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Uncle Rod Mollise's

# Skywatch



## Goodbye Night Sky...

Uncle Rod Mollise

A visit to what remains of *Night Sky* magazine's website revealed words I'd hoped never to read:

*We regret that subscriptions to Night Sky are no longer being accepted. The March/April 2007 issue, now in production, will be the final issue.*

Like everybody who's had anything to do with *Night Sky* (I contributed several articles over the course of its brief lifespan), I've been impressed by what **Kelly Beatty** and his Skypub colleagues have accomplished, and proud to have had a (very) small part in what looked to be a the success of a new magazine--something pretty rare lately.

Not that I'd figured the magazine had a dog's chance in hell when I first heard about it. When I was told about Sky's plans for a new beginner magazine, I was just a mite *skeptical*. It was an idea that had been tried before--most recently by Kalmbach with their *Odyssey*, which was kept afloat for quite a while, but never really took off. *Night Sky*, I learned, however, was gonna be *different*. It wouldn't be a kid magazine, it would be aimed at amateur

astronomy beginners of *all* ages. It would be "backyard astronomy for everyone," light on the *Discovery Magazine* type gee-whiz science-fact stuff, and heavy on practical observing how-tos and equipment advice.

As one issue after the next hit the streets, each better than the last in my opinion, each garnering, from what I could tell, favorable notice among amateurs old and new, young and old, I began to think the upstart just might make it.

Alas, 'twas obviously not to be. I think *Night Sky* was a brave experiment for a time when it's a tough proposition to start a new newsstand magazine (or even keep an existing one afloat). Sadly, sometimes brave experiments fail, however worthy they may be. As above, my hat's off to Kelly, the *Night Sky* staff, and my fellow freelance contributors. No happy ending, but what a magnificent failure *Night Sky* was.



# Shooting Stars with the Orion Starshoot

Charles Allison

*Editor's Note: As we go to press, I've learned the Orion Starshoot has, unfortunately, been discontinued (see this issue's Rumours feature for details). Orion sold quite a few of these nice little cameras, however, so they are likely to be around and available for a while.*



**Fig. 1 M51, Whirlpool galaxy 22 minutes (44x30 sec) Celestron 11" at F/5 TSP 2006**

High quality astronomy imaging is no longer just for the professionals and top amateurs with large equipment budgets and serious time to invest in learning a highly complex craft. The new generation of digital cameras, including even new low cost astronomy specific cameras, has opened this area to most stargazers with payoffs that should be attractive to all.

## Introduction

Over about the last 20 years the world of astronomy has been shaken with the advent of CCD cameras and the availability of inexpensive and powerful personal computers. As with most revolutions, it started at the

top of the professional arena and has been working its way down through the amateur ranks.

Introduced in latter 2005, one of the more recent imaging products offered is the Orion Starshoot deep sky imager. For the first time, an established astronomical equipment company has offered a full-fledged, cooled astronomy camera for under \$400, complete with operating software.



**Fig. 2 Orion Starshoot Camera**

## What is the Starshoot

The Starshoot is a one-shot color camera which provides color images without the complications of taking multiple images using color filters. It is light in weight and capable of being used with small telescopes and mounts. The camera is powered through the USB port of the computer which provides a high speed means of transferring the image to the computer for viewing and disk storage. The cooling option requires a separate 12 volt power source and the camera only comes with a 12V accessory plug cable (cigarette lighter plug).

Resolution of the Starshoot is 752x582 pixels (horizontal x vertical) which is close to some

of the much higher end astronomy cameras that are currently available like the SBIG 7e, although it is much lower than the megapixel digital cameras now being sold. Each pixel is almost square, 6.5 x 6.25 microns (1 micron = 1/1000<sup>th</sup> of a millimeter) in size. This is about 2/3 of the size of the SBIG 7e's pixel.

Unlike many common digital cameras that output signals in RGB formats like BMP or JPG files, the Starshoot images are output in astronomy FIT files without the typical limit of 8 bits of intensity for each primary color, Red, Green and Blue. Starshoot converts each pixel value to an intensity value with a resolution of 16 bits or 1 part in 65535. Common RGB formats normally offer you only 8 bits which is a coarse resolution of just 1 part in 256 for each color.

The Starshoot's sensor is a modern Sony brand CCD chip which is one of the most sensitive available. Referred to by Sony as an Ex-view CCD, this chip has built-in microlenses covering its light sensitive region. While the spacing of the photosites, often just called pixels, is 6.5x6.25 microns, not all of this region is sensitive to light because there has to be some additional circuitry there which is used to get the image data out of the chip. Sony's chips also tend to be lower noise than many brands. The chip size is classified as a 1/3" CCD – which means that the sensitive area is about a ¼" or a 6 millimeter diagonal. Note that these size classifications date back to video camera design long before CCDs were invented

and refer to the outside diameter of a vidicon TV camera tube.

The CCD is a color chip, which means it has a pattern of built-in color filters covering the photosites. The pattern used is called a Beyer pattern and the filters in this CCD are known as CMY filters. CMY refers to cyan, magenta and yellow. Each is the combination of two primary colors, red / green / blue. A set of pixels using these three filters can then be used to create the full color image being viewed. This pattern is done as a 2 x 2 block with a fourth pixel containing a green filter, one of the primary colors. Cyan passes blue and green, Yellow passes green and red and Magenta passes red and blue. Consequently, each color, red or blue, is actually captured on two pixels of the four and green is captured on 3 of the four. The actual red, green and blue colors are extracted by subtracting one from another automatically in the provided software.

In addition to the Starshoot camera, software, cables and 1 1/4" nosepiece, the camera includes a Violet/IR blocking filter which can be mounted on the camera body or on the end of the nosepiece. CCD sensors are more sensitive in the near infrared than the eye or camera film so it is generally a very good idea to have the filter on the camera for all imaging. I normally have the IR filter mounted near the CCD on the camera body, inside the bottom of the 1-1/4 inch nosepiece. There is room underneath the supplied 1 1/4" nosepiece for this to fit, leaving the threaded end of the nosepiece available for mounting a 0.5 focal reducer

which is also used in most of my imaging.

Exposure times for the Starshoot range from below 1 second to over 1 hour. Since the camera has no mechanical shutter and since there is always some timing concerns in windows USB interface applications, exposure times below a second can have problems with being uneven from area to area. This unevenness gets worse as exposure times are reduced. Because of this, imaging bright objects, like planets, is not the best use of the Starshoot. On the upper end of exposure times, the Starshoot can image for over an hour without saturating the CCD with noise. Practical aspects of imaging and more recently adapted techniques tend to limit individual exposure times to much less than this.

The camera body is lightweight aluminum and it comes with a removable 1 1/4" eyepiece adapter so it can simply slide in where the eyepiece fits. The eyepiece adapter screws on to the camera body with a standard T-thread so the Starshoot can be attached to telescopes in the same standard way as film camera bodies have been.



**Fig. 3 M27, Dumbbell Nebula  
21 minutes (42x30 sec) Orion  
ED-80 F/3.75, TSP 2006**

## Setting up Telescope & Image

Despite the high sensitivity of the Starshoot, deep sky objects tend to be very dim and need substantial exposure times compared to terrestrial objects and most of the common solar system objects, like Jupiter or Mars or the Moon. While these solar system objects take exposures of under a second, most deep sky objects require exposures in the 10's of minutes. Except for the sun and the moon, most solar system objects appear rather small and tend to need lots of magnification. There are many deep sky objects that appear much larger and require little magnification.

Two related things that affect what is in the image are the field of view, FOV, and the image scale. FOV is the area of the sky that is actually being captured. Image scale refers to how much of the available detail is being captured or lost because of the pixel resolution. A low-resolution image scale might show stars as one pixel squares and possibly even fail to show moderately close double stars while viewing a larger area of sky. High-resolution image scales might waste many pixels showing nothing additional while viewing a much smaller area of sky.

Seeing conditions of the sky do matter with imaging, more so than visually. The camera is looking through the atmosphere for seconds and minutes to achieve the exposure while the night conditioned eye is able to see what it sees over very short times and can make use of short time periods where there are

improvements in the sky conditions. Typical scales of seeing quality break it into a few categories of excellent to poor seeing conditions that range from around 0.5 arc seconds of resolution up to about 4 arc seconds. Typical conditions offer around 1 to 2 arc seconds with less than 1 arc second being a very good viewing night. Seeing conditions of better than 0.5 arc seconds are often infrequent or even seldom occur in most areas. Most amateur telescopes are capable of resolving from around 1 or 2 arc seconds for smaller telescopes under 6" diameter up to around 0.5 arc seconds for moderately large ones.

Having an image scale where the seeing/telescope resolution takes up more than two pixels cuts down on the field of view without really adding to the resolution with additional detail in the image. Even if there were no atmospheric turbulence smearing out the view, the size of the telescope would limit the resolution of how small an object or how small a difference in the object can be seen. When the image scale is set so that this minimum size fits on two pixels, then nothing that can be seen that night will be lost and the FOV will be the most it can be at that resolution. This resolution is a very tiny angle, normally in arc seconds.

There is a simple equation that can be used to calculate this resolution for a particular telescope and camera size.

$$\text{Angle\_per\_pixel\_in\_arc seconds} = 206 * \text{pixel\_size\_in\_microns} / \text{Effective\_focal\_length}$$

Since the horizontal and vertical sizes of the Starshoot pixel are slightly different, the resolution is also slightly different but not enough to be of practical concern.

For the Starshoot:

$$\text{Angle\_per\_pixel\_in\_arc seconds} = 1339 / \text{Effective\_focal\_length\_in\_mm}$$

Once the angle per pixel has been calculated for the camera and telescope, one can multiply this by the number of pixels for horizontal and vertical values to get the Field Of View that will be captured in the image. Note that the FOV depends only upon the camera's number of pixels, pixel size and on the effective focal length of the telescope to which it is attached. There are calculators that can determine this in astronomy programs like TheSky and are also available on the web at some astronomy sites.

$$\text{FOV} = \text{Angle\_per\_pixel\_in\_arc seconds} * \text{Number\_of\_pixels}$$

$$\text{The FOV for the Starshoot is:} \\ \text{FOVh} = 1006928 / \text{Effective\_focal\_length\_in\_mm}$$

$$\text{FOVv} = 749345 / \text{Effective\_focal\_length\_in\_mm}$$

$$\text{FOVd} = 1255146 / \text{Effective\_focal\_length\_in\_mm}$$

These are the horizontal, vertical and diagonal fields of view for the Starshoot. Like most CCDs and cameras, the Starshoot's image is a rectangle, not a square. Since many deep sky objects are oblong, it can be important to orient the camera to

get a good fit of the object in the image.

While solar system objects range in size from about ½ degree for sun and moon down to points of no angular size like stars, some deep sky objects exceed a degree and a few, like the Andromeda galaxy, are multiple degrees in size. Unless one plans on putting in the difficult effort to create a mosaic, an image pieced together from several separate images, the FOV must be large enough to capture the whole object. Planets like Mars, Jupiter and Saturn are all under 1 arc minute in angular size. Most of the popular deep sky objects one tends to image are well over 1 arc minute in size.

Another facet of imaging is exposure time. Although point sources like stars are not affected in the same way as extended objects, the F/number of a telescope does affect exposure time as well as the field of view. F/number is the Effective Focal length of the telescope divided by the diameter of the main lens or mirror. We use the term Effective because while the telescope has a fixed focal length, it is possible to change this using a Barlow lens to increase it or a focal reducer to decrease this value. If one doubles the effective focal length, one also doubles the F/number and if one reduces the effective focal length, then one also reduces the F/number. The required exposure times depend upon the F/number. When no attachments like Barlow lenses or focal reducers are used, this is referred to as prime focus and the focal length and F/number



will be what is marked on the label of the telescope.

