STOP

Do not plug your camera into your computer until you have installed the software!

SACIV

Intro

Thank you for purchasing the SACIV. With some practice you will be capturing great images. Please take the time to read the instructions before using your SACIV. You will enjoy years of imaging with the SACIV with minimal effort and maintenance. If you bought your SACIVc, which has the integration program from a dealer, then the integration program is in the folder "integration" along with the instructions.

Parts list

The following should be in your package. If anything is missing please contact us for replacement.
1 camera unit with T-ring attached
1 10 foot USB extension cord
1 software CD
1 T- adapter (screwed into the T-ring of the camera)
1 camera adapter (**with the optional eyepiece projection kit only**)
1- camera field flattener lens (**with the optional eyepiece projection kit only**)

Getting started

If at anytime you are asked to restart your computer select "no", until all titles are installed. Then restart your computer. This will save you some time.

The first title to install is the camera driver programs. This CD is not auto installing because of the different titles on the disk. After placing your CD into your drive go to my computer and double click on your CD-ROM drive. Once the contents of the disk come up double click on the folder "SACIVDriver" then follow double click on "setup.exe".If your computer says it needs a windows disk just click on "continue". After that title is installed go back to the CD-ROM drive in my computer. Double click on the Pw25eval.exe. Then follow the onscreen instructions for installation.
Once the second title is installed go back to the CD ROM drive the same as you did for the two previous titles. This time DOUBLE click on the FOLDER "UPI_5trial" then once that folder opens double click on "setup.exe" then 'open" then "ok". Follow the on screen instructions. For the integration program, in the "integration folder click on "SACIVzip", follow the instructions. Then install FV32v202" in the same folder. Now you can restart your computer. While you are restarting you can plug your camera into the computer. If you have plug and play, Windows should detect the camera and load the drivers. If you do not have plug and play then you will have to load the camera through the control panel in "my computer. See your computer instructions on loading hardware.
For Photoimpact5 and Picture Window instructions see the help menu's in those programs. Picture Window has a very intensive instruction manual for astro image processing on this CD-ROM. Focusing is of course done at the telescope. You will find focusing is an art form in itself. The eye can adjust for tiny variances of focus but the camera can't. The higher the F ratio that you are imaging at the harder it gets to focus. But it can be done with patience. A motofocus comes in real handy on higher F ratios but use it on slow focus speed settings. It is very easy to go on both sides of focus at higher F ratios when doing it by hand. Practicing through your scope during the daytime is a good practice, though during daytime, heat rising will be a factor, making the focus go in and out. And because of the brightness colors may be slightly washed out. The camera has controls to invert and mirror the image to bring the image to it's correct viewing for daytime.
To use the camera open the integration program(Astrovideo) and select "driver" the SACIV will show up as either "windows WDM image" or a Logitech device". To acess the controls of the camera click on "video", then "video source".

Prime focus

Most of your imaging will be done with the SACIV at prime focus. The images are sharper, clearer and easier to acquire. After centering the image in a lower power eyepiece, center and focus the image in a high power eyepiece, such as a 10mm. When imaging at prime focus it is like viewing with a 10mm eyepiece with an 8", F-10 scope. Other scopes may very slightly. After centering and focusing with a high power eyepiece it's time to replace the eyepiece with the camera. Just screw the T-adapter into the T-ring of the camera (this is how the camera comes) and insert into the eyepiece holder of your telescope. For doubling your focus length insert the camera into a barlow. For tripling your focus length insert the camera into a barlow and the barlow into a mirror diagonal. Of course if you have a 3x or more barlow then a diagonal will not be needed. On imaging the moon the camera will peak out at around 4x your telescopes focal length. For Jupiter and Saturn it will peak out at 3-4x the focal length of your telescope. This is with an f-10 SCT; other type of designs may vary. With the integration programs higher values are possible and the limit will be your telescope optics. For wider fields a focal reducer can be used. These can be purchased from your favorite astro store. The other alternative is eyepiece projection, discussed next. An eyepiece projection kit, available from SAC Imaging for $20, is needed.

Eyepiece Projection (only with optional eyepiece projection kit.)

During prime focus it will be noted that your field of view is small and the image is large. (like higher power eyepieces). To reduce the image size and thus increase brightness (for brighter deep space objects, full moon full sun, etc.) eyepiece projection (fair to good) or focal length reducers (best) are used. For focal length reducers follow the instructions that came with the lens. To do eyepiece projection the optional eyepiece projection kit is needed. This is available from SAC Imaging or the dealer you purchased the camera. Use an eyepiece larger then 12mm, such as 20mm, 26mm, etc. To do eyepiece projection the T-adapter is removed and the eyepiece is inserted into the camera adapter, (see images below.) using the set-

screw on the side of the camera adapter to position the eyepiece at the proper distance from the camera. This will be by trial and error. The camera lens-field flattener is screwed all the way into the camera. This whole assembly is inserted into the eyepiece holder. This assembly is much heavier then just the camera, so make sure everything is tight so that nothing ends up falling. Some smaller scopes may need a counter weight with this setup. The object is to get the largest circle (the eyepiece being round will produce a circle inside the VFW) possible without the kidney effect. (The kidney effect can be demonstrated by viewing though an eyepiece with your head cocked to the side, so that your eye is viewing at a slight angle. Part of the image in the shape of a crescent moon will be unviewable.) Focusing is the same as for prime focus except it is easier since the focal length is lower. Do not use high power eyepieces for eyepiece project. Use the camera in prime focus for higher power imaging. One final note. You will notice that the images are not quite as crisp as with prime focus. This is because of all the additional glass you are imaging through. (the eyepiece and camera lens- field flattener).


