns square, and a high gain output stage for excellent sensitivity. The camera containing the CCD is our SG-4 Smart Guider camera, our new autonomous guide camera that is also available.

The All Sky 340 camera, illustrated below in Figure One, incorporates the SG-4 Camera inside an aluminum enclosure with an acrylic dome to protect the fisheye lens. The fisheye lens recommended by SBIG is Fujinon's new FE185C046HA-1, with a 1.4 mm focal length, F/1.4.

Figure One: All Sky 340 Camera
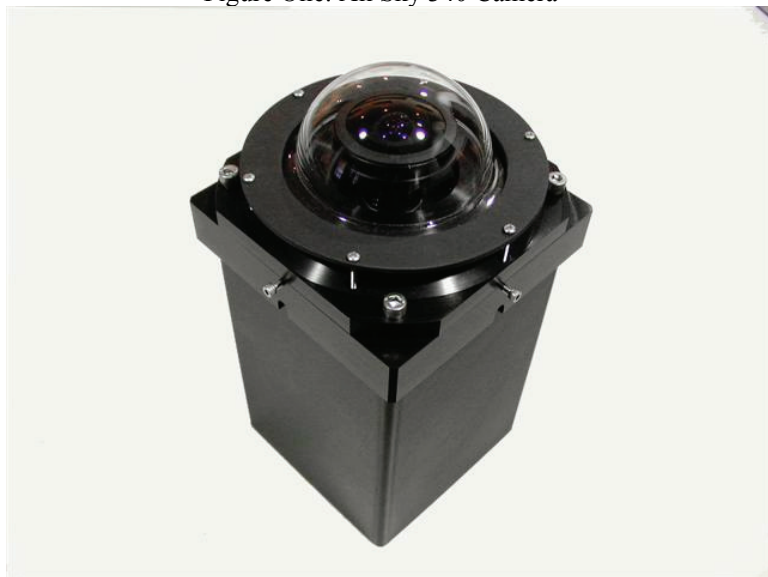
The image quality is excellent wide open, all the way to the horizon. Figure Two shows an All Sky camera image with the Fujinon lens and KAI-340 CCD. The exposure was 60 seconds from a light polluted backyard – the first quarter moon had just set behind the

roof. The field of view is slightly greater than 180 degrees in the horizontal direction.

Figure Two: All Sky Camera Image

The image illustrated was taken using a monochrome sensor. The unit is also available with a color CCD sensor. Note: with a monochrome sensor the daylight images are not particularly good – the sun and bright clouds saturate large portions of the field of view. With a color sensor the sun has a strong blooming streak top to bottom in the image, which mars the aesthetics of the image, but it still works well for cloud detection.

The new All Sky camera has some very interesting features that make it much more versatile than our previous offerings. First of all, it has an RS-232 link to the PC for control and image download. While this interface is very slow in comparison to USB, it will tolerate 150 foot (30 meter) cable runs. Or, you can throw away the cable and use a bluetooth wireless link with an optional inexpensive adapter. And, the unit is low power and can be powered by a solar array (also optional) so you don't need any wires AT ALL running from your PC to the camera! The beauty of this is now the unit can be located where it has a good view of the sky, instead of good access to a power plug or PC. Your roof is now the preferred location, above the trees and neighbor's houses.

By actual test, an RS-232 link, using a USB to RS-232 adapter running at 460.8 Kbaud, with a 150 foot long cable, downloads a full image reliably in ~15 seconds. At 115.2 Kbaud a full image takes ~60 seconds. Bluetooth wireless adapters will typically run at 115 Kbaud, and the one we have tried here worked reliably at a distance of 75 feet. With wireless links, one must minimize the number of walls you have to pass through. Each wall (2 layers of dry wall or wood) costs about a factor of two in signal and range.

The All Sky camera can take an image while transmitting, so with exposures longer than the download time the camera is only insensitive for the length of the readout of the CCD, which takes place in less than 1 second to an internal memory buffer in the camera. As a result, the camera is excellent for meteor detection. Its field of view is wider than our previous meteor camera, so it should see many more meteors near the horizon. One other plus – the software can run continuously in the background while you use your computer for other tasks. At these download rates the computer workload is so slight your applications won't even notice. It will not interfere with regular imaging using the same PC. The All Sky image is there when you want to view it.

Mechanical Implementation:

The housing is lustrated in Figure One. The fisheye lens is mounted to a plate which can be translated, tipped, and focused relative to the CCD, so the full resolution of the lens can be achieved. This plate is also heated, to keep the lens free of condensation. The heat rises into the acrylic dome, warming it and keeping off the dew, and drying off raindrops. The inexpensive acrylic dome is easily replaced by removing a few screws, allowing for routine replacement in the field as the dome suffers the inevitable scratches and damage due to sunlight, windblown dust and disrespectful birds. The prototype shown in Figure one is black – the production version has a white body so it doesn't get as hot in the sun. The unit is 5.5x5.5x11 inches in size (14x14x28 cm). The cables are designed to exit out the bottom of the unit so the connectors stay dry. If one runs the cables into a building make sure the last section of cable before entering the structure angles upward so water doesn't drip down the cable into the wall. The housing has holes in the side so it can be easily mounted to a post with ¼-20 lag screws, or ¼-20 bolts.

Initial Setup and Focusing:

As with all of our products, we recommend a user become familiar with the product indoors in a well-lit setting before venturing outside. A rooftop may be the best place to mount an All Sky camera, but it is the worst place in the world to be installing software and learning camera operation, particularly in the dark. Also, do not try to go to Bluetooth immediately – start with a wired connection. Begin by installing the software to your PC. Make sure you have administrator privileges on the PC, and insert SBIG's software disk. A screen should pop up in a few seconds. Select "SG-4, AllSKy-340" software to install and, on the next screen, select "Install AllSKy-340". The software should install automatically. You might also choose to install CCDOPS at this time. (Note – CCDOPS will not communicate with the AllSky 340. It can display FITS files saved with the AllSky Program, but that is all.) Next, connect the 9-pin serial cable between a serial port on your PC and the AllSky Camera's RS-232 port. If your computers does not have a serial port, one can be easily implemented using an USB-RS-232 converter. One we have had good luck with is the FTDI US232R-10-BLK, but there are many to choose from. We stock this converter if you wish to purchase it, and the drivers are also on the software disk. Finally, hook up the power to the AllSky camera, making sure the connector is well seated and does not wiggle (which would cause the power to be intermittent). Power up the unit, and flip the small recessed Power On/Off switch toward the lettering. The red LED in the switch should light steadily.

