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“A Newsletter for the Truly  
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<RMOLLISE@AOL.COM>

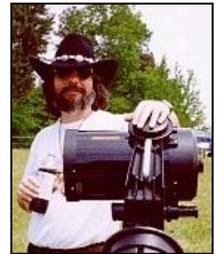
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Skywatch  
1207 Selma Street  
Mobile, AL 36604  
U.S.A.

Rod Mollise's

# Skywatch



## Celestron, The Early Years

Rod Mollise

Think back—way back. While your friends were dreaming of minibikes, massive 8-track stereos, Corvettes and make-out parties were you drooling over White Tube C10s, C16s and (gosh) C22s? Or maybe you're puzzled by old timers on s.a.a. and the Yahoo groups and maybe even at your local club prattling on about “Classic Celestrons,” “White and Blue tubes SCTs” and those aforementioned C10s, C16s and C22s.

If the above rings a bell or at least piques your interest, man, do I have a read for you. Robert Piekieł has put together a book, an E book, that does more than explain the above mysteries. What Bob does is document in minute detail the early years of one of the amateur's favorite telescope companies, Celestron.

What's a White Tube? Before Celestron began mass-producing Schmidt Cassegrains in the 1970s, they had been making near-custom SCTs in a distinctly unfamiliar aperture range (if you're used to the litany of C5, C8, C11 and C14). These telescopes, in apertures of 6, 8, 10, 12, 16 and 22 inches, were attractively finished in white and blue (thus the moniker “White Tube”), and, while not as sophisticated electronically as today's computerized marvels, they had quite a lot going for them, being aimed at the professional/educational market

rather than at amateur astronomers (though quite a few wealthy amateurs did spring for the C10).

Even those of us who couldn't dream of affording the many 1960s dollars a C10 or C12 commanded drooled over the Celestron ads. Some of us never forgot those gleaming white SCTs surrounded by serious men in white coats—Celestron Girls were few and far between then. Until now, though, the only information on these telescopes, and, indeed, on the early history of Celestron has been word of mouth from older amateurs, advertisements and a handful of articles in yellowing back-numbers of *Sky and Telescope*.

It's curious, really, that the SCT, undeniably the most popular commercial telescope of all time has had so little written about it. Oh, there's my book, *Choosing and Using a Schmidt Cassegrain Telescope*, and Bob Manly's *The 20cm Schmidt Cassegrain Telescope*, but that's been it so far.

Now there's a new “bible” for SCT lovers, Bob Piekieł's *Celestron: The Early Years*. Unlike my book and the Manly book, Piekieł has chosen to focus on the historic side of Celestron rather than on buying and using current models from both SCT makers. *Early Years* gives a detailed overview of the rise of Celestron from Tom Johnson's initial interest in building a telescope for himself and his family to his conversion of his company, Valor Electronics, from a tiny vendor of power supplies and other electronic gadgets to the arguably most famous telescope company of all time.



pages, much of the book is formatted in larger fonts, so the “actual” length is considerably less than that—a good deal less than half if the book were reformatted in 12 point type. Also, while the author’s prose is usually very clear and workmanlike, it is sometimes not quite of professional caliber. All this means is that the book could stand a good going-over by an Editor and a Copy Editor, something I hope happens. I’d like to see Celestron the Early Years published professionally in print form. It’s good enough that it deserves much wider exposure and distribution than it’s likely going to get in its present form.

*How do you get it?* At this time, it’s only sold directly by its author. Respond to his Astromart advertisement:

<http://www.astromart.com/viewad.asp?cid=252296>

How mucho? A few people have complained about the book’s not inconsequential price of 49.95 US\$ plus 3 US\$ for shipping. Yes, it’s a trifle high for a CD or DVD. But you’ve paid this much for computer games or a PC planetarium programs you never use. This book is worth every penny—in spades. You’ll agree once you see the work the author put into it. If you are an SCT fan, this is something you *will* want—no—something you *must* have.