For a typical 8" F/10 SCT with a focal length of 2000mm, the Starshoot provides a field of view which is 8.4 x 6.2 arc minutes with a resolution per pixel of 0.6 arc seconds. While this might be a good choice for M1 or M100 on a good viewing night, such a field of view cannot capture all of M27, the Dumbbell Nebula. If one uses a 0.5 focal reducer like the one now offered by Orion for use with the Starshoot, the camera will have a field of view of about 16.8x12.4 arc seconds. The EFL will be 1000mm and the F/number will be F/5, which is much faster than F/10, which is this telescope's F/number at prime focus.

The small field of view for the Starshoot and most other astronomy oriented CCD cameras is one reason for today's large popularity of high quality, small refractors. Small telescopes are desirable for imaging many objects of moderate size. Larger telescopes, especially SCTs with significant focal lengths tend to be at a disadvantage for imaging with smaller cameras, including many of the rather expensive ones.

Typical deep sky objects to image tend to require effective focal lengths from 300mm to 1400mm. Very extended objects like M31, the Andromeda galaxy, need even shorter focal lengths to capture significant portions in a single image. A moderately sized 35mm camera lens might be the desired way to go although focusing with one will likely require T-ring extension

tubes or may not even be possible with the Starshoot.

The difficulty of imaging increases as the focal length increases. Going with a focal length greater than 1000mm starts to make it much more challenging. Vibrations, errors in the drive gears and alignment error tend to become much more serious issues so it is best to keep the effective focal length down, especially while learning. Even expensive mounts have errors and limitations that must be worked around. Telescopes and mounts that work very well for visual astronomy may hardly work at all for basic deep sky imaging.

Part of the reason for this difficulty can be recognized rather quickly when one realizes the resolution of images may range from 0.96 arc seconds to 4.5 arc seconds for focal lengths of 1400 mm down to 300 mm and the eye can generally notice out of round stars that are out of round by a single pixel width in one direction. Considering that a high quality expensive mount does well to achieve 5 arc second variations over the time period it takes the timing gear to make one cycle in the mount, typically over a few minutes. Autoguiding and means of reducing mount errors is beyond the scope of this article.

The easiest way to get started in imaging is going to be by using short focal lengths, 300-1000mm, where tracking imperfections are a much less serious problem. Small refractors are an excellent choice if you have one and so are small Newtonian telescopes. If you have an SCT, it is an

excellent telescope to use but you definitely will need a focal reducer, preferably one capable of a 0.33 reduction. Some brands offer an extension tube with their 0.5 focal reducers to provide a 0.33 reduction option. While this works well with most SCTs, some small refractors may have trouble focusing in close enough to work at a 0.33 reduction. Also, inexpensive 0.5 focal reducers may start to show problems and imperfections when operated at these more significant reductions.

While most imagers prefer to work with telescope mounts like German equatorial mounts which track the sky using only one axis, it is possible to do this on a typical alt-azimuth fork mount. Using a wedge, a device that tilts the telescope down so the fork points towards true north rather than straight up and down is popular with imagers. Some fork mounted SCTs, usually smaller ones, have a built in wedge capability for photography. The rest can be adapted with a wedge, either from the manufacturer or third parties. Making one from metal or wood is an option for some people. An alt-azimuth fork mount may also be used directly without a wedge if one takes short exposures and corrects for rotation using software.

## Taking and Processing an Image

Depending on the F/number of your telescope and on the brightness of the object you are imaging, exposures vary significantly. Many imaging purists tend to take a few rather long images that they combine to

create the final picture. Some may only take a single image, even if it takes 30 minutes to expose. There are theoretical arguments supporting this approach. However, creating a 30-minute exposure from many short exposures usually can provide equivalent images and perhaps even superior images even on the best of equipment. From a practical aspect, going beyond about 1 minute exposure time with a longer focal length usually requires manual guiding or auto guiding.

Many target objects have brighter stars in the field of view that can become saturated when exposed too long. The Starshoot CCD is friendlier to overexposure than many CCDs but it can still have problems visible in the image. Limiting the individual exposure times to where overexposure is not a problem will help create a nicer image. Limiting the individual exposure time to fairly short lengths will help reduce and overcome imperfections in tracking the object. Most imagers that take long exposures have tales of running a 30-minute perfect exposure that was ruined at the last moment by bumping the telescope or perhaps having an airplane streaking across the middle of it. Losing a 30 second exposure due to a satellite streak is far less traumatic than losing a 30 minute exposure to one.

Generally, I use image exposure times ranging from 15 seconds to 60 seconds with the most common being 30 seconds. It is easy to set up sequences of 5 to 100 images using the supplied program, Maxim DL Essentials, a simplified version of Maxim DL

which is one of the top programs used for astronomy imaging. I find that 30 to 60 raw images maximum tend to be the most manageable when processing. Most of my imaging is done with focal lengths between 300 mm and 1400 mm and F/numbers between F/3.75 and F/5 with a few at F/7.5. The telescopes used are a Celestron CGE1100 and a piggybacked Orion 80mm apochromatic.

Total exposure times for my finished images usually range from 15 minutes to about 30 minutes and are combinations of typically 30 to 60 raw images. Often it is not known just how long the exposure should be or how many of the raw images might be spoiled by tracking errors, bumps or airplane trails so usually there are a number of extra images made at the time which might be rejected during the alignment process while combining raw images.

In a night's imaging, I usually start and end by taking a short series of images with the telescope covered over. These are called dark images and contain the pattern of the CCD's imperfections and noise floor, which are subtracted out during processing. Usually about 5 or 10 images are taken like this for each exposure time length used during the night. For instance, one series each of 15-second images, 30-second images and 1-minute images. These are done after the camera has had a chance to cool down and before cooling is removed at the end of the imaging night.

Basic capture and processing details are shown in the Starshoot manual. These details

are covered in a number of excellent books on the subject. We will cover here the basic initial processing that can lead to some really excellent results.

Unfortunately, the Starshoot is not going to simply display perfect color results downloaded for instant display to the screen, at least not with the supplied software. The results are going to be usually skewed in color and in intensity. The eye can only discern about 64 unique shades of gray. However, the eye can distinguish between millions of colors in comparison tests. With 16 bits of dynamic range in an image, only a small part of that range can even be viewed on the typical computer screen at one time. Some effort is required to adjust the raw image into viewable scene.

Imaging of an object begins with finding it in the Starshoot's field of view. Capturing data in the raw 2x2 mode and either the focus or fast focus capture mode is a good way to find and center it. Using the 2x2 mode combines 4 photosensitive sites into each pixel brought into the computer which maximizes the sensitivity of the Starshoot. This lets you use shorter exposures to find the ghost of an object. The fast focus mode speeds up the download at the expense of more noise, but here speed helps. Using an eyepiece or even a device called a flip mirror can help find objects and so can detailed star charts of the area. Even goto telescopes may not bring the desired object into view of the camera's narrow field so finding the object is often a bit of an effort.

Once the object has been put in the Starshoot's field of view, it's time to focus it. As an evening's temperature changes or the location of an object changes, focusing is normally required. Focusing is extremely crucial to making good images. Sometimes, it is worthwhile moving over to a nearby brighter object to focus on when exposure times making focusing very hard to accomplish. Rough exposure is easily done by just looking at the image coming in on the screen and adjusting until stars are a minimum size. There are numerous tricks and devices available for focusing. Some are as simple as home-made crossed dowels in front of the telescope that create diffraction spikes whose lengths in the image indicate the quality of focus.

For finer focusing, the full raw 1x1 mode should be used, perhaps even with the Focus download option rather than Fast Focus. On the Maxim DL Essentials camera control dialog box, there is a text box which indicates maximum pixel intensity, FWHD and HFD. When focus is at the optimal point, the pixel intensity will be at maximum and FWHD and HFD will read the lowest. Generally, I use FWHD – which is full width half maximum and is an indication of how big an object is. There is no user control over the selection of which object is selected by the software to provide these measurements.

Once the object is found and focus is done, it's then time to set the actual image capture time and mode. Capturing images as Light Raw 1x1 in the Autosave capture mode is

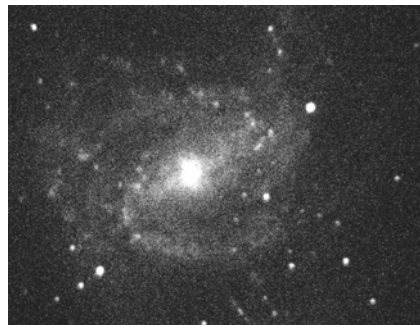
normal. Capturing in color is not recommended nor is enabling the dark subtract as these can be done later. When the Autosave capture mode is enabled, it is possible to select a base file name, the number of images to collect using the base file name and the option of selecting a subdirectory where to store these numbered files. If one stops and restarts the save command, the next unused number becomes the starting value and the total number of images to capture is used again. Maxim DL Essentials will then proceed to capture these files into the selected subdirectory using the base file name with a number sequence tacked on to the name.

Files are saved in FIT format which is the professional astronomy file format. Some information such as the camera type and CCD information and exposure time are included along with the current date and time. Other optional file content details, such as the telescope, object and location are not available to add into the FITs file when using the Essentials version of Maxim DL.

Once a set of images and darks have been captured, it is possible to proceed to capture images of the next object or to process the images. Normally, one usually waits until they are finished imaging for the evening to process images so as to get maximum imaging time.

While there may be different ways to process the image, I will describe the processing approach that has worked well for me. After capturing several dozen images and a batch of

raw images, I start with setting up the dark images and select 5 to 10 dark images of the same exposure time to load into the program. While it might be possible to avoid doing this, I strongly recommend doing them even if one has to use dark frames taken several days or weeks earlier.

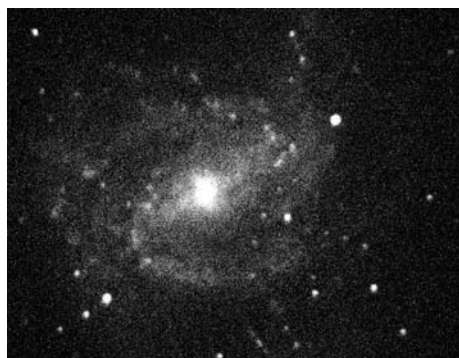


**Fig. 4 M83 Raw 30 Second Image Before Pre-processing**

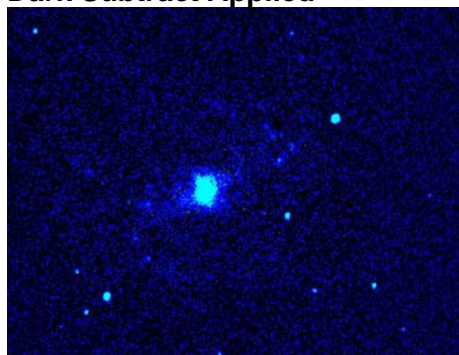
Processing of the raw images is sometimes called preprocessing. This consists of subtracting dark frames and then combining the raw images into a single final image. Although Maxim DL Essentials doesn't offer it, other programs usually include doing additional test images referred to as flat field frames which will help calibrate the images and overcome dust donuts, the shadow of dust particles on optical parts like the filter or focal reducer, along with other problem intensity variations.

Above is Figure 4, which is a raw 30-second image of M83 prior to any pre-processing. The image was taken at TSP2006 while there were some thin clouds passing by which ruined a number of the raw frames. It's also appears that the focus may be a little bit off or that there is still some amount of cloud haze in the image.