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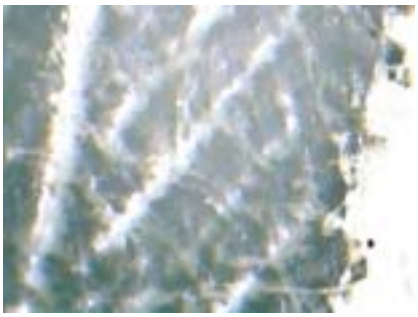
1. Camera adapter and camera field flattening lens. 2. Field flattening lens mounted on camera. 3. Eyepiece mounted in camera adapter and T-adapter mounted on camera adapter after unscrewing it from the camera. 4. Complete assembly mounted on camera for eyepiece projection.

Imaging with a Microscope

The SACIVd come ready to image with a microscope or telescope by either prime focus or Eyepiece projection. Since the SAC cameras are set up to image at prime in a 1.25" eyepiece holder or with a 1.25" eyepiece for eyepiece projection and a microscope uses smaller eyepieces and eyepiece tube, a slightly different approach is used. Through a microscope the camera adapter will be attached to the camera for both prime focus and eyepiece projection. At prime the camera adapter tube is slide over the eyepiece tube of the microscope and the 3 set screws are used to hold the camera and center the image. How far down the eyepiece holder of the microscope the cameras camera adapter is put will depend on the microscopes objective being used. The small camera lens is not used for prime focus.
For eyepiece projection the cameras camera adapter is secured to the eyepiece with the 3 set screws and the small camera lens is inserted into the camera by the threads on the camera at the ccd chip opening. See the images above in the topic "Prime focus".
Since a microscope can supply it's own light source it will be easy to set the cameras adjustments and only focusing will be needing attention. Camera controls can be kept on automatic (default settings) until you get used to focusing. Images below are; **1 Showing the SAC camera attached to the microscope and 2. Showing an image at prime of fiber and ink of a $5 US bill.**

1 **2**



Cleaning and Maintenance

Treat the SACIV like you would any other optical instrument. To clean the camera lens use the same method you use for your telescope. Because the CCD chip is open to the environment at times you may notice dust in the image. To clean the glass covering the chip first try blowing off with compressed air. (Available at most camera and telescope outlets. The use of a small "lens pen" is ideal for anything that will not blow off. These are also available at most camera and telescope outlets. If you do not have a lens pen cleaning with the same solution you clean your eyepieces with a Q-tip. Other than cleaning of the optics there is no maintenance that needs to be done to the SACIV.

Hint and tips

1. Prime focus is the method to get the most out of your camera and telescope. Even though the SACIV is capable of imaging up to 1280 x 960 dpi most of your imaging should be at 320 x 240. The reason for this is pixel binding. The 1280 x 960 is a software enhanced mode. When you image in 320 x 240 you are combining 4 pixels in the camera for every pixel displayed on your screen. This can give you more detail even though the image is smaller. The 320 x 240 is also interlaced. You can always go into picture Window and put the resolution up, even 2400dpi or higher, in post processing the image.
2. If you notice vertical lines through the image window, reduce the gamma, even down to 1 if needed. Or post processing can reduce them.
3. For a larger detailed image, the higher you boost your telescopes f- ratio the more detail you will get. To do this in prime focus the camera can be mounted in a barlow. If your scope is f-10 it will be operating at f-20 with a 2x barlow, f-30 with a 3x barlow, etc. By placing the barlow before a diagonal you increase to f-30 with a 2x barlow, f-40 with a 3x barlow, etc. Most of the planetary images with the C-8 on the web site were done at f-30. The SACIV will max out at f-40 on planetary and f-50 on lunar imaging with an f-10 telescope. Please see "Hi Resolution imaging", on this cdrom for more detail of this. For images and explanation of how they were imaged see below "IMAGES".
4. As stated before, prime focus is the best way to image. If a large field of view is wanted to image clusters, etc. then a focal reducer can be used. There are 6.3 and 3.3 reducers readily available on the market. Most of these fit SCT, but adapters are available to use these reducers with other type of scopes. It is possible to image nebula with the SACIV with a fast focal length and stacking images or using the integration progam with a fast f- ratio.