## Burgess 127mm f/8 Achromatic Refractor

**Geoff Gaherty**  
Toronto Centre RASC

Bill Burgess of Burgess Optical announced early in 2003 a new line of achromatic refractors which he planned to import from China. I learned of these in March and placed my order then at the special

The meat of this book, though, is the chapters on the White Tubes. Each of these scopes is examined in excruciating detail from its design to its use to its maintenance to its restoration. While I’ve examined and used quite a few of these telescopes over the years—they don’t call me “Mr. SCT” for nothing—I learned a lot, and I do mean a *lot* here. Not only things I’d forgotten over the years, but much I never knew.

As mentioned above, this is an “Ebook.” That is, it is not offered in print form (though the user can print it out if desired), but instead in one of two electronic forms. Normally,

it’s delivered in Microsoft Word format on a DVD. Being aware that many users do not yet have DVD drives on their computers, Mr. Piekiel has also made an edition available on CD. This version contains the book in Adobe Acrobat (.pdf) format rather than Word. While the .pdf version is much smaller megabyte-wise, it contains exactly the same material as the DVD. The (many) pictures in the book *are* considerably clearer and better looking in the Word DVD version, however.

Any nits to pick? A few. While it is advertised as containing 1300

introductory price of \$299 USD. That price included an 8x50 finder, a 2" diagonal, a 2" to 1.25" adapter, a pair of tube rings with Vixen-compatible dovetail, and a 40:1 fine focus adapter. The price is now \$489 USD, but that includes an aluminum case and two eyepieces. My telescope, serial number 47, finally arrived on December 13.

Although some members of the Burgess Yahoo group had reported shipping damage, my scope arrived safely double boxed via parcel post. The finder, which was packed loose in the box, had put a couple of small nicks in the paint of the main tube, but that was the extent of the damage.

The tube wall is of noticeably heavier, thicker aluminum than the typical Chinese refractor, and is painted white. It has several knife edge baffles installed inside. The objective cell screws onto the tube and has three pairs of push-pull bolts for collimation, although mine arrived in perfect collimation. The metal dewshield, also painted white, is machined with microbaffles (grooves) on the inside, and screws onto the objective cell. The dewshield is fitted with a plastic cap with a smaller aperture with separate cap. This dewcap is slightly small for the dewshield and tends to fall off. The objective has deep green coatings that appear very evenly applied.

The focuser screws into the other end of the tube and is beefier than those found on other Chinese refractors. It also is free of that nasty sticky grease that characterizes so many Chinese telescopes. The drawtube and 2" to 1.25" adapters are both fitted with compression rings, rather than having bolts acting directly on the eyepiece barrels. The finder mounts in a dovetail groove on the focuser, as is typical on many refractors today. This places the finder's eyepiece uncomfortably close to the main telescope eyepiece. Its alignment is adjusted

by six bolts in two rings rather than the more common two bolts and opposing spring, which I find much more convenient. The finder's objective cell is plastic and is glued onto its tube; mine immediately came unglued. The removable dewshield on the finder is also plastic. The finder focuses by adjusting the eyepiece in a helical fitting; mine was jammed on arrival and required considerable force to free. The crosshairs are extremely fine and not located in the focal plane of the finder eyepiece; they disappear completely against the sky. This finder is the only component to get a low mark.

is only half an inch longer and half an inch larger in tube diameter than the Antares, it weighs 6.6 kg (14.5 pounds), more than 50% more than the Antares' 4.3 kg (9.5 pounds). This says a lot about the solidity of the Burgess' construction.