Launch the SBIG AllSky340 software. You will see the screen shown in Figure Three as well as one or two image windows.

Figure Three AllSky340 Main Software Screen
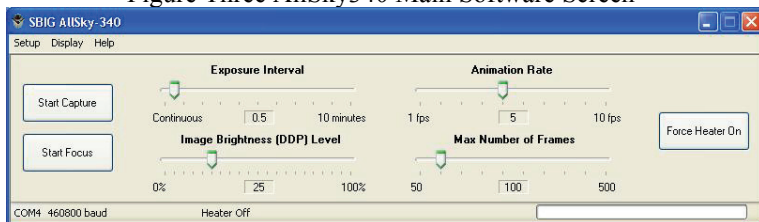
The first item to try is under the Setup menu item - Serial Port. This will open up a window you can use to test the RS-232 link. There you can enter the COM port and the baud rate, and hit TEST. If you

are successful, a box will pop up saying so. Note that when the window opens it automatically tries to communicate with the camera on the selected COM port, starting at 9600 baud and working it way up in speed. If it successfully finds a camera it tells the camera to switch to a higher baud rate and try that. If it cannot communicate at the higher baud rate, it reverts back to the last successful baud rate. This all happens automatically without user control. The reason you need to know this is if you try the camera indoors on a computer with a fast link, and then move outside to a laptop with a slower link, the camera will not communicate. When this happens, the camera can be reset to 9600 baud by turning off the power, and holding down the Guide On/Off button while powering up the camera, and holding it until the status LED turns red. Then when the Serial Port command is run it will start out at a baud rate that will work on any machine (9600).

Once you have successful communication, start the focus operation by clicking the Start Focus button on the Main Software Screen. The camera will start out by taking very short exposures and gradually working its way up to longer exposures until it senses adequate signal levels. The images displayed are binned 2x2 to speed this process up. When you start this command, you should have the AllSky camera in a well-lit room with something on the ceiling above it you can focus on (other than a way too bright light bulb!). When an image with adequate brightness is collected the software will ask you to select a region to focus on. Pick a structured area in the center half of the frame and the software will go into a rapid focus mode zoomed in on that area. Focus the area carefully and, when done, select STOP FOCUS to end the process and return to the Main Screen.

Once you have a pretty good focus, you might want to select START FOCUS again and work on the centering. When that looks good, you can select the START CAPTURE command which will capture and display full resolution images. You can use these images to set the final focus. Adjusting for best focus across the CCD by tilting the lens is best done outside with the unit looking up at a star field. Focusing the AllSky camera can take some time to get perfect, so don't be in a rush to get through this step. Fortunately focus holds over temperature changes fairly well. Sometimes the day/night temperature cycling can initially cause some focus shift, but it should settle down after that.

Focus, Tilt and Centering Adjustments:

The focus, tilt and centering adjustments are shown in Figure Four. If you have the lens installed at the factory it will be close when you get it, but it can be tedious getting it perfect.

Figure Four: Focus, Tilt and Centering Adjustments
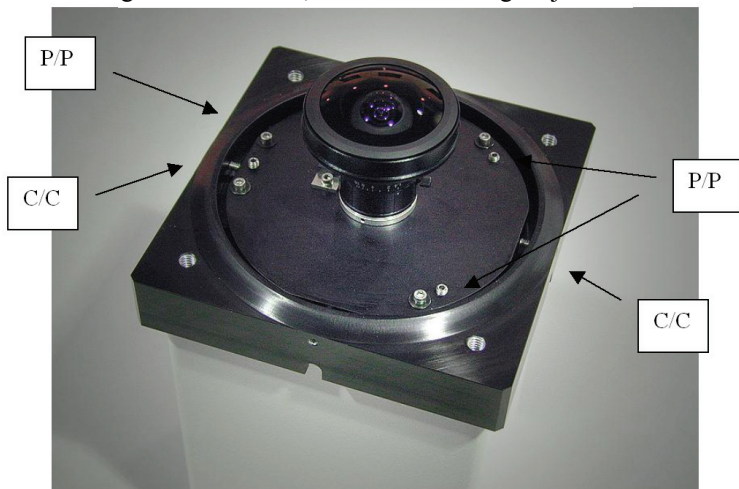
Focus can be adjusted with the three sets of push/pull screws around the periphery of the lens plate (marked P/P). They are adjusted by loosening one screw of the pair slightly, and tightening the other. You are trying to set focus to an accuracy of about 0.001 inch (25 microns), which is only $1/25^{th}$ turn of the screw, so a very delicate touch is required when close. To set the centering, use the push/pull screws labeled C/C around the edge. Note that this adjustment can only be done when the focus screws are a little loose so the plate can translate. The proper order of adjustment is:

A) Inside, in a room:

1) Set the focus close to correct in the center of the image
2) Translate the lens so the centering is quite good
3) Set the focus in the center carefully

B) Outside, under the stars

1) Adjust the tilt of the lens plate to get the best focus

across the image
2) Tighten up the screws, but do not over tighten them
3) Check focus in the center again

Setting up the software for logging All Sky images to your PC or the Internet:

The ABIG AllSky 340 software supports a variety of logging options you can use to monitor sky conditions. The simplest is to just have it running in the background on your computer, and when you want to see the latest still image, merely maximize the application. Other options are to log all images as JPEG and FITS files to your disk, to log a JPEG or FITS image to a fixed location on your disk over and over, to transmit the files to a web site where others can download them, to create movies out of these files saved on your disk for visualization on your PC or to be uploaded to an FTP site, etc. The most useful for users who want to share their sky information with others is just to write a JPEG to a fixed web address automatically. If you have a web page with FTP access, the software will allow you to repetitively write the latest image to a location there provided you have your user name and password. See the AllSky Software Section of this manual for more information on these options.

Installing Firmware Updates for the AllSky340:

The AllSKy340 can be easily reprogrammed in the field using the following procedure:

1) Within the AllSky340 program, select HELP from the top task bar menu, and select ABOUT,
2) Click the REPROGRAM button,
3) Browse to the new program file (.BFx),
4) Select "OK"

At the end of reprogramming turn power off to the camera and turn it back on to force a fresh boot of the camera.