Preprocessing begins by opening all of the raw images of the particular object that were taken during the capture sequence. One can highlight all of the images beginning with the base name for this image and open them in one command. Going past 60 raw images being open at one time tends to slow my computer down so it might be desirable to process images piecemeal on some computers. Once all the images are opened I then go through each one and click on the Subtract Dark button and the click on the Convert to Color button. At this point, you should click on the Make Pixels Square button if you have used an Alt Azimuth mount that needs rotation corrections which happens during your imaging. Otherwise it is an optional step, one I usually skip.



**Fig. 5 M83 Raw Frame with Dark Subtract Applied**



**Fig. 6 M83 Raw Frame with Color Conversion**

Once the raw frame has been converted to color I click on the reduce window icon ' \_ ' on the upper right corner of that window to get it out of the way. If the image is obviously bad, like containing satellite streaks, grossly oblong stars or even multiple stars from vibration during the image, I usually close the window to get it out of the way. Also, I normally do not save these raw images once they have been processed with dark frame removal and color conversion. These converted images take up a lot more room than the 16 bit raw frames and might accidentally overwrite the originals, perhaps with the wrong dark frame set having been subtracted.

Once all of the raw frame windows have been preprocessed and reduced to icon size, it is time to deal with alignment and combining with the Combine button. Since the obviously bad image windows have been closed, all of the open images are to be combined so selecting the Add All button takes care of selecting all of them still open. When the Combine dialog box has the images selected for processing, a second Combine Images dialog box pops up. For deepsky use, there are two common Align Mode options. One is 1 star manual while the other is 2 star manual. Two star alignment is needed when you imaged using an Alt-Azimuth telescope mount where there will be some rotation of images. For those using a wedge or other polar aligned telescope mount, the manual 1 star mode should be quite adequate. Typically, one will select the check boxes

for Use Centroid and Auto Next. These permit the program to calculate precisely where the middle of the star is rather than relying on a click position within the star and when clicked, the program automatically moves to the next image.

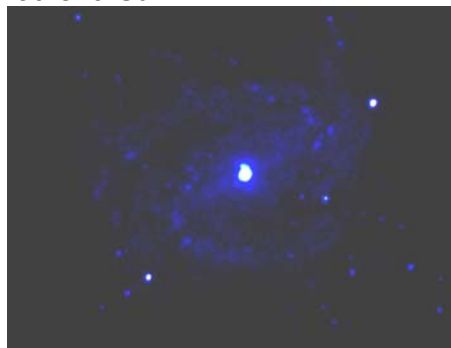
Note that it is best not to make any changes to the color settings of any raw image at this point. It is very important to leave them all unchanged so that the final image is built from raw images whose values were all the same when combined. It is also best to leave the Screen Stretch dialog box to Low, Medium or High rather than on manual when doing the preprocessing because if on manual, the entire image might disappear from view when the dark subtraction occurs and make it difficult to do the alignment during the Combine mode.

Once you select a star, click on it and the program will cycle through all of the raw images. It is important that the star be visible in all images to be combined and that it not become confused with any others. When doing the Manual 2 star alignment, one first goes through clicking on Star 1 and when finished, will switch over to Star 2 and cycle through again. When all images have had their reference(s) selected, then one can select the Output mode and click on OK so the Combine will be completed.

The output can select Sum, Median or Average. Usually, one would Sum an image to achieve the benefit of an extended time exposure. If the



exposure time of each raw image is reasonable, using Median or Average could be used to reduce noise or remove problems that affect areas of the image. Since the benefit of extending time is often to reduce noise, it is possible that one might benefit with some images to do Median or Average. Output rather a Sum.



**Fig. 7 M83 Combined Image – No Contrast/Color Adjustments**



**Fig. 8 M83 Composite With First Color Corrections Applied**

At this point, I then start to adjust the intensity and color. Once the intensity looks good, I might do an unsharp masking to sharpen the object a little. After this, the color is adjusted. This, like the Screen Stretch, tends to be a bit

of artistry as one tries to establish the right coloring. It is possible that there may be some interaction between intensity and coloring so it might take multiple tries to get the images as you desire them. Some directions are provided in the Starshoot manual but essentially, one resets the scaling and background levels and then usually selects the Auto background calculation. Much of the color determination depends upon selecting the Click on White option and selecting a neutral white star or an area expected to be white. It is possible to manually adjust the background and color scaling numbers although this can tend to become tedious.

Once the color balance is reached, it may be desirable to make adjustments again to the Screen Stretch to bring out what is desired in the image. While the upper and lower screen display limits may be set by changing minimum and maximum number values or by dragging the little green and red cursors along the Screen Stretch histogram, I find that doing a click – hold in the gray block in the upper right hand corner of the Screen Stretch dialog box provides a good way to manipulate both minimum and maximum values at the same time while viewing the picture on screen. Nothing is lost doing either the color adjustment or screen stretch other than the previous settings for these. I prefer to adjust these onscreen

settings prior to saving the new combined FITs file.



**Fig. 9 M83 Composite With Rough Color and Intensity Corrections**

When the image appears as desired, one can then export it to a more common picture format, such as JPG, TIFF, BMP or PNG in addition to FIT. It is in the Save As dialog box. Although the program specifies 16 bit formats are available for TIFF and others, I've not exported anything but 8 bit/color files since I don't have programs capable of handling them. I normally export files to JPG format which produces excellent images for use on the web or for 4x6" photographs printed at the local 1 hour photo place. While it's possible to do 8x10" photos, the resolution of a single image tends to appear to be a bit coarse. Creating a mosaic from several images is possible but can easily become a very daunting task.

In order to get a proper result from the FITs image exported into another format, one usually needs to do a manual stretch rather than relying on the Auto Stretch option. Stretch dialog options include a variety that permit Linear, Log or Gamma along with Input and Output ranges. For most images, I select Screen Stretch for the input so the settings I've used for onscreen viewing are used rather than Max Pixel or Stretch dialog Manual settings. For the output range, JPG requires 8 bit although 12 and 16 bit options are provided along with unlimited for use in some FITs format.

The failure to set these parameters to reasonable values for your 'Save As' can result in the image becoming wrecked, blacked out or whited out in the new file. It is always best to double check your exported images just to make sure that they are formatted the way you intended. It is also possible at this point to do additional image processing with a pc photo program or to correct small problems and also to crop the image to the desired size. If you are combining numerous images while the telescope is drifting, there is likely to be an obvious area on one or more sides which have somewhat less than the full image exposure.

There are many photo programs that range from free or provided with inexpensive webcams, digital cameras and scanners up to rather expensive professional image processing software packages which cost more than the Starshoot. Quite often, it's best to use very simple ones unless you are intimately familiar with the more expensive complex ones.

lengths ranging from 300mm up to over 1000mm.

The Orion Starshoot opens up the realm of low cost imaging for amateur astronomers. It is a new level of low cost for equipment and for the time invested in learning how to image, and for the time involved in generating the images. By doing some imaging rather than only viewing, one opens up their hobby in a variety of ways. With just a few minutes of image exposure,

one can capture dim objects that could never be seen with the eye even in much larger telescopes. Dim colorless fuzzies come out in beautiful colors textures and details that would never be realized visually. Pictures can be viewed at any time, not



**Fig. 10 M83 Final Image, Cropped and Fixed up in Corel Photo**

### Summary and Conclusion

In this article we have covered a very basic introduction to the Orion Starshoot camera and some of the things necessary to get started taking and processing images. The Starshoot and other similar cameras are well suited for small telescopes with effective focal

just after dark on clear nights during only part of the year. They can be shown to friends and relatives who would never be coerced into going out on a hot muggy night, or a cold freezing one, just to stand around to see a glimpse of some colorless fuzzy. Image processing offers one the ability to participate in the hobby during the daytime and even during rainy or cloudy nights. A picture is worth at least a thousand well chosen words when trying to

convince a spouse that it's important to get that new telescope or piece of equipment. Ultimately though, there's nothing like seeing a mediocre old black and white smudgy astronomy book image from years past and then looking at a beautiful crisp color image that you did yourself, last night or last year, unless there's even something new in your image like possibly a brand new supernova or undiscovered comet.

#### Imaging Procedure Summary

- Take Dark Frames
- Take Raw Images
- Create Master Dark Frame
- Subtract Master Dark from Raw Images
- Convert to Color Raw Images
- Reject Obviously Defective Raw Images
- Select Raw Images to Combine
- Align and Combine Raw Images into Image
- Adjust Image Intensity and Color Balance
- Perform Initial Image Processing
- Export Image to a Standard Format
- Final Process Image for Defects, Cropping
- Save Final Image

See the last page of this issue for some screenshots of the Maxim Essentials program.

**Charles Allison** enjoys astronomy in the Wild Horse Desert area of deep South Texas. He is vice-president of the Kingsville Astronomical Society, the host organization of the Deep South Texas Stargaze, a winter time star party held near Freer TX, located about 50 miles on the other side of

nowhere. Charles built his first astronomy camera, a cookbook 245, a few years ago and just got his Orion Starshoot this last Christmas. Most of Charles' astrophotography has been planetary imaging with video and web cameras.

## A HOME-MADE DEW DESTROYER

### Walter Dutchak

I needed a "Dew Buster" for my 8-inch CAT. Dew was ruining viewing sessions consistently. At my local branch of the Royal Astronomical Society of Canada, President Dave McCarter had provided a very efficient design for a pulse modulated circuit to control a 12V dew buster system. He even provided suggestions on how to make the heater elements using resistors. The circuit looked like a great design, but I preferred a slightly different approach to making the heater elements.

The heater elements were of a parallel resistor ladder design which was about 1" to 1.5" wide and would require something like Velcro strips to fasten to the telescope and eyepieces. What I wanted was a "ring-shaped" heater element that would tuck in against the gasket that covered the correcting lens. For the other heaters I preferred to design a series resistance loop that I could coil around the eyepieces and finder scope.

Having limited availability of resistor values that I could obtain I started to work out a design

firstly for the correcting lens heater. For the heater to put out up to 9 or 10 watts of heat I needed small values of resistance and yet to dissipate the higher values of heat the resistors would have to be larger, large enough to handle the extra heat without cooking themselves to cinders. By building small parallel groups of 3 resistors each I decided that I could string 9 such groups in series for a total resistance of about 14 Ohms for about 10 Watts of heat power output at 12 Volts DC. (This was all rough estimating in the head. Actual building and measurements of the various values proved to be slightly different, as you will soon find out by reading on).

The problem I had to solve involved the fact that it would be unlikely that I could stuff each group of 3 parallel resistors into about a 1/4" diameter tube which would make the heating ring. It was a problem of topology. How to reconfigure the physical shape of the 3 resistors in parallel so that they could become a narrow and lengthened package. Eventually the solution presented itself to me and the stretched out layout (see Figures B & D below) had the advantage of distributing the heat over roughly a 3" length (times 9) within the heating ring.

It was still not so easy to shove into the 1/4" diameter tubing of the ring so I cut a slit along the hidden edge of the ring and that accommodated the resistors snugly as the sketch below shows.

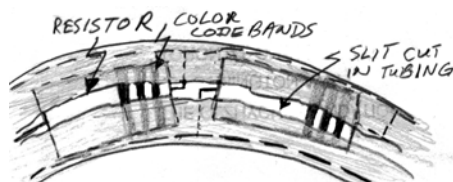
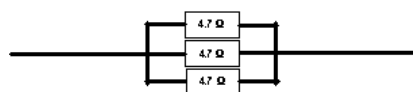


FIGURE - A

When “stuffing” the resistors into the ring of tubing it is important that wires do not make short circuiting contacts. Small strips of standard vinyl insulation tape can be used at critical points. DO NOT, however, use cellulose tape since it would melt under increased heat and a short circuit would be inevitable.