First light through the Burgess showed it to be a formidable performer. Even though Mars had shrunk to only 9.4 seconds in diameter, I could clearly see the tiny South Polar Cap and considerable detail on the gibbous disk using a 4mm Radian eyepiece at 250x. There was a slight purplish haze around Mars, characteristic of the chromatic aberration found in short-



I already own an excellent Antares 120mm f/8.3 achromatic refractor, which consists of an objective made in Japan to Vixen specifications mounted in a Synta tube assembly. I was curious to see how the Burgess would compare with it, since the two have similar apertures and focal lengths. Physically the Burgess was the clear winner, with its heavier tube, focuser, and collimatable cell, though the Antares' Canadian-made finder was superior to that on the Burgess. Even though the Burgess

focus refractors like this. Turning to the Orion Nebula, I was easily able to resolve the four main stars of the Trapezium at 250x, and then discovered that I could also see the fifth star, known as "E." The sixth star, "F," wasn't visible. Saturn showed more chromatic haze, and was difficult to focus accurately at 250x.

On New Year's Eve I was finally able to set up the Antares and the Burgess side by side under good seeing conditions for a careful comparison. The Antares was

mounted on a Super Polaris on a Vixen pier while the heavier Burgess was on a GP-DX and HAL 110 tripod. I used Tele Vue diagonals and Radian eyepieces in both scopes, since I had not yet received the Burgess 2" diagonal. The 40:1 fine focus adapter is also still on its way from China.

First up was Mars using my 5mm and 4mm Radians for 200x and 250x. Despite Mars' minute 8.4 second diameter, both scopes showed the Mare Cimmerium and the North Polar Hood clearly on the tiny gibbous disk. The Burgess appeared to have less color around the image, but the Antares' image was crisper, had more contrast, and snapped into focus more clearly. Round one went to the Antares by a hair.

Second round, the Moon just past first quarter at 250x. The highlands appeared yellow in the Burgess with

crater Deslandres lay just to the south of the Straight Wall. It is filled with craters, rilles and rubble, which were revealed much more clearly in the Antares. So round two also went to the Antares.

Third round, star test at 250x with green filter and no diagonal, using Rigel as a target. As I've seen before, the Antares delivers an almost perfect star test, very symmetrical on either side of focus, and a tight Airy disk in focus surrounded by a few faint rings. The Burgess had dim inner rings surrounded by a bright ring inside focus, and a very blurry pattern outside focus indicating spherical aberration. I removed the filter and examined the in-focus image in both scopes. Rigel is a very unequal double star, the primary being a brilliant 0.1 magnitude and the secondary a faint 6.8. They are separated by 9.5 seconds, but the faint star can be easily lost in the

All of this isn't as bad for the Burgess as it may sound. The Burgess 127 f/8 is in fact a very good telescope—it's just that the Antares objective is in a different class altogether. Keep in mind that when this objective was available for separate sale from Sky Instruments, it cost nearly twice as much for the glass alone (not including even the cell) as I paid for the entire Burgess scope! If I hadn't had the Antares alongside for comparison, I would have been very impressed by the Burgess' performance. I would expect it to easily equal or exceed the optical performance of refractors with similar specifications from other Chinese manufacturers selling for much more, and, as I remarked earlier, its mechanical construction is outstanding. All in all, the Burgess 127 is an excellent bargain.

## Clear Skys, Inc. Observatory Review

Tim Crawford

In 1999, at a location approximately 40 air miles north of Anchorage, AK, I constructed a 10 ft. x 12 ft. roll-off roof observatory in which to mount a new Meade LX200 12 inch scope on an 8-inch diameter Le Sueur Pier with the Le Sueur adjustable polar plate <http://www.astropier.com/>

This worked quite well for me as there were few neighbors' lights to be concerned about and I liked having the open sky overhead. When the Northern Lights would sometimes interfere with observing, it was nice to be able to sit down and simply enjoy the overhead show while it lasted.

In late 2002 we retired and moved to Arch Cape, OR (on the North Coast, about 20 miles south of Seaside, OR). Our new home here is only three lots off the Pacific Ocean and has a small backyard and adjoining neighbors.



purple shadows while they were more a pale yellow green in the Antares with neutral shadows. The Straight Wall was perfectly placed and looked like an antique military sword in both scopes. Neither scope showed the Rima Birt parallel to the Straight Wall. The large ruined

glare from the bright primary. Both scopes showed the smaller star very clearly, but the image in the Antares was much cleaner and "refractor-like" with a tight Airy disk surrounded by faint rings. So the Antares won the third round as well.