Miscellaneous Issues:

The primary purpose of this camera for most users will be detection of cloud cover, both during day and night, but primarily night, at a remote site. Under massive saturation conditions, such as the sun in the field of view, a vertical column of saturated pixels will be seen in the image. This appears to be unavoidable at our shortest exposure of 50 microseconds. When thin clouds are near the sun it can blossom out horizontally, and be annoying. We feel that, while this is cosmetically irritating, it does not compromise the primary purpose of this device much. The monochrome sensors are more affected by this due to their approximately 4X greater sensitivity.

There is a vent hole underneath the lens plate to allow the enclosed space under the dome to ventilate to the outside air. There may be conditions where fogging can appear inside the dome under rapidly changing atmospheric conditions but it should dissipate quickly (within an hour) due to the action of the heater. The heater, when on, is injecting >4 watts into the lens plate to keep the lens clear of moisture and also the dome, as the heat rises from the plate. This power level has worked well here in Santa Barbara, which is really prone to fog due to the presence of the ocean – we think it will work well for most users. The heater is seldom needed in the day since the sun heats up the interior of the dome, but will hurt nothing if left on. The heater schedule can be set within the software mainly to conserve power for solar powered installations.

Be sure to ground the case. Do not assume the case is grounded through your PC RS-232 port. At SBIG we have had many cameras come in that were destroyed by lightning, but at least 4 times more than that were not actually struck, but simply in the presence of high electric fields when lightning is in the area. If the camera is on your rooftop it becomes a lightning rod unless your installation is solar powered and has a wireless connection. If it is on a roof, and you are running an RS-232 cable to your PC, we recommend you use an RS-232 isolator, such as the B&B Electronics 9SPOP2 (www.bb-elec.com). It slows your baud rate to 115,200. There may be faster ones out there, but we are not familiar with them.

Since the KAI-340 CCD used in the AllSky 340 camera is not cooled, dark frames are required on a regular basis to cancel out the pattern noise due to hot pixels scattered across the CCD. For this

reason the AllSky 340 camera has a built-in mechanical shutter. The software contains a control to schedule how often a dark frame is collected. A new dark should be collected if the ambient temperature changes by one degree, so each user may have different situations at their site. We recommend a new dark at least every 15 –30 minutes or so.

AllSky-340 Software

The AllSky-340 Software is a complete solution for using the SBIG AllSky-340 camera. This software provides the following functionality:

- Focus assistance
- Automatic exposure adjustment
- Continuous imaging
- Still image archiving (FITS or JPG)
- Time-lapse movie creation (AVI) and archiving
- Automatic FTP of still images and/or time-lapse movies.
- AllSky-340 Heater Scheduling
- AllSky-340C Debayering with adjustable color balance

Further details about the functionality of the AllSky-340 Software can be found by browsing the help topics.

Menus

Setup Menu

The Setup Menu offers commands to setup the functionality of the AllSky-340 Software.

Commands

Serial Port...
Opens the serial port setup window to allow changing the serial port and baud rate.

Dark Subtraction...
Opens the dark subtraction setup window to allow changing the frequency of new dark frames.

Still Images...
Opens the still image setup window to configure still image saving and archiving.

Movies...
Opens the movie setup window to configure movie saving, archiving, and AVI CODEC selection.

FTP...
Opens the FTP setup window to configure the FTP server and log-in credentials.

Heater Schedule...
Open the heater schedule setup window to set the heater on and off times.

Display Menu

The Display Menu offers commands to change the visible windows and the image mode.

Commands

Show Current Image
Shows or hides the AllSky-340 Current Image window. The most recent image taken by the AllSky-340 camera is shown here.

Show Previous Images
Shows or hides the AllSky-340 Previous Image window. A time-lapse movie of the past few frames is shown in this window.

DeBayer Images
Enables or disables the debayering algorithms on the images downloaded from the AllSky-340C. This should only be enabled for the AllSky-340C. Debayering is the process of calculating a color image from the CCD, which has a Bayer Mask of color filters over each 2x2 group of pixels.

Color Balance...
Opens the color balance window. This menu item is only enabled when DeBayer Images is enabled.

Windows and Dialogs

Main Window

The AllSky-340 software main window contains the most commonly used functions when operating the AllSky-340 camera.

Commands

Start Capture Button
This button begins the imaging process. The software will continuously take images using the AllSky-340 camera, adjust the exposure time as necessary, create any images and time-lapse movies that have been setup, toggle the heater state, FTP files, and any other functionality that normally occurs during operation. After pushing this button the button text will change to "Abort Capture" and many other functions will be disabled.

Abort Capture
Pushing this will stop the imaging process. When the abort is complete, the button text will change to "Start Capture" and the disabled functions will again be available for use.

Start Focus
The button begins the focus process. While the first step of the focus process is executing, this button text will change to "Abort Focus". The focus process starts by taking a low-resolution image which will be displayed in the Current Image window. When the low-resolution image is available, the software will prompt for the user to click on a feature to focus on and the button text will change to "Continue Focus". During this time, many other functions will be disabled.

Continue Focus
After the focus feature is selected, clicking this button will continuously take a full-resolution sub-frame around the focus feature. During this process, the button text will change to "Abort Focus".

Abort Focus
Pushing this will stop the focus process. When the abort is complete, this button text will change to "Start Focus" and the

disabled function will again be available for use.

Exposure Interval Slider
This slider sets both the interval between exposure start times, and the maximum exposure time for each exposure.

When the slider is all the way to the left side, the software will take exposures as fast as possible - limited by the image download time from the camera. When set to continuous, the maximum exposure time is 2 minutes.

If the exposure time determined by the imaging process is longer than the download time, the software automatically interleaves the download of the previous image with the exposure of the next image. This allows the camera to be imaging the sky continuously (except for the CCD readout time of about one second). Thus when it is dark and the exposure time is equal to the maximum exposure time, there will only be a very short period where the camera is not actively imaging the sky.

Image Brightness (DDP) Level
Prior to displaying an image, the software will do a DDP-like non-linear stretch to the image to better display the full dynamic range of the images. This slider adjusts how strong of a DDP stretch is performed on the image. A value of 0% is the weakest stretch and produces an image that is closest to the raw image from the camera, while a value of 100% is the strongest stretch.