Configuration A

FIGURE - B

Figure-B shows how each group of three 4.7 Ohm resistors in parallel are connected in series as 1.56 Ohm groups (9 groups x 1.56 Ohms = about 14 Ohms total resistance). 12 Volts across 14 Ohms would produce heat demonstrated by the formula for Power as (Volts Square divided by Resistance), i.e.  $V^2/R = 12 \times 12 / 14 = 144 / 14 = \text{about } 10 \text{ Watts}$  of heat power.

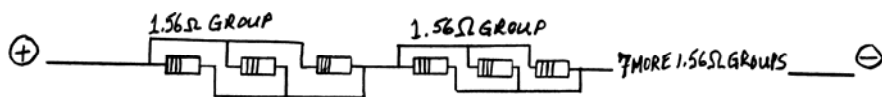
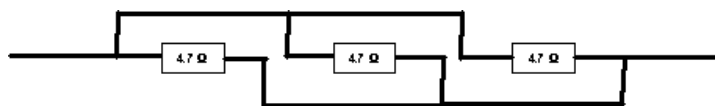


FIGURE - C

The above configuration of three 4.7 Ohm resistors in parallel is equivalent to the

configuration shown below. In Canada – London Branch astronomy club.



Configuration B

FIGURE - D

both cases the total resistance in parallel is about 1.56 Ohms.

The LX90 has a circumference of approximately 28 inches at the corrector plate. Using configuration B, if each parallel group of resistors is spaced evenly so that it spans about 3.01”, a total of 9 such groups can be connected in series providing a total effective resistance of approximately 14.09 Ohms. which would produce a calculated maximum of about 10.2 Watts of heating power from a 12V DC supply. This would use a total of 27 4.7 Ohm resistors and each resistor would dissipate a maximum of .38 Watts of heat when the maximum current through the resistive dew heater is at a maximum of approximately 0.85 amperes. This was the theoretical design that I started with to build a dew heater ring for the LX90 8” Schmidt correcting lens (corrector plate). A detailed description of the project follows.

The above configuration was built, placed inside a fire-

Each group of 3 resistors in parallel was assembled, and then each triple group was soldered in series. There were 9 groups altogether for a total of 27 4.7 Ohm resistors used. As mentioned above, the calculated resistance of each 3 resistor parallel group is 1.566 Ohms and the total calculated resistance of 9 such groups is 14.094 Ohms. The assembled correcting lens heater was measured with two different digital multi-meters and they agreed on a total resistance of 13 Ohms. (This goes to show that theoretical and measured values are often different because of lower tolerances of cheaper components). ½ Watt rated resistors were used. If these resistors are only rated at ¼ Watt each, then the heater can still safely operate at 6 Watts of power (which would be about 8.8 volts applied to the heater (about 80% of the 11 volts that gets delivered to the heater at the maximum potentiometer setting ).

Following are the measurements done during testing of the heater and controller unit:

**Measurements** (in all following examples the symbol “≈” translates as “is approximately equal to”

Input Voltage set at ≈ 12.3 V ( All voltages are DC )  
Max. Heater Voltage ≈ 11 Volts  
Heater Resistance ≈ 13 Ohms ( Therefore the Theoretical Power ≈  $11^2 / 13 \approx 9.4 \text{ Watts}$  )

retardant sleeve (1/4” diameter electrical insulation tubing) and tested with the pulse width modulated controller circuit designed by Dave McCarter, president of the RASC London (Royal Astronomical Society of



**TABLE - 1**

Measured Current (I) in amperes	Approximate Calculated Power ( $P = I^2 R$ ) [ R = 13 Ohms ]
0.055	0.04 Watts
0.15	0.16 Watts
0.25	0.9 Watts
0.85	9.4 Watts

At the maximum potentiometer setting 9.4 Watts of power is produced. This power is dissipated through 27 resistors as heat. Configuration B (Figure-D) as shown above (also see Figure-B), was how these resistors were arranged – 9 groups of three resistors in parallel. Thus at the maximum setting each resistor will dissipate about  $9.4/27 \approx 0.35$  Watts of power as heat. This should be no problem if the 4.7 Ohm resistors used are actually rated as  $\frac{1}{2}$  Watt resistors. However, if they indeed are only  $\frac{1}{4}$  Watt resistors then the heater will safely produce about 6 Watts of heat as explained above.

The control unit was built with 4 phono plug outlets to connect heaters so that 3 more heaters can be connected. The controller controls the output to all 4 heaters in exactly the same way. In other words, if the potentiometer is set at 75% of maximum then each heater will deliver only 75% of its maximum heating capability. All heaters must be designed to work from the controller 12 Volt DC input (or as was measured about 11 Volts across each heater). The resistance of each heater should be designed to produce the required maximum heat output for the optic on which it will be used. (For example, the heater for the finder scope or for an eyepiece need only deliver a

maximum of about 4 Watts and at most times only about 1.5 Watts will suffice to maintain eyepieces and small finder scopes free from dew.

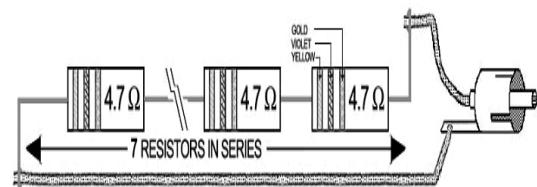


**Figure E. DEW HEATER RING FOR THE CORRECTING LENS:**

The ring is attached to the correcting lens gasket by double sided foam tape, the kind used for attaching smaller picture frames to walls. The collimation screws seen in Figure-E have been replaced by Bob's Knobs. The plastic lens cover still fits, although not all the way in, and a small notch was cut out to allow the wire leads from the heat ring to pass through to the top of the telescope tube. You may notice that the leads exiting the heater coil are at the bottom of the heater ring in this old picture, but I have since turned in around so that the leads now exit at the top and are taped to the tube. The heater wires are terminated with a small two-pronged female plug. The cable from the controller unit has a matching male two-pronged plug.

#### **DESIGN FOR FINDERSCOPE & EYEPIECE HEATERS**

Again using 4.7 Ohm,  $\frac{1}{2}$  Watt resistors, the following series configuration of 7 resistors was used to produce a loosely coiled heater (covered by a wire insulator) which would produce about 3.6 Watts of heat power at the maximum heater controller setting. The return wire (below the resistors) was left insulated (insulation is not shown in this diagram).



**FIGURE – F**

***Eyepiece & Finder scope Heater Configuration (Above)***

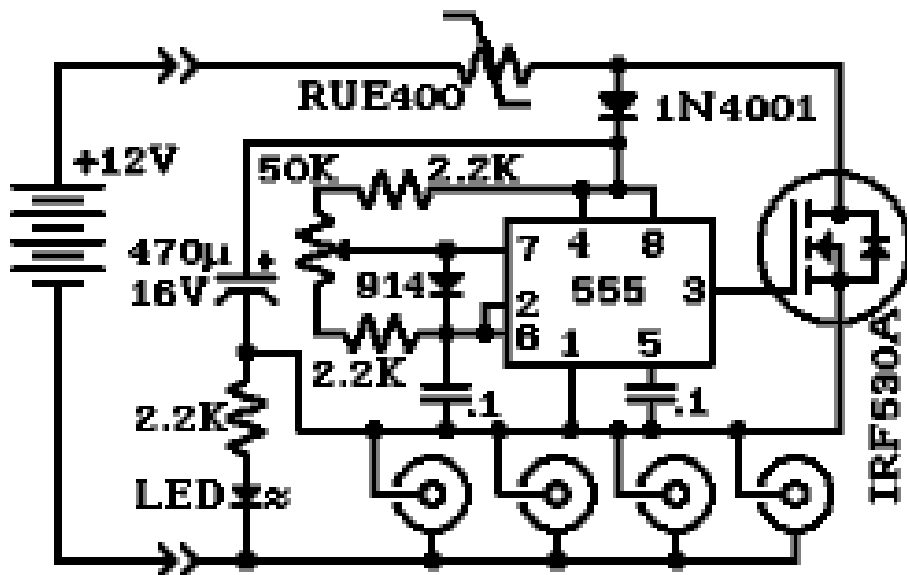
**INSULATING the heater:** On very cold nights the heater coils can be wrapped with any insulating material to prevent heat from escaping into the cold night air. Orphaned wool stockings will find a use here.

#### **Pulse modulated Heater Controller Circuit**

This circuit was designed by Dave McCarter, President of the RASC London (Royal Astronomical Society of Canada – London Branch). There are several similar circuit designs on various astronomy sites that could be used for your personal circuit or one could purchase a commercially made circuit, such as the Kendrick unit. The RUE400 component below is a self-resetting plastic fuse. RUE300 can be used also.

RCA-type female phono jacks are used to connect heaters





circuit gets brighter to indicate that the heaters are hotter.

**FIGURE – G**

Heaters cables with RCA-type male plugs plug into these jacks - only 4 shown at the bottom of Figure-G. Any number of outputs is possible limited only by the 10 Amp current rating of the MOSFET (Power Transistor).

### TEST MEASUREMENTS of Correcting Lens Heater Circuit

All testing measurements were done with the following common parameters:

Source power supply was set to: **12.3 V DC** (Using a variable DC power supply)

The Heater Controller Circuit was the Pulse Modulated control circuit designed by Dave McCarter.

### **CORRECTING LENS HEATER:**

**Heating Loop** for the Schmidt corrector plate of the 8" LX90 telescope.

The loop was constructed of **27** 4.7 Ohm, ½ Watt resistors arranged in 9 parallel groups connected in series (described above). Each parallel group contains 3 resistors of 4.7 Ohms

each, for a total equivalent resistance of about 1.56 Ohms. Thus 9 such groups in series totals about 14 Ohms.

- The actual MEASURED LOOP RESISTANCE was **13 Ohms**. Here are the results
- The **potentiometer** shaft was turned to lower the resistance in roughly 1/10<sup>th</sup> steps – a very rough estimate to get a general view of the power output produced over the range of the 50 K ohm potentiometer.
- The **potentiometer** is a 50 K Ohm variable linear resistance control – like a volume control – identified as **Pot. setting** in Table-2 below. As the potentiometer is set to a lower resistance the pulse stream coming out of the 555 Timer chip causes the MOSFET (Metal Oxide Field Effect Transistor) to pass more current to the heaters and thus the heaters get hotter. Also, as the potentiometer resistance is lowered the Light Emitting Diode (LED) in the controller

Pot. setting	Current (I) Through the Loop Amps	Voltage Drop Across the Loop Volts (V) DC	Calculated Power Output in Watts $P = I^2 R$ (R=13 Ohms)
1/10th	0.09	1.5	0.1
2/10ths	0.15	2.6	0.3
3/10ths	0.37	5	1.8
4/10ths	0.45	6	2.6
5/10ths	0.53	7	3.6
6/10ths	0.61	8	4.8
7/10ths	0.68	9	6.0
8/10ths	0.76	9.8	7.5
9/10ths	0.83	10.5	8.9
MAX	0.87	11.2	9.8

**TABLE – 2**

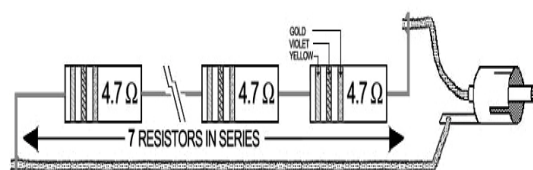
### TEST MEASUREMENTS of Finder scope & Eyepiece Heater Circuits

Again, the source power supply: (Using a variable DC power supply) was set to **12.3 V DC**.

The Controller unit was the one designed by Dave McCarter, president of the RASC London (Royal Astronomical Society of Canada – London Branch) astronomy club.