It was my experience with the roll-off roof observatory that in high humidity periods (which were limited to about three weeks in the fall near Anchorage) the dew was like rain inside the open room. Based upon this experience, nearby homes, a small yard and desirous of minimizing the exposure of all my equipment to the salt air, the only practical choice for me was to purchase a dome and place it on a deck.

I searched the publications for dome manufactures as well as the Internet and secured as much information as possible about each manufacture, models and pricing. I also joined a yahoo news group, "Observatories."

I was seeking the largest dome that I could reasonably afford to purchase. I went ahead and poured the pier cement into the ground and mounted the LeSuer pier that I had brought with me from Alaska. After this was done I mounted the scope and ran a plumb bob off the DEC axis to determine the center of the deck/observatory and what the southern pier offset would be. Once this was done I then made a rough circle layout of various sized domes, i.e., 6 feet, 7 feet, 8 feet, 9 feet and 10 feet.

From these observations I felt that I needed, at a minimum, for my comfort a structure whose base would be somewhere between 8 and 9 feet in diameter. I also wanted something with a reasonable wall height so that I did not have to crawl in or step over a high lip and something with, preferably, a door that I could simply open.

I looked at a lot of domes that came close to meeting my needs and some of them were very nice, for the price, but just a bit small.

I was giving very serious consideration to a 10-foot "Home dome," which is a very nice dome with lots of automation options, but I

was at something of a standstill, as it was really more than I wanted to pay and I did not really require any of the automation options.

Then, on the yahoo "Observatories" group, one of the members informed everyone that he had a "Clear Skys" (sic), a new manufacturer's dome, on order. I immediately jumped to their website and downloaded the specifications:  
<http://www.clearskysinc.com/>

The dome they were advertising was an 8 1/2 foot model with 54" high walls with a door for access. The overall zenith height, inside, was 106 inches with a 24" wide slit. Not only were the specifications within my search range, the introductory price, at that time, was only \$4500.00, FOB.

I emailed them with questions regarding wind loading and ability to withstand heavy rain along with several others. The answers provided were prompt and encouraging. I then inquired as to manufacture time and shipping costs. Based upon these responses I immediately placed an order.

Before actually starting the deck for the dome I had to first determine the floor height around the already installed 63-inch Le Sueur pier. I finally settled on a pier height of 43 inches above the floor by using ladders and boards at various heights while I moved the scope around on its polar mounting to try and arrive at what, for me, was a reasonable height compromise; then I built the decking and supports to the determined height around the pier. Also, I had to construct the deck around the pier using the plumb bob determined center from the center of the Declination axis of the SCT rather than the pier center. The offset of the pier, for my latitude, was around 15 inches to the South.

The distributor kept me informed with regular emails of the status of

my observatory construction and the anticipated ship date; I really appreciated this.

Everything was tracking great until they were actually ready to ship the crated observatory. The original shipper they had used for several previous shipments increased the shipping price rather dramatically from the original quote that I had been provided.

Rather than have me waiting until they could secure alternative shipping arrangements they agreed to split the new shipping expense with me. This was reasonable to me. I do know that shippers prefer to cube large objects with light weights. I estimated that their approximately 10x9x6 foot container would weigh in the neighborhood of only six hundred pounds or so.

The next problem I had to face was that I live 90 miles from the nearest large city (Portland, OR) and there are no fork lifts readily available in my rural coastal area which would allow me to receive the packing crate at my door.

I drove up and down the coast, approximately, 40 miles in either direction checking with business and trucking firms in hopes of find one that would allow me to have the carton shipped to them where they could off-load for me and then let me disassemble and remove the individual sections.