This stretch is applied to both the image shown in the Current Image window and the JPG that is saved to disk. The FITS file does not contain any stretching.

Animation Rate

This slider sets the animation rate for the time-lapse movies. It is applied both to the movie shown in the Previous Images window and the AVI files saved to disk.

Max Number of Frames
This sets the maximum number of frames shown in the Previous Images window, and the maximum number of frames in each AVI file saved to disk. For the Previous Images window, when the number of images taken exceeds the maximum number of frames, the oldest frames are discarded and only the most recent frames are

shown. For the AVI movie files saved to disk, when a file reaches the maximum number of frames, a new file is created for the next set of frames.

Status Bar

The AllSky-340 Software Status Bar shows current information about the state of the software.
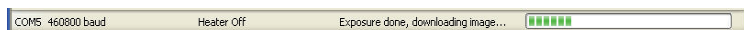
Indicator Description

- The first item in the status bar shows the current RS-232 COM port.
- Second is the current RS-232 baud rate.
- Third is the Heater status.
- Fourth is the status text for the current process. Depending on the current process, this text will change.
- Last is a progress bar indicating progress of whatever is listed in the status text. In the screen capture above, the image download is about 25% complete.

Serial Port Setup Dialog

The COM Setup Dialog allows setup and testing of the RS-232 port.

Dialog Entries

COM Port

This specifies the COM port number that the AllSky-340 is connected to. If you have multiple COM ports, you may have to experiment to determine the correct number.

Baud Rate
The drop-down list shows all the baud rates supported by the AllSky-340 and this software. The default baud rate for the camera is 9600 baud.

Test Button
Pushing this button will cause the software to attempt to connect to

the AllSky-340 camera. If the software finds the camera at the specified COM port, but at a different baud rate it will attempt to change the baud rate to the requested value. If it cannot communicate with the camera at the requested COM port or baud rate the test will fail. If the test succeeds, the Ok button will be enabled.

Ok Button
This accepts the COM Port and Baud Rate and closes the dialog.

Cancel Button

This discards any changes to the COM Port and Baud Rate and closes the dialog.

Notes

While the camera does ship from the factory set to 9600 baud, it is possible that communication with the camera may fail when using third-party adapters (e.g. Bluetooth) that do not operate at this baud rate. Thus you must first connect to the AllSky-340 using a hard-wired RS-232 (or USB-to-RS-232) link. When the "Test" button is used and a successful connection is established at a baud rate, the AllSky-340 will store the baud rate into its non-volatile memory and always use the new baud rate.

Since it is possible to use high speed baud rates not always supported (230400 baud, and 460800 baud) there may be a situation where the camera is set to a baud rate the PC cannot achieve. If the "Test" button fails at any Baud Rate and the COM Port is correct, the AllSky-340 can be reset back to 9600 baud using the following procedure:

- Power-off the camera.
- Push and hold the Guide On/Off button.
- Power-on the camera.
- Release the Guide On/Off button when the Status LED is red.
- Cycle power to the camera.

Now the camera will be reset to the default 9600 baud.

Dark Subtraction Setup Dialog

The Dark Subtraction Dialog allows setup of the automatic dark subtraction during the imaging process..

Dialog Entries

Dark Subtract Images
This checkbox enables or disables the automatic dark subtraction feature of the AllSky-340 software.

Maximum Dark Age
This defines how often to take a new dark frame when the exposure time doesn't change. Since the AllSky-340 is uncooled, the dark current can change with ambient, thus it can be important to take new darks on a regular basis.

Exposure Time Tolerance
This value determines how much of a change in exposure time will require a new dark frame. If a dark is taken with a 60 second exposure and the exposure time tolerance is 10%, a new dark will be taken when the exposure time changes to less than 54 seconds, or greater than 66 seconds.

Ok Button
This accepts the entered values and closes the dialog.

Cancel Button
This discards any changes and closes the dialog.

Still Images Setup Dialog

The Still Images Setup dialog defines what still images to save, and where to put them.

Dialog Entries

Save Current Image (JPG Format)
Checking this option allows the current (most recent) image to be saved in JPG format to the specified location. The file will be named: AllSkyCurrentImage.jpg.   When checked, the "Save Previous Images (JPG Format)" checkbox and the "Upload Current Image (JPG)" checkbox will be enabled.

Save Current Image (FITS Format)
Checking this option allows the current (most recent) image to be saved in FITS format to the specified location. The file will be named: AllSkyCurrentImage.fit
When checked, the "Save Previous Images (FITS Format)" checkbox will be enabled.

Save Previous Images (JPG Format)
Checking this option allows all the previous images to be saved in JPG format to the specified location. The file will be named: AllSkyImage000000000.jpg
The 000000000 number will be replaced by the current index (which is incremented after each exposure).
When checked the "Upload Previous Image (JPG)" checkbox will be enabled.

Save Previous Images (FITS Format)
Checking this option allows all the previous images to be saved in FITS format to the specified location. The file will be named: AllSkyImage000000000.fit
The 000000000 number will be replaced by the current index (which is incremented after each exposure).

File Name Index
This is the current number used in the previous image file names. Be careful when changing this, it may cause older images to be overwritten.

Image Path
Sets the location where the current and previous images are saved. Click the "..." button to browse to the desired location.

FTP:
Upload Current Image (JPG)
Checking this option causes the software to attempt to FTP the AllSkyCurrentImage.jpg file to the defined FTP location. The FTP parameters must be set correctly for the FTP to succeed.

Upload Previous Images (JPG)
Checking this option causes the software to attempt to FTP the AllSkyImageXXXXXXXXX.jpg file to the defined FTP location. The previous image file is only FTPed when it is first created. The FTP parameters must be set correctly for the FTP to succeed.

Ok Button
This accepts the entered values and closes the dialog.

Cancel Button
This discards any changes and closes the dialog.

Movies Setup Dialog

The Movies Setup dialog defines what movies to save, and where to put them.

Dialog Entries

Save Current Movie
Checking this will cause the software to create and save the most recent frames (defined by "Max Number of Frames" on the main window) into a movie file: AllSkyCurrentMovie.avi
When checked, the "Save Previous Movies" checkbox and the "Upload Current Move" checkbox will be enabled.