**Heating Coils** – a string of 7 resistors in series wound around ocular containers (coiled)

For the 50mm objective lens & eyepiece end of the LX90 Finder scope, and for all other eyepieces.



**FIGURE – H**

The return wire below the resistors is electrically insulated (This insulation is not shown in Figure-H)

- these heater strips were coiled around the finder scope and eyepieces
- seven 4.7 Ohm resistors were linked in series for a total resistance of 32.9 Ohms
- the entire string was encased in an insulation covering stripped from a pair of insulated 18 gauge wires and then looped to fit around the 8" circumference of the finder scope dew shield at the objective lens end of the finder scope. Here again, the electrical insulation was slit along one side to facilitate "stuffing" in the string of heater resistors. The 7 resistors in series actually measured at **33.3 Ohms**. The same was done for the finder scope eyepiece end and for the heater to be used with all interchangeable eyepieces.
- Here are the results measured at roughly 1/10<sup>th</sup> potentiometer setting intervals:

**Coiled Eyepiece Heater**

Figure-I shows a mock-up of how the coiled series heater looks around an eyepiece. I do not have a digital camera to take this picture so I used an earlier image of an eyepiece and drew in how the coiled heater looks on it. The phono plug is actually at the end of a much longer cable which is soldered directly to the

coiled heater, but I have shown it in this picture at the end of the heater part to provide a compact view of all the parts involved.



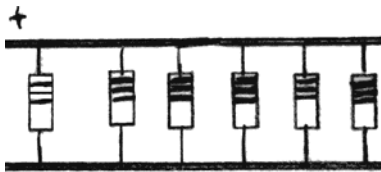
**FIGURE-I**  
**HEATER TESTING USING A 12V Battery Power Pack**

The source was the "Eliminator" power pack from Canadian Tire (an auto parts and home hardware type of store). The measured DC voltage output was 12.64 V DC (using the "DC Battery Load Test scale" on a digital multi-meter. (This measures the actual DC Voltage when the battery is connected to a load - such as dew heaters in this case). On the regular DC scale the reading was 13.08 V DC.

The heaters and controller work very well. Several people in our Astronomy Association have used the controller designed by Dave McCarter and they attest to its superb functioning. The heater designs described in this article can be used with any 12 volt controller unit. The main advantage of the serial resistor design over the "ladder" resistor design is that fewer resistors are used. The disadvantage is that lower value resistances must be used in series, that is why I used some higher values in parallel

(groups of 3) to create an overall lower resistance before connecting the groups in series. Of course there are other pros and cons not discussed here.

**The LADDER design**



The ladder design consists of higher value resistors arranged in parallel - like steps in a ladder. Higher value resistors are also usually much less expensive than very low value resistors.

Pot. setting	Current Through the Loop Amps	Voltage Drop Across the Loop Volts DC	Calculated Power Output in Watts $P = I^2 R$ ( $R=33.3$ Ohms)
1/10th	0.027	0.9	0.02
2/10ths	0.044	1.4	0.06
3/10ths	0.76	2.0	0.19
4/10ths	0.11	2.5	0.37
5/10ths	0.12	3.8	0.48
6/10ths	0.18	6	1.08
7/10ths	0.21	7.3	1.47
8/10ths	0.24	8.5	1.92
9/10ths	0.30	10.5	2.99
MAX	0.34	11.6	3.8

**TABLE – 4**

# An Easy Swivel Head for Piggyback Mounting

Jack Fox



If you do piggy back astrophotography especially in the Polar mounted position on your ETX and find your camera is not in the best position for your subject and you can't afford a professional swivel head mount, this may be just for you. The approximate cost of the materials is about \$18.00. Materials are the mini tripod, epoxy putty, super glue gel and a 1/4-inch nut. This mount works best for the light-weight digital cameras such as the Nikon Coolpix series and other digital camera brands. The old 35mm SLR's are a bit heavy, but doable.



I found the same type mini-tripods at Best Buy and Circuit City for \$12.95 or \$14.95

depending on the features. The \$14.95 has a neat removable head that makes threading the camera on the mount a snap. After completing the modifications, the unit threads on the Scopetronix ETX Piggy Back Mounting bracket or any mounting bracket with a standard 1/4 20tpi bolt.



To remove the swivel head from the tripod legs, turn the unit upside down and you will see a Phillips head screw. Remove the screw and the tripod legs will come off. Be very careful removing the screw because it is on very tight and the screw head can be easily stripped.



Once the tripod legs have been removed, you are ready to fasten the 1/4" nut to the inside of the base where the screw was just removed. Cut a small piece of duct or electrical tape to cover any opening to the ball & socket area below the base. Rough up one side of the nut with a file or bench grinder and apply super glue to the surface. I use the gel super glue, less messy. Press

the nut firmly in the center of the base directly over the screw hole and hold it until the glue sets.



Next, mix the epoxy putty (not the liquid form) so that it is one color and pliable. Roll small pieces between your fingers to form a cylinder shape and insert them complexly around the nut. Make sure the putty is flush with the top of the nut and not any higher. Do not get putty on the threads. Wet the tip of your finger to smooth out the exposed putty surface around the nut. Wipe off all excess putty from the surfaces of the swivel unit. Allow the epoxy to fully cure over night.



Mount your piggy back mount to your OTA and screw on the swivel head to the 1/4" bolt. Tighten firmly but not over tight. Depending upon your piggy back system or method, you may attach your camera to the swivel head first and then to the OTA. If you have the mini tripod with the detachable head, all you do is loosen the long handle that is

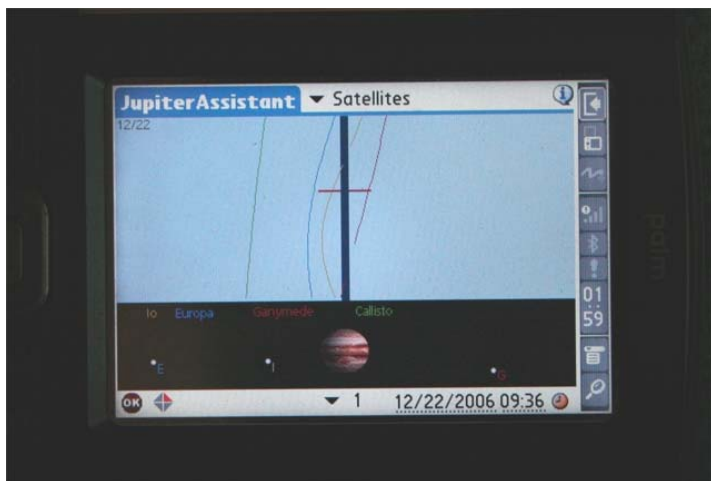
attached to the removable head (see last photo) and screw the head to the base of the camera then lock the entire assembly into the swivel head. Now, you're in business to adjust your camera to most any angle to properly frame your photos.

Any questions email Jack Fox at [jackfox@mindspring.com](mailto:jackfox@mindspring.com)

## Astromist 2.3 for the Color Palm PDA:

### Astronomy Software That Does Everything!

Timm Bottoni



My search for astronomy software for the Palm PDA began a while back. I got my wife a new Palm T/X this year, which means I got to use her old Palm Zire 71, so I figured why not try to find an inexpensive piece of software that would suit my as yet undefined astronomy needs. I didn't know what the heck I was looking for at the start, so I did the usual *Googling*, and *Yahooing* and found several likely candidates. Those of you with a Palm PDA probably know you will find there are many small, inexpensive games, utilities, and other cool software products sold online as downloads from either the developers who write them or from various PDA-oriented download sites. Many of these little programs are free, inexpensive, have free trial periods, or are at least available as evaluation versions (with some features disabled in hopes you'll spring for the real deal). This allows the savvy Palm user to "try-before-you-buy" on a large number of software products.

Well, it turned out that there were several Palm programs that offered considerable astronomy functionality, most very

inexpensive at \$40 or less. After trying several I decided to buy a product called *Astromist* (version 2.3) written by Cyrille Thieullet.

Why did I choose this one? Simple, *it did everything I could think of* and few things I *didn't* think of.

The program's list of features is almost endless, but basically it has a *huge* database of stars and objects, and the ability to add your own objects as well, like the recent Comet SWAN. It has a nice full color graphic interface, showing zoom-able and click-able star charts, with loads of user selectable preferences and options. It has special wizards to help you with the moon and planets, and has the ability to manage observing lists to your hearts content. It acts as an observation log in the field, has a night-vision mode, and, to top it off, can control a go-to scope with the proper cable, or--get this--*wirelessly* with a serial Bluetooth adapter available from Aircable (if your Palm has Bluetooth built-in).

*Whew, that's a lot of features--* but there is *more* and *more*--the features seem endless, really too many to list here (for a complete run-down, visit the Astromist website at <http://www.astromist.com/>).

I know all of this sounds too good to be true in software that sells for just \$39. *Is it?* In one sense, yes. Loads of features translate to a steep learning curve. If you have never been called a computer geek or an *astronomy* geek, you might want to look for a simpler package. This is *not* your kids night-light planisphere, nor the free Sky software that came with your Go-to scope. Nope, it's going to take some old fashioned



“reading the manual” to get up and running on this little gem of a tool, not to mention a bunch of trial and error. I spent quite some time just clicking and trying every one of the little icons, gadgets and gizmos in order to get comfortable with this software.

As you might expect from the above, Astromist’s installation process is pretty involved, and the first time you run through all the configuration screens will be a bit daunting. You’ll need to be familiar with the Internet and hot-syncing your Palm to get it all up and running, but you will, and once you do, it’s on to learning the features.

**Tools, Assistants, and Settings** –are the main menus, and they are your friends!

The **Tools** menu is the first drop down menu, and the first choice is the Wizard. No, not the Harry Potter kind, the kind that makes starting off easy. The main Astromist Wizard is really the home page, and gives you a choice to click an icon and pick from the following options starting in the top left, and going clockwise; Planets, Galaxies, Nebulae, Globular Clusters, Comets, Bright Stars, Moon Assistant, Jupiter Assistant,

Saturn Assistant, Caldwell Objects, Messier Objects, NightTripper, Load Personal Objects, List Manager, Finder Assist, Camera Control, Scope Control, Observation Log, and Current Sky. The main starting view has nearly everything you would want to get started.

Beyond the Wizard, the Tools menu also includes 2-Star, 4-Star, and Polar Alignment options for controllable mounts, as well as the ObjectInfo, NightTripper, SkyChart, CompassChart, Scope Control, and Camera Control features.

The **ObjectInfo** screen shows everything you could want to know about the object (with the exception of the common name – perhaps that can be a new feature request), including when to view the object, type of object, RA, Dec, Alt, Az, Constellation, Size, Magnitude, Rise and Set, Best viewing period, and even the best eyepiece to use.

“**NightTripper**” is the place where you build lists.

SkyChart takes you to the Planisphere view.

**CompassChart** is a unique feature that shows you the relative direction, N,S,E,W and altitude of the object.

**Scope and Camera** control are there for those who are controlling these devices.

The

**Assistants** menu includes the Finder feature, the ObserverLog, Comets&Asteroids, Eclipses. Jupiter, Mars. Moon, Planets, Satellites, Saturn, Day/Night mode, and Twilight. The Finder is basically a way to search for any object in the program’s installed catalogs. ObserverLog, is of course, where you log your observations, and it’s actually quite good, providing for most of the things you would want to record, many in convenient drop down menus. The other Assistants all have a variety of screens and views, all in full color, each relative and important to the object that Astromist is assisting you with.