After several frustrating days I pulled into a warehousing/packing business on the waterfront in Astoria, OR, which is about 40 miles north of my residence. The general Manager, Dan Supple, of Astoria Warehousing, Inc., was very sympathetic to my plight and readily agreed to allow me to ship it to their loading dock where they would unload it for me and allow me to disassemble it so that I could remove the individual sections into a truck. Wahoo! The Observatory was finally on the way.

The folks at Astoria Warehousing called me when it came in and I told them I would be there the next day or the very next at the latest. I contacted the unemployment office in Astoria and located two day laborers to help me uncrate the observatory and load it into a 17 foot U-Haul rental truck and then to help me with the assembly.

After uncrating, which was a fast and easy job due to the excellent manner in which the individual pieces had been packaged, the folks at Astoria Warehousing told us to leave the large pile of crating wood as they would burn it with their own. After cleaning up I tried to pay Dan but he would not accept any. Wow! That was unexpected; he told me that maybe some day I could do him a favor; I sure hope that I will be able to. It is not often that we come across such generous individuals.

The Observatory has four individual wall sections while the assembled dome is one-piece. While I think just two folks alone might be able to handle uncrating, transportation and assembly, the Dome itself is a lot easier for three folks to handle and the extra set of hands comes in quite handy during some portions of the work, and three folks is preferable, in my opinion (actually I ended up having to use a fourth person for one part).

By the time we got the truck back to my house and unloaded into the back yard it was time to return my able help back to Astoria. The next day returned to Astoria to pickup my helpers and we set about assembling the Observatory in my backyard.

I had pre purchased eight 1/2 inch stainless steel bolts with which to install each individual wall section

as well as two extra 1/2-inch stainless steel lag screws for each section. Given our high winds I wanted to be double sure that the wall sections would be fully secured. Before setting up the wall sections we drew a circle around the deck boards with the same diameter as the inside of the wall footing so we would have a good point to begin the assembly and centering process (a pencil on a string works good for this purpose when one end is tied to a nail at the center point).

I also laid one of the wall sections on a 4'x8' piece of 1/2" plywood and drew a line around the inside of a wall section in a number of places (for different widths) so that I could then cutout a table to fit the wall curve. As events unfolded I ended up making two tables for the inside;



each table was approximately 15 inches wide with one being about 60 inches in length and the other about 50 inches in length. I used 1 1/2 inch dowels for the front legs on each side and rested the rear portions of the table on metal shelf holders bolted with stainless steel bolts to the observatory wall.

Before actual bolting of the individual wall sections we also stood all four of them up around the mark we had made and made a couple of small adjustments in the mark as required by actual placement.

The assembly instructions required that each wall section be calked at its assembly joints; we did this and bolted the individual sections together. When they were all bolted we were then able to re-center the whole assembly before calking the bottom and bolting it down to the deck. This final re-centering was also important, as I had predrilled holes for the computer/scope cables in the decking. Due to the height of the decking itself I ran to a neighbors so that we could have a fourth set of hands to help lift the dome up (two on the ground and two on the deck).

The dome was a perfect fit and as the walls and deck were level it rolled around the top with a gentle push.

I really do not think that the total assembly times exceed four hours for us.

First light was on 6/23/03. After a polar alignment check I slewed to the crown jewel of the Summer Skies, M13. The dome slit mechanism worked very well and I am quite comfortable with how it operates; you just have to be careful not to let the pull ropes out of your hands as the two sections can fall to their stops once Mr. Gravity takes over. Everything

worked as well as I could have expected. The interior room was still quite adequate for myself and several visitors, even with the two tables I had installed. While it is a bit tight on the south side of the Pier, due to the offset, I seldom have occasion to view from that area.