Save Previous Movies
Checking this will cause the software to create and save all the frames into movie files. Each movie file will have the number of frames defined by "Max Number of Frames" on the main window. The files will be named: AllSkyMovie000000000.avi
The 000000000 number will be replaced by the current index (which is incremented after the movie file reaches the maximum number of frames).
When checked, the "Create Playlists" checkboxes, the "Upload Previous Movies" checkbox, and the "Upload Playlists" checkbox will all be enabled.

File Name Index
This is the current number used in the previous movie file names. Be careful when changing this, it may cause older movies to be overwritten.

Movie Path
Sets the location where the current and previous movies are saved. Click the "..." button to browse to the desired location.

Update Interval
The movie files are not created or FTPed after every image is downloaded to preserve CPU and network resources. This parameter defines how often the movie files are updated. The movie file may be updated sooner than this if the maximum number of frames is reached for a specific file.

Create Playlists:
These options create an M3U playlist file for the specified period. This is useful for when the maximum number of frames, and thus each AllSkyMovieXXXXXXXXX.avi movie file, result in a shorter period of time. The M3U playlist file lists all the movies necessary to make up the time period.

For past 24 hours
When checked, creates an "M3U" playlist file for the past 24 hours.

For past 48 hours
When checked, creates an "M3U" playlist file for the past 48 hours.

Upload Current Movie
Checking this option causes the software to attempt to FTP the AllSkyCurrentMovie.avi file to the defined FTP location. The FTP parameters must be set correctly for the FTP to succeed.

Upload Previous Movies
Checking this option causes the software to attempt to FTP the AllSkyMovieXXXXXXXXX.avi file to the defined FTP location. The previous movie file is only FTPed when it is first created. The FTP parameters must be set correctly for the FTP to succeed.

Upload Playlists
Checking this option causes the software to attempt to FTP the "M3U" playlist files to the defined FTP location. The FTP parameters must be set correctly for the FTP to succeed.
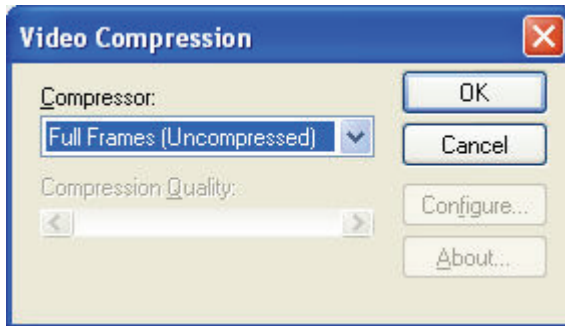
Ok Button
This accepts the entered values and closes the dialog. After closing, the Windows AVI Video Compression Setup dialog is shown.

Cancel Button
This discards any changes and closes the dialog.

AVI Video Compression Setup Dialog

The AVI Video Compression Setup Dialog defines what kind of AVI will be created.

Dialog Entries

Compressor
This selects the Codec to use to compress the AVI. For the most reliable operation select "Full Frames (Uncompressed)". We at SBIG have also had good success with the DivX Codec.

Configure...
If a compressor is selected, the Configure button will be enabled. You must configure the Codec per the Codec documentation in order for the AllSky-340 software to properly use it. Details are Codec dependent and beyond the scope of this document.

Ok Button
This accepts the entered values and closes the dialog.

Cancel Button
This discards any changes and closes the dialog.

FTP Setup Dialog

The FTP Setup dialog defines how to connect to your FTP server.

Dialog Entries

Site Name/Address
Enter your FTP site name or IP address here.

User name
The user name the FTP server requires. Some FTP sites allow anonymous login, but have different anonymous login requirements.

Password
The password the FTP server requires. Normally the password is hidden, but clicking the "*" button will un-mask the password characters for entry verification.

Remote Directory
This specifies the path on the FTP server where to upload files. Click the "..." button to browse the FTP server path. (You must have the Site Name, User Name, and Password correct in order to browse the FTP server directory.)

Purge old files from server
Checking this will case the AllSky-340 software to remove any old files from the server. This is useful to preserve storage space on the FTP server. Be careful - all files beyond the time specified in the Remote Directory will be deleted. If this feature is used, it is best to have a dedicated directory on the FTP server for just the AllSky-340 images and movies.

Remove files after
Defines how old the files must be prior to their removal from the FTP server.

Heater Schedule Setup Dialog

The Heater Schedule setup dialog defines when to turn on and off the heater.

Dialog Entries

Turn On at
Defines the time to turn the AllSky-340 heater on.

Turn Off at
Defines the time to turn the AllSky-340 heater off.

Notes

To leave the heater on all of the time, set the Off time to be one minute before the On time.

To leave the heater off all of the time, set the On time to be one minute before the Off time.

Color Balance Dialog

The Color Balance dialog defines the color weights during the debayering process.

Dialog Entries

Red
The red slider and entry define the weight of the red pixels in the final image.

Green
The green slider and entry define the weight of the green pixels in the final image.

Blue
The blue slider and entry define the weight of the blue pixels in the final image.

Notes

The best values determined experimentally at SBIG are:

Red: 83
Green: 80
Blue: 100

Further Help

Contacting SBIG

At SBIG we pride ourselves in our products and our commitment to you, our customer. We want to hear from you when things go right and we want to hear from you when things go wrong, as they sometimes do. Please help us make our products better by giving us your feedback. Feel free to contact us:

Phone
(805) 571-7244

Fax
(805) 571-1147

Email
<sbig@sbig.com>

Home Page
<www.sbig.com>

Frequently Asked Questions Database
<www.sbig.com/FAQ/SBIGFAQ.htm>

User List Server
subscribe from our home page

US Mail/Shipping Address
Santa Barbara Instrument Group
147A Castilian Drive
Santa Barbara, CA 93117

Appendix A: Bluetooth RS-232 Operation

SBIG has experimented with operation of the AllSky-340 camera using a wireless Bluetooth RS-232 solution. The AllSky camera incorporates the SG-4 as the imager. We have had good luck running the camera over Bluetooth for a number of months. While we do not recommend using Bluetooth for initial setup of the SG-4 for Autoguiding, you may wish to use Bluetooth for image downloads from time to time or for remote control of the SG-4. The instructions for using Bluetooth with the SG-4 are identical to the AllSky camera:

About the AIRCable Serial3X

The product we have been using is the AIRCable Serial3X Bluetooth device. We use two of these products – one on the AllSky-340 camera and one on the PC. The external antenna gives good range, and the camera-side device is able to get 12V DC directly from the camera's RS-232 port.