Finally, the **Settings Menu** gives you Preferences, Location, NightMode, CCD, Checklist, Load/Save Lists, Import Memo to List, Export List to Memo, Export Alignment data, Register, and About. Most of these topics are well-described by their titles, and include a rather extensive list of user selectable preferences, a map and a list of cities to choose from for location, a way to define CCD size, and a checklist to help you remember what to bring on an observing sessions.

Admittedly, I have not used or tried all of the features listed yet, and an in-depth description would take a review at least three times this long. Yes, this software really does *everything!*

Features are nice, but how does the all-important **Planisphere** view work? You have the option of controlling things with the stylus or with the PDA’s buttons, which you can configure a number of ways. Basically you just point and move around the screen, zoom in and out, and select objects. The Alt-AZ, and





RA-Dec coordinates are shown, and other basic controls and indicators, including ways to get to the other functions, are available as little icons on the screen. One thing in particular I like, is the ability to easily turn on and off circles for the Telrad, and the eyepiece fields. There is lots to explore, and again it's just too much to try to explain the whole thing. I will say there isn't anything I can think of that there isn't a way to do.

How is **support**? I emailed the author on several occasions and every time got a prompt, informative, polite and well-written reply.

So what's the payoff for all this work and studying to learn *Astromist*? An awesome, fun, feature-rich application that provides the user with a very rewarding and highly customizable electronic planetarium, planning, and observing toolset.

How do I like to use *Astromist*?...

**Step one** – Configure the settings the way you need them and like them, including your location, preferences, seeing conditions, scope parameters, eyepiece parameters, and a sneaky little thing I figured out called the **Telrad circles**.

The Telrad circles are preset, but you can change them to show any size circles you like. You can also add a circle for the field of view of your favorite eyepiece. In my case, I have the four circles for my 80mm refractor. The first is set to 4.3 degrees, which is what I see in my using my 33mm SWAN eyepiece. Next is 2.2 degrees, the field for my 16mm UWAN. Then, 1.1 degrees, the view in my 7mm UWAN. Finally, .5 degrees, the FOV with my 4mm UWAN

**Step two:** load up a list of objects to look at from your favorite source, like Uncle Rod's,

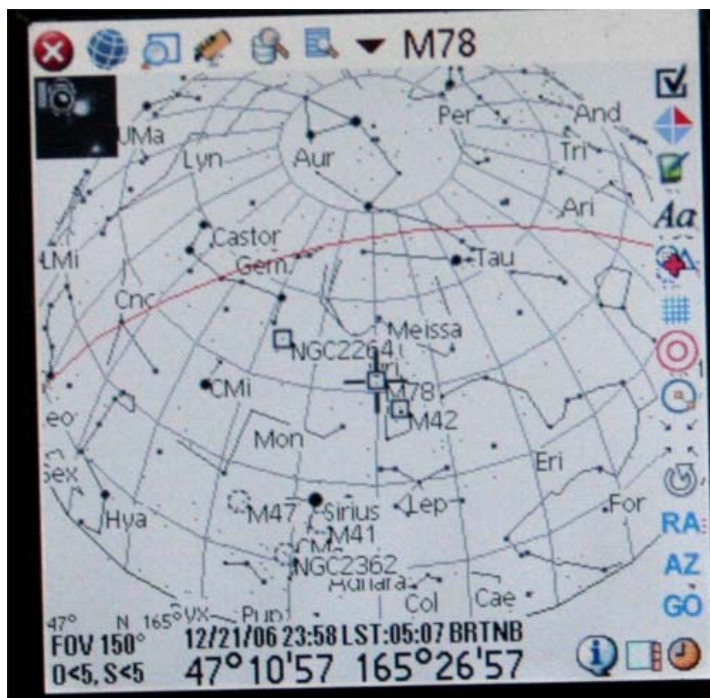
*The Urban Astronomer's Guide*, or simply pick from objects from the many lists by a variety of selection criteria to build your own list in the **NightTripper** section. You can create and edit lists or import and export them. The ability to pick objects

is very nice. Don't even ask which objects are included, because they are ALL included. If you need more, you can, for example, download lists of comets and asteroids for free from appropriate websites, or even create your own objects at will.

**Step three:** bring your Palm outside with you, set it in to one of three variable brightness night modes, and start *finding things* from your list. As you zoom in, you can control the image orientation (which admittedly took me a bit to figure out). What this means is that the view can be reversed or flipped until it matches what you see in your eyepiece by.

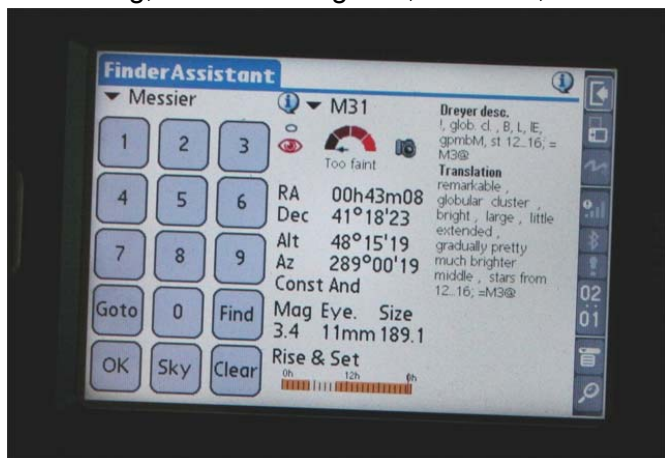
With all the configuration options set, what you see on the Palm's display is very close to what you see in the sky at a particular moment in time, through *your* eyepiece, with *your* seeing conditions, at *your* location, with *your* eyes, (aging or young), and with *your* scope's aperture. I have to say, it's a bit amazing at first, looking at the screen and then going back to the eyepiece and realizing that you have pretty much an exact match. Want more "realism"? You can even click on an icon and see an actual photo of what you are looking at. It sure helps to know what to expect when you are finding things.

When everything's set the way you like it, you just *observe*, and take notes, which you can export those to your handy dandy PC text editor, by the way.



All in all, what you have is a sweet all-in-one planning, observing, and recording tool, in

steer some folks towards a laptop instead. Balanced against that, of course, is the incredible



level of portability of the Palm. And you are not giving up much capability with Astromist as compared to “real” astronomy programs for PCs. Don’t forget the modest price, either. All in all the decision to use Astromist

I must admit I have three CATs, all from the same manufacturer, Celestron: a C90 (older rubber coated, Starbright Coatings), a Celestron Pacific C5 (Orange, Special Coatings), and a C8 (black, Star Bright Coatings) and I have only had one other scope, an 80mm refractor.

I started my collection with the C90, and then added the C8, and finally the C5. While I love my C90 as a spotter/telescope, and the C5 is truly amazing for its size, if I could only have one scope *it would be the C8*. After six years of use, I find that the C8 satisfies my needs so well that I no longer even think of getting any type of scope to replace it. While the C90 was my first scope and the C5 was a “deal I could not refuse,” the C8 is the scope I recommend to people who can afford it, even if all they can afford are used ones. From the 1990’s on, it seems both Meade and Celestron finally got their optical performance consistently into the *very good to excellent* range.

I purchased my C8 in 2001 on a CG5 mount for around a

\$1000.00. You can find this scope on the newer CG5 at Astronomics for about \$1050. Additionally, you can find 8-inch SCTs on the used market for between \$700 and \$800 on a mount of some type. Or you could purchase a tube and a used CG5 separately for between \$600 and \$800. When buying used, you want to be careful about considering scopes made prior to 1990 due to some inconsistency in the quality of scopes made during the “comet (Halley) mania” years.

a handy Palm PDA.

was a no-brainer for me.

**Step four:** (optional) I haven’t done this, but you *could* align your scope using *Astromist*, perhaps even wirelessly, and then use the go-to feature instead of your scope’s hand controller. The advantage, you ask? Well, it’s *cool*, and it’s click and go. It sounds cool, anyway, but, and it appears to support pretty much any of the standard go-to systems.

*Are there any drawbacks to Astromist?*

Sure. Nothing is perfect, is it? As I already mentioned, installation is long and complex; especially if you load all 8 *gazillion* photos of NGC and M objects, all the moon pictures, the planet pictures, every one of the 2 *bazillion* catalogs supplied. There’s the hardware requirements, too, of course. Your Palm better be color and really ought to have an expansion card, or you will be limited to smaller catalogs and no fancy pictures. Don’t forget, too, that you’ll be doing all these things on a relatively small Palm display—something that may

Finally, the biggest surprise of all is that Astromist ran surprisingly well on my old and hardly state-of-the-art Palm Zire 71. It’s satisfyingly fast most of the time, slowing down only occasionally—when it’s building object lists from catalogs of 20,000 items, for example. On the new Palm T/X? Wow! The screen, the speed, the interface, *everything* just leaves the Zire 71 in the dust (of a comet tail)! Yes, this has got to be one of the coolest \$39 software packages I have ever seen.

Go to [www.astromist.com](http://www.astromist.com) for more information, including full feature lists, screen shots, the instruction manual, the feature disabled free version, and more information.

## “Jack of All Trades”

Jeff Lee

What do you get for your \$600 to \$1100? You get a scope people either love or hate. You get a scope that will show you just about every class of object fairly well in the city and extremely well from dark skies. You'll get a scope that really is a Jack-of-all-trades, and a master of--(you've got to read more if you want to know). What you really get is a scope that just might satisfy your optical needs for a *lifetime*.

**Product Specifications:** 8-inch Schmidt-Cassegrain Optical Tube Assembly, Aluminum Optical Tube, Celestron's standard StarBright coatings, 2032mm focal length (f/10)



For those who like optical specifications, an 8-inch (200mm), 80-inch focal length (2080mm), f10 (really 10.4) scope has a Dawes Limit of .58, a Rayleigh Limit of .7, with a Field

Stop of 1.25-inch and a Maximum FOV of .87 degrees.

**To complete the SCT for using I feel the following are “must have” accessories which may or may not come with the optical tube.**

### Finder Scope

A scope of this size, unless you have it on a computerized mount and never star hop, needs a good finder. One at least 50mm in aperture. While I have Digital Setting Circles powered by a PocketPC using Pocket Sky, I find that on many nights when viewing at home, a 50mm finder is the best tool for quickly finding an object I want to view; especially one I am familiar with. The trick to finding objects with “just” a finder is in either using my PocketPC or a sky chart (Cartes du [Ceil](#) is a great charting program that's available for free) and viewing/printing a finder chart in the right orientation. While I like computers, I do find I get a different feeling when I find things the “old fashioned way.” A 50mm or larger finder will bring real value to your 8-inch SCT.



### Zero-Power (Unit) Finder

You may also want to consider a zero power sight, at least to supplement your finder. I prefer one with circles rather than a dot. Because I switch back and forth between my smaller scopes and my C8, I have found the Rigel Quick Finder works best for me. Again, I often print charts with 2 degree circles to help me quickly find objects when I'm not using the DSC's (also very helpful on quickly finding Polaris for Polar alignment).

### Focal Reducers (FR)

Then there's the accessory that gives you two scopes for the price of one, a focal reducer, like the Celestron and Meade f/6.3 “reducer/correctors.” One reason some people don't like SCT's is the “narrow field of view” that such a long focal length produces. Since the 8-inch SCTs have small field stops, 2” accessories don't give you their full benefit. I've found that using a focal reducer and a 1.25-inch EP such as the Ultima 35mm gives a very usable FOV of around 1.3 degrees. An additional benefit of the Meade and Celestron FRs is that they are also field flatteners, which means some of the optical distortion at the edge of FOV is *corrected*. I find this greatly increases the enjoyment I get from my scope when viewing large objects. One last benefit of the focal reducer is that if you want to try imaging with that DSLR or other camera, your f/10 scope is now an f/6.3 scope, and you will benefit from both shorter exposure times and a flatter field.