I was very happy with the observatory, until our first heavy rain, that is. The darn door leaked around the original seal and I was annoyed about it. I immediately contacted Clear Skys, Inc. as well as several other purchasers about this issue. Clear Skys responded that they were going to test the door seals and see what

they could come up with. The first fix that they sent me was not effective; however, the second fix was, and completely solved the problem with no further incidents occurring. In addition to a new seal for the wall section of the door they also had me install a drip edge above the door. Future purchasers should have no problem in this regard as they have already incorporated the changes in their production.

I should also mention that I have had no leaks around the dome slit-track area at all, even in some real gully washers. So far the structure has endured up to 70 mile an hour winds with no problems whatsoever (it is, of course, important, to remember to attach the interior dome tie down ropes before vacating after use); I have worried a bit about memory set on the wheels due to a slight pressure from the tie down ropes but so far, after about 8 months, there is no problem there as the wheels seem to retain their original rolling smoothness.

I am a happy camper with the Clear Skys, Inc. Product and would not hesitate to purchase another one again. In my experience they provide excellent before and after market support. I am also quite

proud of the 8'x8' mural, in our backyard, painted as a surprise for me by our granddaughter, Alyssa Crawford, during her summer vacation.

## Star Patch GPS

Henry J. Schilling

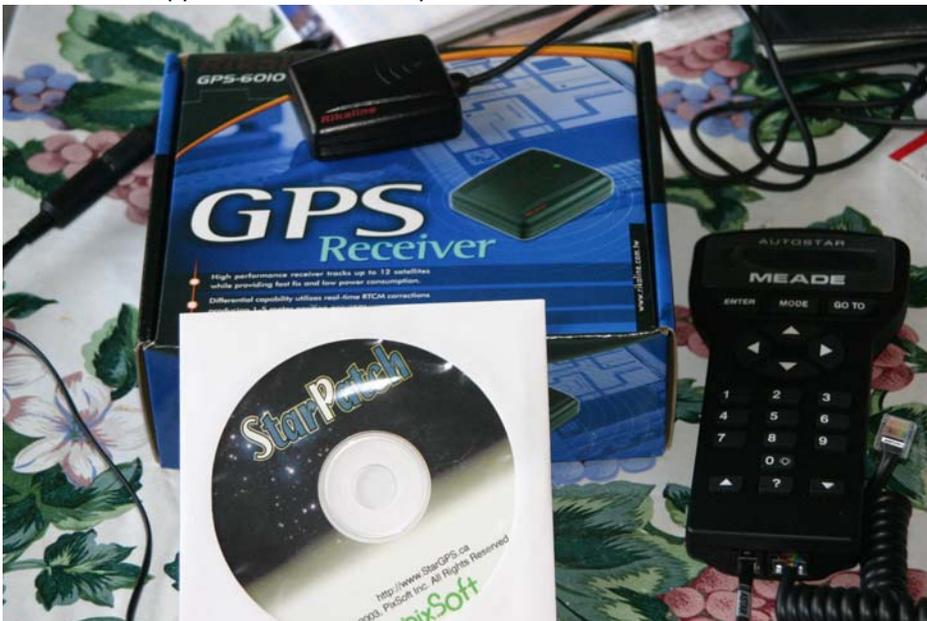
The Star patch GPS <http://www.stargps.ca/> is a GPS add on for the Meade 495/497 Autostar. It hooks into the Autostar in the same way as the Meade 505 cable and to the scope at the aux port. It also is a high speed Autostar update tool. It will update the Autostar in about 1/4 of the time of the ASU. It will work on all 495/497 equipped Meade telescopes. It will not work with the 494 hand controller. The software will run on Microsoft Windows 95 through XP.

I got the GPS unit for accuracy in date and time. I want to try and track satellites at some time. Let's dispel a myth from the start. The Starpatch GPS will NOT align the telescope and it does not have an electronic compass. I purchased the entire package, this includes the GPS receiver and the software. Starpatch says that a handheld GPS with a serial connection can be used but I

cannot speak to that. Shipping was fast and at \$10.00 USD, reasonable from Canada. You first install the software and hook the computer to the Autostar with the *included serial cable* (Meade 505 compatible). The software will ask for the CD key and will go to the Starpatch web site and register itself. You will need an internet connection to do this of course. You can use the GPS on only one Autostar. If you want to run it on two you will have to buy another license.