Information about the AIRCable Serial3X is available here: http://www.aircable.net/serial3x.html

The device can also be purchased from the above site. Be sure to order two devices.

AIRCable Serial3X Setup

As they are delivered, the two AIRCable Serial3X devices are not setup to talk to each other. The process of "pairing" the devices is fairly simple, but does require using a PC based terminal, like HyperTerminal. The instructions here show how to configure the devices using HyperTerminal.

Disclaimer: The process shown here is what worked at SBIG. SBIG does not support the AIRCable Serial3X devices. The procedure outlined below may or may not work on all Serial3X devices.

On both Serial3X devices, set the dip switches as follows. For the units we have tested: ON is away from the dip switch

numbers, OFF is close to the dip switch numbers.
- 1 → ON
- 2 → ON
- 3 → ON
- 4 → OFF

Start with one of the two Serial3X devices.
- Connect the power cable to the device and confirm that the red LED turns on.
- Connect an RS-232 cable to the PC (can be connected through a USB-to-RS-232 adapter).
- Connect the RS-232 cable to the null-modem connector included with the Serial3X device.
- Connect the null-modem connector to the Serial3X.
- Open HyperTerminal
  In Windows XP this is normally at:
  Start→All Programs→Accessories→Communications →HyperTerminal
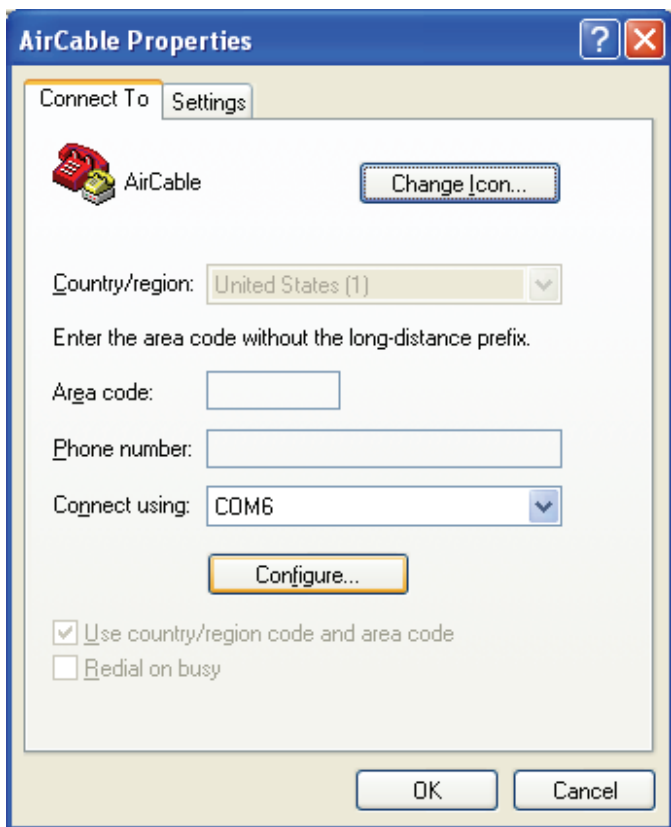- In the Connection Description, type anything you desire and click Ok.
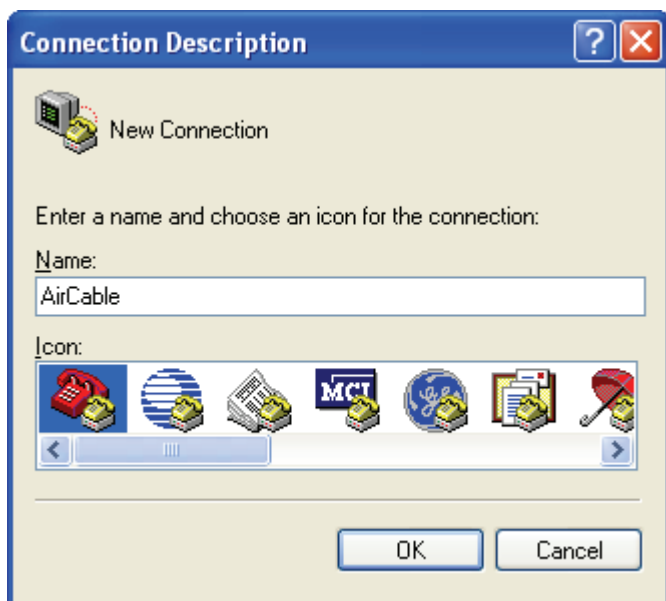
- Select the COM port that the RS-232 cable is connected to and click Ok.
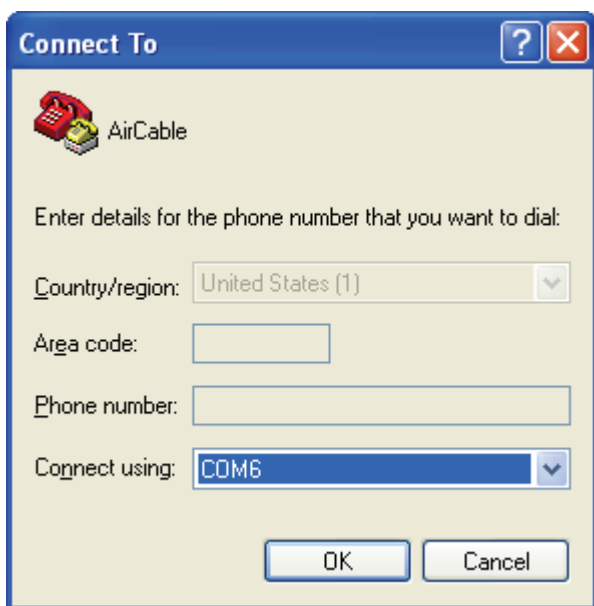
- Set the Bits per second to 115200, Data bits to 8, Parity to None, Stop bits to 1, Flow control to Hardware and click Ok.
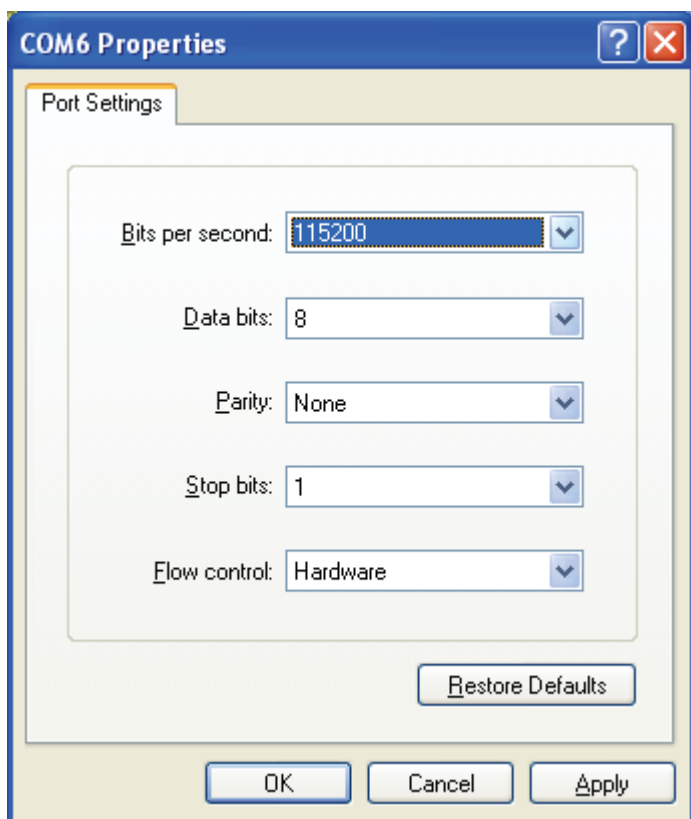
- Go to the Call menu and select Disconnect.
- Go to the File menu and select Properties.
- Click the Configure button.