### Dew Shield



Depending on where you live, a “dew shield” might help with the corrector plate dewing up (there are also heaters that can prevent dew from ruining your observing session, and which may be *mandatory* for dew-heavy observing locales).



## Knobs

Finally, the least expensive but most critical accessory you can purchase is a set of “knobs” for collimating your scope. Over the years, an urban legend arose about the difficulty of collimating an SCT. Many SCTs people view through are not well collimated, and that is one of the contributing reasons why many people think SCTs are not optically good.

Several years ago, people began to replace the factory supplied screws with “Knobs” and, suddenly, collimating a SCT was no longer like having a root canal. So, get a set of Knobs--less than \$20 shipped--and learn to keep your scope well-collimated.

A simple method that I use to get me in the ballpark and ready for using a star to fine-tune collimation (if my scope is way out which only happened when I changed to Knobs), is to take aluminum foil and a sewing needle and make the smallest hole you can. Then put the foil on your brightest flashlight and

put it say, 60 to 80 feet away from your scope. Following the directions the come with Bob's Knobs

(<http://www.bobsknobs.com>)

you can get the scope in rough collimation, and by the time you are done (shouldn't take more than 30 to 60 minutes) you are ready to finish the fine-tuning under the stars.

In the CAT section here at *CloudyNights*, you can learn how to clean the optics which you should not do that often. An SCT needs very little cleaning. Rod Mollise, kind of the Uncle of SCT's, states that most SCT's, if reasonably cared for, can go a very long time before recoating the mirror. This is due to the fact that SCT's, especially those who are stored in cases, are semi-closed systems. Rear filters or leaving your FR on is also beneficial to keeping the interior of your SCT dust free.

SCT's do have to “equalize” (temperature of the scope matching the temperature of the surrounding air) in order to achieve the best optical performance. What this means is if you don't store your scope in an area that matches the outside temperature, you will have to wait to touch up collimation and/or enjoy the best optical performance of this design. I often chase “faint fuzzies” while waiting for the optics to settle down.

## Jack Of All Trades, Master of None?

I see things. I *like* to see things. It really doesn't matter what type of astronomical things I see, I really like them all. If I have a favorite it is probably globular

clusters. But in general just like to look at things in space. I have looked through scopes from 14.5-inches down to 80mm. Some have been high end; some very inexpensive. I know I personally like 8-inch scopes because of their general performance and their portability.

Under dark skies my 5-inch SCT is pretty amazing. In fact, so is the 3.5-inch. However, most of my viewing is from my yard with its magnitude 5.3 zenith. The little 5-inch works very hard to resolve the big clusters. The 8-inch does it without breaking a sweat.

From double stars, open clusters, globular clusters, and semi-bright galaxies to planets, and the Moon, I have spent time enjoying the very sharp views that my C8 produces in my yard. On first light on a Moonless night (where I used to live with 5.6 to 5.8 Zenith), it provided me with a view of M51 that showed structure and the bridge. I recently was at a very dark site with the 5-inch and the view was just not as good.

I find that using this scope with the FR and moderate powers yields stars are very sharp, and, yet, when using a Barlow, the optical performance remains very, very good. I find I get a cleaner split on the double-double in Lyra at slightly lower power with the FR installed.

A significant point in the performance of an 8-inch SCT is the ability to use “Ford/Chevy” EP's like Celestron Ultima's. While Ultimas are discontinued by Celestron, there is at least one firm (Orion with their “Ultrascopics”: Ed) selling this

design under its brand. I have a fairly complete set of Ultimas which provide powers (including the FR) ranging from 37X to greater than 400X (recommended limit). The entire set probably costs less than one premium 2-inch EP.

How high *can* you go? While I don't tend to go much above 200X, on those rare nights when seeing is very transparent and steady, I have used the scope at 416X. I was astonished at the view of Saturn on that night. While I am not an optical expert, I have several photographic lenses that cost what a APO would cost, and I think I can at least recognize color and contrast. Subtle shapes on Saturn's globe, incredible detail in the rings, black sky--the combination of the Ultima's and the SCT provided me with a view which reminded of the best photographs I've seen. Even better: just something about capturing those photons with your own brain.

What doesn't work for me with an SCT? Cool down time during the winter months can be a big issue, especially if a SCT is your only scope and you have to keep it in a heated room. Collimating was very daunting at first, but Knobs took care of that. Perhaps collimation is the biggest issue in owning any type of reflector. If you think collimating a scope might make you nervous, be sure to visit a club to see it done before you buy. Nothing ruins the performance of an SCT like being out of collimation, closely followed by thermal equalization.

Additionally, setting up the scope, especially on an equatorial mount, can be frustrating until one has done it enough to be comfortable. When mounted on a computerized mount, the set up is easy, and on one-arm mounts like the Nextstar series very portable and user-friendly.

Finally, cleaning the interior of the scope (something that's seldom required: Ed) is best done by the manufacturer. The corrector plate and main mirror have one orientation that gives the best optical performance. While not overly difficult take a corrector plate off a SCT is not for the faint of heart.

### Conclusion

I spent a lot of time using my C90 (four years) before I made the decision to get a "real telescope". I had budgetary limitations, and made the decision to buy what my research showed was the best all-round performer and decided that I could live with the short comings of the original CG5 mount. Six years of viewing every type of celestial object, comparing its performance against smaller and larger scopes, learning how to collimate, and finally with a DSLR doing some imaging, I have to say that the 8-inch SCT is certainly a Jack-of-All-Trades. Seeing the various objects at a range of magnifications, seeing incredible detail in them, and becoming proficient using the abilities of the C8 and equatorial mount, has convinced me that the SCT is certainly a master of *one* thing. It is a telescope that

does everything I've wanted a telescope to do and does it each thing at a level near the best of designs for each thing.

If you have very specific needs and can live within the limits that various designs which are masters of a single viewing type, then an 8-inch SCT might not be the scope for you. ***BUT if you are looking for a scope that is a least a master apprentice at all things astronomical and fits in well with human needs (such as transporting/storing), then an 8-inch SCT might just be the CAT's Meow for a lifetime of viewing!***

## The Planet in the Machine

Diane K. Fisher and Tony Phillips

The story goes that a butterfly flapping its wings in Brazil can, over time, cause a tornado in Kansas. The "butterfly effect" is a common term to evoke the complexity of interdependent variables affecting weather around the globe. It alludes to the notion that small changes in initial conditions can cause wildly varying outcomes.

Now imagine millions of butterflies flapping their wings. And flies and crickets and birds. Now you understand why weather is so complex.

All kidding aside, insects are not in control. The real "butterfly effect" is driven by, for example, global winds and ocean currents,



polar ice (melting *and* freezing), clouds and rain, and blowing desert dust. All these things interact with one another in bewilderingly complicated ways.

And then there's the human race. If a butterfly can cause a tornado, what can humans cause with their boundlessly reckless disturbances of initial conditions?

Understanding how it all fits together is a relatively new field called Earth system science. Earth system scientists work on building and fine-tuning mathematical models (computer programs) that describe the complex inter-relationships of Earth's carbon, water, energy, and trace gases as they are exchanged between the terrestrial biosphere and the atmosphere. Ultimately, they hope to understand Earth as an integrated system, and model changes in climate over the next 50-100 years. The better the models, the more accurate and detailed will be the image in the crystal ball.

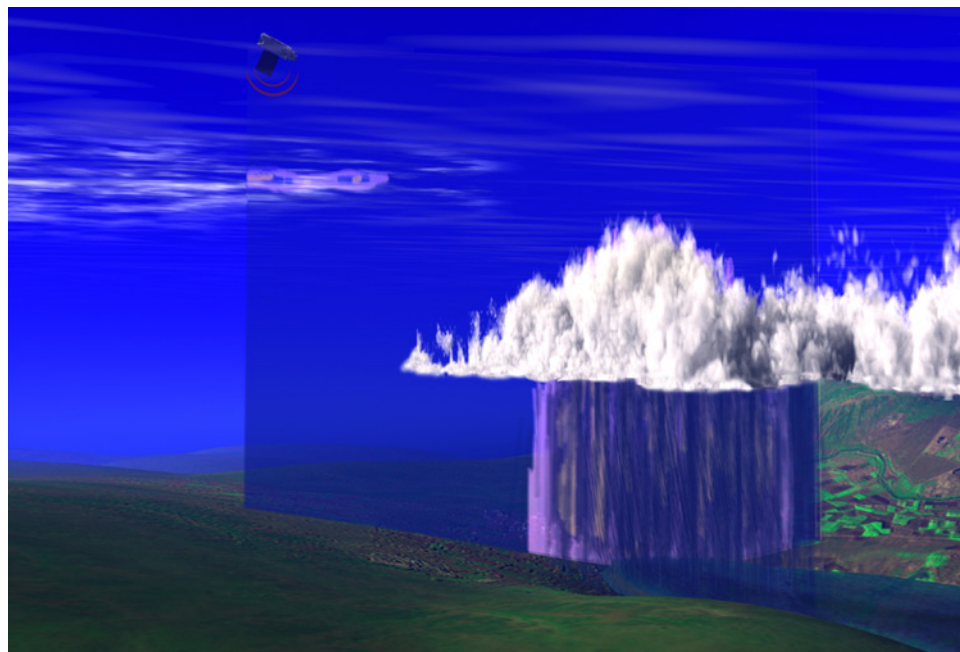
NASA's Earth System Science program provides real-world data for these models via a swarm of Earth-observing satellites. The satellites, which go by names like Terra and Aqua, keep an eye on Earth's land, biosphere, atmosphere, clouds, ice, and oceans. The data they collect are crucial to the modeling efforts.

Some models aim to predict short-term effects—in other words, weather. They may become part of severe weather warning systems and actually save lives. Other models aim to predict long-term effects—or

climate. But, long-term predictions are much more difficult and much less likely to be believed by the general population, since only time can actually prove or disprove their validity. After all, small errors become large errors as the model is left to run into the future. However, as the models are further validated with near- and longer-term data, and as different models converge on a common scenario, they become more and more trustworthy to show us the future while we can still do something about it—we hope.

For a listing and more information on each of NASA's (and their partners') Earth data-gathering missions, visit [science.hq.nasa.gov/missions/earth.html](http://science.hq.nasa.gov/missions/earth.html). Kids can get an easy introduction to Earth system science and play Earthy word games at [spaceplace.nasa.gov/en/kids/earth/wordfind](http://spaceplace.nasa.gov/en/kids/earth/wordfind).

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*



# My Back Pages

"Crimson flames tied through my ears  
Rollin' high and mighty traps  
Pounced with fire on flaming roads  
Using ideas as my maps  
"We'll meet on edges, soon," said I  
Proud 'neath heated brow.  
Ah, but I was so much older then,  
I'm younger than that now."



## Club Notes: News of the Mobile Astronomical Society and Items of Interest for Gulf Coast Area Observers

2006 was a very important year for the Mobile Astronomical Society (MAS), with the group staging a remarkable resurgence on several fronts. Most importantly, we gained quite a few new and *enthusiastic* members—the lifeblood of any club. And older members were re-energized when the group finally gained the use of a dark-site for some truly productive deep sky observing. In contrast to our old location, which often

“featured” a magnitude 5 or even 4 zenith, the new site has sported a prominent band of Milky Way on just about every observing run. 2007 looks to be a wonderful year, the best in ages, for us.