The system works very well. You will have the time and date immediately (UT and the difference in the Autostar, + or -) and the GPS fix in around 30 seconds. I have also used it with a hand held Garmin GPS unit and work just as well if not better. I have found that the alignment is easier with the accurate time, date and position. I disconnect the receiver after this. I have used it on an ETX-125EC UHTC and a LX90 and it works great on both. It looks like Satrpach keeps up with patches too. I have received notice via email of two updates since I bought the system, about two months ago. I have not tried to track a satellite yet but will soon. The Starpatch software is very good. It will update an Autostar in about 20-30 seconds. Not 90-120 like the ASU. No BS. It's that fast.

Not a very long review but there is not much to say. The Starpatch GPS does it's job very nicely. Is it a necessity? No. If you take the scope to different places it is a plus. Is it nice to have? I say yes with a big BUT. When I bought my system it was \$129.00 USD plus \$10.00 shipping. I thought that was dirt cheap for a GPS. Well it is now \$169.00 plus \$10.00 shipping. Still not too bad but a big jump from \$129.00. If I were asked to recommend or not I would recommend it if you have the need as I did. Check out the site. Contact them if you like. They have been very good to deal with.



I had a problem with the GPS receiver and it was replaced with no problem. It turned out to be a firmware issue with the unit and had nothing to do with Star Patch GPS. Again first rate customer service.

## The Blue and the White

Vern Cox

Every once in awhile something good comes your way. It is especially nice when it is a surprise. When you are not necessarily looking for it. Way back around September 2002 or so I noticed a classified ad for a scope I took to be a Celestron 10" reflector in our local club newsletter. I had just received my completed 8" reflector and decided that a mass-produced 10" dob would not be a good replacement for my 11" Starmaster I had sold a few months earlier. I looked at it for a second and then forgot about it. A few days later a friend of mine called me in a panic telling me about this great scope for sale that I should investigate post haste. Turns out it is the C 10. I tell him I have no interest in another dob. He then proceeds to give me the rundown on the whole blue and white history. That got me interested. I spent the next few hours trying to do some research but at the time there was not a lot of information on the net.

My friend is very knowledgeable about a lot of things. His enthusiasm was starting to convince me. He had just taken delivery of a 6" TMB and did not want to buy another scope but continued to urge me to take a look at this "wonderful scope" as he described it. I decided to give it a whirl. I called my wife at her office and after a little whining was given the green light. I called the owner of the scope who turned out to be a great person to talk to, scope or no scope. He then let me know that he had changed his mind as was going



to keep the scope for a while longer. I was a little deflated but more relieved. I was on a three year plan saving up for a 8" TEC and felt a well made 12.5" homemade dob would better serve me until then.

Fast forward to late May 2003. A phone call comes in on a Friday evening and I do not take it, as I do not recognize the name on my caller id. The caller does not leave a message. The next morning as I was driving to work just before 9am my cell phone rings and it is the same caller. Now I am curious so I take the call. It is the owner of the scope telling me that the scope is again for sale and that I had first

shot at purchasing it. I make a date to see the scope the following Sunday. After a week of trying to gather as much info as possible from both the net and Rod Mollise the SCT guru, my friend and I drive over to see it. On the way my friend tells me how old the scope is. What he thinks might need fixing and so on. When we get there and see the scope our jaws almost hit the floor. The scope itself was in almost new condition. I have seen two and three year old scopes in much worse shape than this gentleman had kept this scope in for over 36 years!! The only thing I did to the scope was pull the corrector and clean both sides. Everything works fine. The three-

spindled focuser needed evening out to give the zero image shift that the design gives but more on that later.