5. Use the least amount of USB cable that you can. If more than 16' is needed a USB amp will be needed. One USB amp will be needed for every additional 16 feet of USB cable length.(The amp comes with 16' of cable)
6. Focusing is very critical for a CCD camera. It will take some time to get use to focusing. If you get a good focus and you notice the image going in and out of focus, it is most likely caused by the atmosphere. The CCD is very sensitive to the movement of the air both inside and outside the optical tube of your telescope. It is also very sensitive to seeing conditions. Also the CCD chip will pick up the tiniest movement of the scope. Windy nights are not a good time to image unless the telescope is protected for the wind. If seeing is marginal for visual it is usually poor for the camera. A CCD chip does not have the advantage of the human brain, which can compensate for some of these problems. Heat rising off the ground can be another problem to make focusing and imaging a problem.
7. The camera is very good at picking up dirty optics. Usually on the main mirror, objective lens or corrector this is not much of a problem. But on the barlow small bits of dust will show up as spots sometime as out of focus spots depending on which optical surface of the barlow or eyepiece the dust is on. The optical surface closest to the chip is the most critical. To tell if the dust is on the camera lens cover or any other optical surface turn the camera clockwise and notice that the image turns. If the specks or dust turns too then the dust is on the barlow, mirror, diagonal, etc. of the scope. If the specks or dust remain unmoving even as the image turns the dust is on the ccd chips glass cover and can be cleaned as stated above.

Support

For the SACIV and its driver program wsnyder@sac-imaging.com
321-259-6498
For Photoimpact5 www.ulead.com
For Picture Window www.dl-c.com

Warrantee

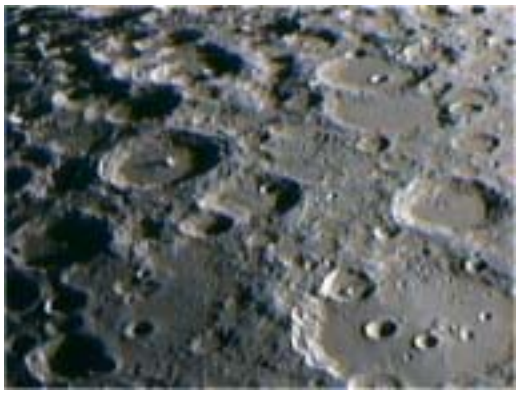
The SACIV is warrantee for 1 year from the date of purchase against manufacturing defects. Please call first (321-259-6498) Your repaired camera or a new unit will be shipped within 72 hours of receipt of the defective unit.

After the sale

We at SACIV Imaging believe in strong and responsive customer relations. We are not only here to help with any questions or problems but we would also like to hear from you about what you would do to make a better camera, making it easier to use, etc. We would also be honored to have some images you have taken with the SACIV. You can send images preferably in JPEG (you can save in JPEG right from the camera program) to wsnyder@sac-imaging.com

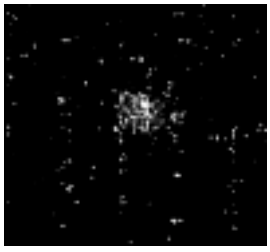
IMAGES

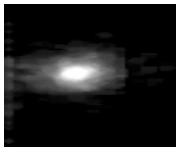
Both Saturn and Jupiter were images with a 8" SCT at prime focus. Normally these scopes are F-10. These images were done at F-30. We did that by putting a 2x barlow before the diagonal . By putting the barlow before the diagonal it turns the 2x barlow to a 3x barlow making the 8"f-10 scope into a 8" F-30 scope. That's putting the camera into the diagonal, the diagonal into the barlow and the barlow into the scope. Post processing was done in Picture Window to bring out the lighter areas and to darken the dark areas. Unsharped masking was also used.



The image above of the moon was done at F-20 using a 8" SCT. To get the F-10 scope to F-20 a barlow was used after the diagonal. The image below was done at F-30 with the same scope on the same area bottom right of above image) of the moon. (sorry the image got turned around). Again F-30 was achieved by using the barlow before the diagonal, as described above with the Saturn and Jupiter images. Not much besides unsharped masking used for post processing.

The above images are of M42 the Orion Nebula. The left one in color and the right one a color negative of the same image. Negative imaging can be done in the cameras program after the image is taken or in picture window as post processing. The images were taken with a 12" SCT reduced in Focal length by using the eyepiece projection kit option. A 26mm eyepiece was used. (all eyepieces do is change your scopes focal length not magnify an image) Brightening light areas and darkening of dark areas was done. Some color enhancement was done also in Picture Window.





M-4 on the left and M-31 on the right were done with a 8"SCT operating at F-6.3. This was done using a Celestron 6.3 focal reducer. (both Meade and Celestron make a 6.3 reducer, Celestrons is $20-40 cheaper and they are the same product) M-4 is mag 5.9 and M-31 is mag. 3.4. A lot of brightening and unsharped masking used. Dimmer deep space objects can be imaged by using a 3.3 focal reducer (only Meade make one), or eyepiece projection.

Experimentation is needed to get the images you want. By changing camera controls and by changing the focal length of your scope you can image almost anything you can see through your scope.