*Huh-huh, huh-huh, **Christmas**, time for ho-ho-ho, and mistletoe, and presents to pretty girls, and hermetically sealed mayo jars kept on Funk and Wagnall's front porch for a fortnight, jars aimed right between the eyes (heh-heh) of that DILLWEED, jars full of...*

## RUMOURS

*As noted in this issue, Skypub's Night Sky magazine is **no more**. In case you missed it, here is Rich Fienberg's statement, which appeared several places on the Internet. I found the candid nature of this statement very refreshing; if only everybody in the astro-biz were as forthcoming:*

“Hello, everyone. This is Rick Fienberg, editor in chief of Sky & Telescope magazine. There's a lot of speculation on this newsgroup about goings-on at Sky Publishing, so I thought I'd better jump in and set the

record straight. My colleague J. Kelly Beatty and I just posted the following announcement on our website, SkyTonight.com:

"Sky Publishing has decided to stop producing Night Sky, its bimonthly magazine for beginning amateur astronomers. The next issue, appearing in February and dated March/April 2007, will be the last. We are no longer accepting new orders for Night Sky. More information about the disposition of existing subscriptions will be available shortly.

"We launched Night Sky in May/June 2004 to serve entry-level stargazers who want to enjoy and explore the heavens but who find Sky & Telescope too advanced for their needs. Apparently, there aren't as many of these folks as we thought -- at least, not enough of them prepared to buy a magazine like Night Sky.

"Sky Publishing was acquired by New Track Media in February 2006. NTM chief executive officer Stephen J. Kent explains, 'We decided to wind down Night Sky because it never gained traction in the marketplace. Despite three years of aggressive subscription and newsstand marketing, the magazine showed no sign of becoming profitable. I'm as disappointed as anybody, because it's a terrific product.' Kent adds, 'We'll enhance and improve the editorial mix in Sky & Telescope and on our website to make sure we continue to serve amateur astronomers of all levels.'

"Launching a new magazine is always a gamble. According to Samir A. Husni, chair of the journalism department at the University of Mississippi and a leading analyst of the magazine industry, 60% of new magazines fail in their first year, 80% fail by their fourth year, and 90% are gone within 10 years. Sky & Telescope, founded in November 1941, is now in its 66th year of continuous publication."

"Ordinarily, we'd leave it at that. But I'd also like to make a few additional comments to address the rumors and innuendo circulating here and in other online forums.

"Yes, we laid off five people last week. That's what happens when you close down an unprofitable part of your business. It was very painful, but sadly necessary. Four of the layoffs were associated with the closure of Night Sky, and one with cutbacks in our book-publishing business, which has also been struggling lately. The affected employees are sharing the news

with friends and associates as they see fit; I don't think it would be appropriate for me to list their names here.

"No, President/publisher Susan B. Lit was not dismissed; she decided to leave on her own. Over the past six years she led the conversion of Sky Publishing from a mom-and-pop operation to an enterprise worthy of becoming the foundation of New Track Media, but with that accomplished, she was no longer in charge. Not surprisingly for someone who had risen to the level of CEO, she decided to look elsewhere for new opportunities to apply her considerable knowledge and skills.

"Yes, Stephen James O'Meara will now be writing regularly for Astronomy rather than Sky & Telescope. I'd tell you why he made this change if I knew, but I don't. One day he told us he didn't want to write his column for us anymore, and the next day we heard that he will be writing for the competition. I don't know what prompted this, and Steve won't tell me. All speculation voiced online to date is just that: speculation.

"As far as Sky & Telescope is concerned, the only 'writing on the wall' says that New Track Media is firmly committed to maintaining its flagship publication's leadership in the astronomy-magazine marketplace. Yes, we'll be doing some things differently, but all in the interest of operating more efficiently (to keep costs down and avoid having to raise the price you pay) and providing a better experience for our readers/customers.

"I'm not going to dignify with a response those parts of O. Dam Itall's message (see, as you might expect, **sci.astro.amateur** for the article in question: AA) that are nothing more than baseless speculation and outright falsehoods. I will say only this: It doesn't take much courage to make an anonymous post.

"Thanks for this opportunity to clarify a few things. Feel free to post your comments here (I'll be back to read them over the next few days), and/or you can send e-mail to me directly at [rfienberg@SkyandTelescope.com](mailto:rfienberg@SkyandTelescope.com). "

-- Rick Fienberg, Editor in Chief, Sky & Telescope

*Some news in the Star Instruments/RCOS lawsuit concerning the Meade RCX* (if you don't know what this is about, see Uncle Rod's blog entry for Wednesday, October 11 at <http://uncle->

[rods.blogspot.com/](http://rods.blogspot.com/). Seen on the Star Instruments website:

“Star Instruments, a leading manufacturer of quality optical systems based in Newnan, Georgia, announced today that it has reached a settlement agreement with Anacortes Telescope and Wild Bird, Incorporated, a Meade dealer located in Anacortes, Washington. No monetary damages were involved in the agreement in exchange for dismissing Anacortes from the lawsuit.

“Russell K. Statman, attorney for the Plaintiffs (which also includes RC Optical Systems and an individual who purchased one of the controversial telescopes) stated, “Anacortes’ willingness to cease the objectionable advertising made this settlement easy and inexpensive. That was all the Plaintiffs wanted to dismiss them from the lawsuit.” He added that the same settlement agreement was presented to the other dealer defendants and, surprisingly, was rejected within 12 hours by Meade’s counsel, who also represents the other 13 defendants. “It is inexplicable. If the dealers agreed to correct the false advertising, Plaintiffs would agree to dismiss them from the lawsuit, too, with no payment of financial compensation.”

**Also in RCX news...**the **RUMOR** is floating around the usual Internet amateur astronomy hangouts that up to 50% of RCXes have been returned to Meade because they have been “dead out of the box.” This sounds like a suspiciously, outrageously high number to me, but that’s what’s being bandied about on the ‘Net.

**For the affluent among you:** the word is that Takahashi will be coming out with a new 106mm refractor this year. It will be a *quadruplet*, and will replace the FSQ106. Further, “The focuser and aluminum castings will still be hand made, one at a time without automation. It will continue to have two front elements, a center corrector and rear flattener element. The focal ratio will be F4, faster than the current F5.0. It will use a similar sliding dew shield, with a red band instead of the blue band, similar to the TOA and TSA line of refractors signifying ED glass instead of a Fluorite element.” Best start saving up your pennies now, bubbas and bubbettes.

**While it was never as popular amongst penny-pinching imagers as the Meade DSIs, the Orion StarShoot was a well-liked little camera.**

Unfortunately, Orion is discontinuing it. It seems that the reason is, it appears, that **SAC Imaging**, the small Melbourne, Florida concern (the owner, I’m *told*, moonlighted at SAC from his regular job in motel management) could not produce working cameras in sufficient numbers to satisfy Orion’s demand. Further, it appears, based on statements from the principals found on the SAC Imaging Yahooogroup, that SAC is *moribund*, and is down to one employee, the owner. Orion says they will be releasing new cameras (SAC produced a planetary camera for Orion in addition to the deep space-oriented StarShoot) this spring.

--The Anonymous Astronomer

## Astropoems

### *The Night After Christmas*

*‘Twas the night after Christmas, ‘twas calm and ‘twas clear.  
Nothing could bring an observer more cheer.  
Perseus stood on his perch way up high,  
His steed, Pegasus, was grazing nearby.  
The Gemini twins were now climbing the sky,  
And the Beehive\*, I swear, I could see naked eye.*

*I waited for old Canis Major to bark;  
The whole dome of heaven was stunning and dark.  
It was good to be out, far away from the crowd,  
While enjoying a sky that did not hold a cloud.  
The unchanging stars that were named long ago  
Return with each season for gazers below.*

*To my brothers and sisters, be they near or far,  
I bid you good fortune and wish on a star.  
May good health and peace find their way to your door,  
May your blessings outnumber the stars in M-4\*.  
Wherever life leads you, wherever you roam,  
May the stars always be there to guide your way home.*

### Lamentations

*Hostile photons in the air,  
Hostile photons everywhere.  
Silv'ry beams of cold moonlight  
Spell the end to starry night.*

*Lovers by the Moon do spoon,  
Fiddlers play the Moon a tune,*



But the man who hunts the sky  
In search of wispy nebulae,  
Spurns the Moon and bids her go  
To the netherworld below.

"Moon that's rising in the trees,  
You've spoilt my view of galaxies.  
From the sky the stars you've swept--  
I wish that you had overslept!"

--Roger Curry, Northeast Florida Astronomical  
Society

## The Wrap Up

ON TIME this time with a *bunch* of  
good articles and more pages than  
you can shake an armadillo at!  
Can I get a YEE-HAH!?

What with Katrina's aftermath and  
all, 2006 was an odd year--to put  
it mildly. Here's to NORMALCY!  
See y'all in the spring!

--Rod Mollise

### **Scott Smith AstroToon**





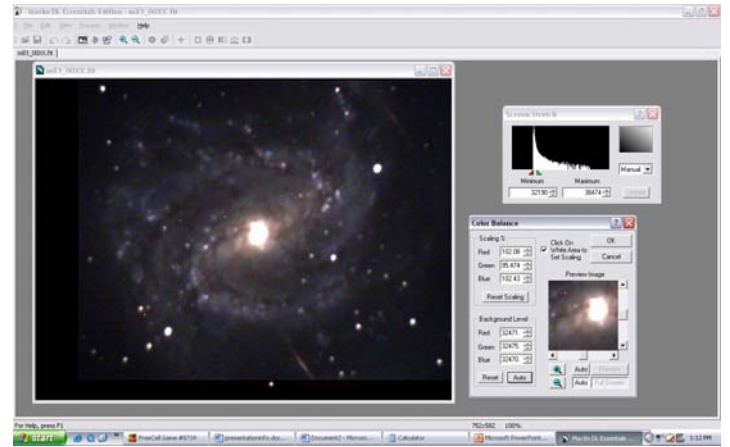
The screenshot shows a Windows XP desktop environment. The main window, titled 'black101\_2002.06', displays a solid black screen. To the right, three smaller utility windows are open:

- Screen Settings:** A window with a black preview area and a 'Monitor' dropdown menu set to 'Monitor 1'. It shows a resolution of 1024 x 768 at 60 Hz.
- Start/About Settings:** A window with input fields for 'Analog Scan' (set to 1) and 'Analog Offset' (set to 1710). It has 'Default', 'OK', and 'Cancel' buttons.
- Camera Control:** A window with tabs for 'Exposure' and 'Guide'. The 'Exposure' tab is active, showing 'Mode' set to 'Light Run 1st', 'Focus' set to 'Auto', and 'Dark Subtract' checked. It also displays camera status: 'Camera On', '10:50:41 @ 1:00:00 sec', 'Max Pixel 20303 at (144,437)', and 'Pixel 2.04, WFO 0.15'.

The taskbar at the bottom shows several open applications, including 'File Help, gsm...', 'PencilCell Game #3734', 'presentationshow.doc', 'explorer.exe', and 'Calculator'. The system tray on the right shows the date and time as '7/2/2002 10:50' and the volume icon.

The screenshot displays a Windows XP desktop environment. A large window titled "dash101\_2002.06" is open, showing a black screen. To the right, there is a "Screen Switch" utility window with a "Main" button and a "Screen" dropdown menu. Below it is a "Camera Control" window, which includes a "Preview" section showing a person's face, a "Mode" dropdown menu set to "Frame Rate 1/1", and a "Seconds" field set to "10". The "Camera Control" window also has a "Start" button and a "Stop" button. The desktop background is a solid grey color.

The screenshot shows the Starlink Desktop Edition v0.1.0.2001.00 application. The main window displays a field of stars. On the right, the 'Camera Control' panel is visible, featuring 'Expose' and 'Guide' tabs, a 'Mode' dropdown set to 'Light Run 1st', and a 'Focus' section with 'AutoFocus' and 'Manual' buttons. A 'Status Window' in the top right corner shows a graph and numerical data.

[illegible]