- Confirm the settings entered previously, click Ok then Ok again.
- In the HyperTerminal window, now push the + key three times and then push the Enter key.
- Wait at least 30 seconds. This should appear:
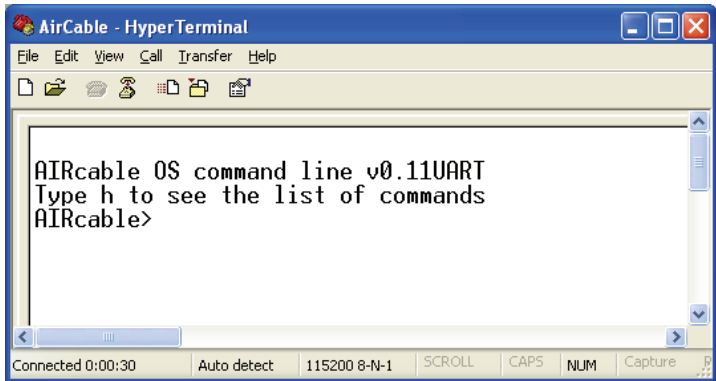
- Type the following commands. Text listed between <> indicates instructional text, not the actual text to type into HyperTerminal. When <Enter> is listed, push the Enter key on the keyboard. Do not push the Enter key unless it is specifically stated.
    - a
    - 3
    - n
    - <Type in a unique name of your choice. This IDs your device pair. Use only letters and/or numbers.>
        - Write the ID name here:

        _____
    - <Enter>
    - p
    - <Type in a unique 4 digit PIN. This sets the password for your device pair.>
        - Write the 4 digit PIN here:

        _____
    - <Enter>
    - u
    - 1152
    - <Enter>
    - 0
    - 0
    - e
- This device is now setup as the "Slave" device. This is the device that will connect to the AllSky-340. It may be helpful to write an "S" or other identifying mark on

30

the device.

- Disconnect the "Slave" device from the null-modem connector and set aside. (Keep the power connected to the Serial3X.)
- Connect the other Serial3X device to the null-modem connector and connect the power supply.
- In HyperTerminal, again push the + key three times and then push the Enter key.
- Wait at least 30 seconds. This command prompt should again appear.
- Type the following commands. Text listed between <> indicates instructional text, not the actual text to type into HyperTerminal. When <Enter> is listed, push the Enter key on the keyboard. Do not push the Enter key unless it is specifically stated.
  - a
  - 4
  - b
  - <Type the same unique ID name you entered for the "Slave" device.>
  - <Enter>
  - p
  - <Type the same unique 4 digit PIN you entered for the "Slave" device.>
  - <Enter>
  - u
  - 1152
  - <Enter>
  - 0
  - 0
  - e
- This device is now setup as the "Master" device. This is the device that will connect to the PC.
- At this point the Serial3X devices will attempt to communicate with each other. The green LEDs should both be on solid and the blue LEDs will occasionally blink. Before about 2 minutes, both devices should show both the blue and greed LEDs on solid.
- Remove the "Master" Serial3X device AND the null-modem adapter from the RS-232 cable.
- Close HyperTerminal.

AllSky-340 Setup

The Serial3X devices have been setup to run at 115200 baud over the wireless link. The devices are not capable of communicating at any other baud rate. Thus the AllSky-340 must also be setup to communicate at 115200 baud.
- Connect the RS-232 cable from the PC to the AllSky-340.
- Power on the AllSky-340.
- Run the SBIG AllSky-340 software.
- Click the Setup→Serial Port… menu item.
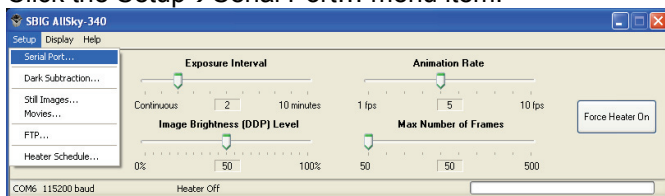
- Set the proper COM port number and select 115200 baud.
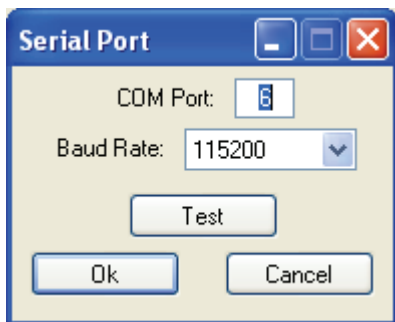
- Click the "Test" button.
- If the AllSky-340 software is able to communicate with the camera ("Test successful!" window will show up), it will set the baud rate in the camera to 115200 baud. This will now be remembered even after power-off.

Final Steps

- Turn off the AllSky-340.
- Disconnect the RS-232 cable from the AllSky-340.
- Connect the "Slave" Serial3X device to the RS-232

port on the AllSky-340.
- Connect the "Master" Serial3X device with the null-modem adapter to the RS-232 cable connected to the PC.
- Turn on the AllSky-340.
- Confirm the green and blue LEDs on both Serial3X devices turn on solid.
- In the AllSky-340 software, click the "Test" button again.
- Congratulations! Setup is now complete!

AllSky-340 Bluetooth RS-232 Known Problems

While the Serial3X devices generally work well, operating them 24-hours a day, 7 days a week does expose some minor problems.

Long Image Downloads

The wireless Bluetooth operation occasionally experiences transmission errors – especially when operating over longer distances. The AllSky-340 software can catch most transmission errors and will retry the most recent packet of image data. Occasionally the most recent packet cannot be recovered and the entire image download will be restarted. This can extend the image download time considerably. Larger gain antennas for the Serial3X may help with this problem.

Corrupted Images

Not all transmission errors are detected by the AllSky-340 software. Because of this, an occasional corrupted image may be shown. This is simply an result of the imperfect wireless connection. The worst case is when a dark frame is corrupted. This can impact a number of light frames downloaded from the camera. If a large number of images are corrupted, try reducing the distance between the Serial3X devices, or change to a larger gain antenna.

Communication Failure

At SBIG we have seen, on a regular basis, that the Serial3X devices fail to properly communicate to each other – or at least between the PC and the AllSky-340 camera. The failure could mean that no communication is possible, or that some communication is successful but that the image doesn't download.

We have seen this communication failure happen as frequently as every few weeks.

To fix the problem, the Bluetooth link between the Serial3X devices has to be reset. This can be done one of two (known to us) ways. Both involve manipulating the "Master" Serial3X device (the one connected to the PC).

    Method 1.   Push and hold the button on the Serial3X device for approximately 10 seconds. The blue and green light should go off. Release the button. The Serial3X device will now reboot and should re-establish a link to the "Slave" device connected to the AllSky-340. After a few seconds, the blue LED should turn on solid. Communication should now function normally.

Unscrew the external antenna from the Serial3X device. Set the antenna aside. Place the antenna connector on the Serial3X in the palm of your hand. Close your hand about the connector while watching the blue LED. When the blue LED turns off, the Bluetooth link has been broken. Reconnect the external antenna. After a few seconds, the blue LED should turn on solid. Communication should now function normally.

Appendix B: Connectors

Power In Jack: The POWER IN jack is used to supply 12VDC to the camera. The jack is locking and *center-positive*. The mating plug is the locking model *Switchcraft S760K* with 0.218 inch outer diameter and 0.080 inch inner diameter (5.5/2.0 mm).

POWER JACK

Center pin (0.08")
+ 12VDC

Ground

Guide Port: *The AllSky camera is used in a stationary position and therefore the guide port of the internal SG-4 is not generally used for AllSky monitoring. The information is provided here for reference only.* The Guide Port is where you connect the SG-4 to a telescope using a 6 conductor phone type cable. Viewed from outside the back plate of SG-4, looking in, it has the pin-out configuration shown in the diagram at right. Pin 6 is not connected. The *+X, +Y, -X and –Y* signals are driven from mechanically isolated relays so there is no need for additional opto-isolated relays or relay box for use with any telescope**.** *Note: In order for the East/West toggle switch to function properly with GEM mounts, the SG-4 assumes that +X and –X moves correspond to RA.*
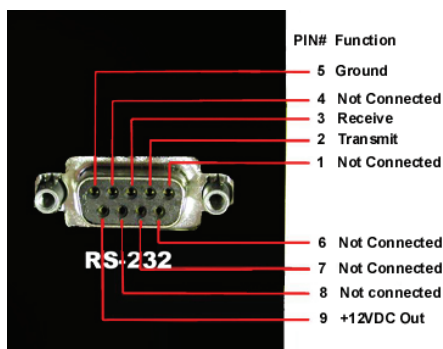
654321

NC +X
Ground +Y
-X -Y
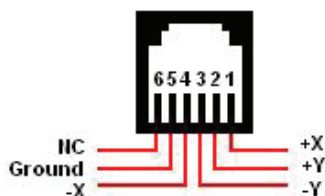
Clip is on same side of flat cable at both ends
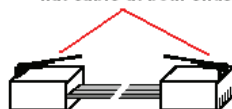
RS-232 Port: The RS-232 port is used to connect the SG-4 to a serial port on your computer. *Note: Pin 9 supplies +12VDC out when the SG-4 is receiving power through the POWER IN jack. This allows a Blue Tooth wireless transmitter to be connected directly to this port and it will receive power from the SG-4. A serial to USB adapter may also be connected here if your computer does not have an RS-232 (serial) port. Adding accessories powered* by this port will increase the power requirements for the camera by the amount used for the accessory. Our standard power supply is more than adequate for most applications.

PIN# Function

5 Ground
4 Not Connected
3 Receive
2 Transmit
1 Not Connected

6 Not Connected
7 Not Connected
8 Not connected
9 +12VDC Out

RS-232

Appendix C: Typical Specifications

CCD: Kodak KAI-340, 640x480 @ 7.4 microns square

Read Noise: Under 15 electrons rms at 1:1 binning

Operating Temperature Range: -10 degrees C to +45 degrees C

Storage Temperature Range: -20 degrees C to +50 degrees C

Internal Read Time to memory buffer: <1 second

Minimum Exposure Time: 0.1 second

Maximum Exposure Time: 10 seconds (10 min. when used with a PC)

Shutter included for remote or automated dark frame acquisition

Size: 5.5 x 5.5 x 11 inches (approx.)

Weight: 2 pounds

Power Requirements: 12VDC (10.5 – 14VDC), 600mA max.
  ~2.4 watts with heaters off
  ~6.8 watts with heaters on

(Note: If using the camera's RS-232 port to provide power a USB adapter or Bluetooth transmitter, the camera's power requirements will increase by the requirement of the adapter. The Bluetooth transmitter tested at SBIG added 50mA).