Not only had he kept the scope in great shape he had made several improvements. The greatest of which was the AC/DC inverter that he had built right into the pier. You cannot even tell that the scope uses ac power, as the inverter is completely invisible. He made custom magnifiers for the setting circles complete with red lighting and a nice tool for polar aligning the scope. These are a few of the improvements. There are others but I will not include them here. One of the most useful things he had to offer was his years of assembling and transporting the scope. He included a wagon complete with a foam and wooden cradle to cart the scope around. He gave me the complete rundown on how to assemble the scope while putting the least amount of wear and tear on it in the process. He also included a fully functional UniHex eyepiece turret loaded with five Clave plossls in the same pristine condition as the scope. All par focalized I might add. All but the 45mm were threaded directly into the UniHex. Very nice.

I am sure that at this point one would think that all that is nice but how does the scope perform? Well, I must say it performs beyond my expectations. According to my friend the optics would be of high quality with a better matching of the individual components. He felt it would be the best SCT I had ever looked through. He was right. Star images are on a par with my 11" Starmaster. That is saying a lot. At f 13.5 the central obstruction is listed at 30% as opposed to today's 35 plus percentages. One concern I had was the uncoated corrector. I spent a large part of the time between first seeing the scope and actually picking it up finding someone to coat the corrector. Both Cumberland Optical and Spectrum

Thin films of Bohemia New York informed me to leave the corrector alone. It could not be replaced if damaged and both companies felt that the gain in performance would not be worth the risk. One gentleman at Spectrum went further. He informed me that I might be surprised at how little impact this would have on the scope's performance.

A comparison with a C 9 ¼ using M13 as the target showed a lot. The C10 out resolved the cluster by as much as one would expect from a scope 3/4ths of an inch larger. The difference was obvious. The C10 was noticeably brighter. It is also a relief to not have to baby sit the corrector's coatings for the next thirty years let me tell you. We all came away wondering about paying extra for premium coatings . The contrast is very good with a inky black background on star fields. I have yet to give the scope the ultimate test for me. The moons of Jupiter but the time is coming up. Based on what I have seen I expect to see nice round astigmatism free spheres of varying sizes. Just like I see in my other scopes.

This scope was hand picked by Tom Johnson himself as a replacement for the original owner's first scope. The original had drive problems so Tom Johnson simply replaced it with this one. All I can say is that the image quality is on a par with my highly optimized 8" reflector and 6" Mak/Newt. Both of these scopes were made to give perfect star images and deliver high contrast. This scope is right there with them.

It is unfortunate that a lot of the things that make this scope great cannot be done at a reasonable price today. The optics for instance are not matched but made together as group. The same person hand figures the primary, secondary and corrector. Once the best set up is determined any remaining problems are then hand figured out of the system. This is very time consuming

with most of the figuring being done by hand.

The focuser design is also something to note. The main focus knob drives a belt the simultaneously drives to other spindles set at 120 degree angles from the others. This results in zero image shift thus eliminating on of the biggest complaints SCT detractors have about the design. The primary also rides in a mirror cell that allows the primary to be collimated as well as the secondary.

Not only can precise collimation be achieved the optical axis and mechanical axis can also be matched perfectly. The clutches, drives, gears and hand controls are all butter smooth. Even the finder has great optics. I enjoyed M11 almost as much in the finder as in the main scope. The 4" F/15 guide scope is another nice touch. It to possesses good optics and rides on a dual axis adjustable mount.

This scope costs 2300 dollars in 1967. I do not know how much that is today but I imagine it is on a par with the mega buck SCT that Takahashi offered in the early eighties. I am proud to own it. My plan is to both use and maintain this scope until I cannot handle it anymore. I will then find someone who will be as proud to own it as myself, someone who I trust to maintain it as well as the original owner as I plan to. Then I will pass it on.

## The Tennessee Star Party

Rod Mollise

I'm always up for a star party, and the prospect of another one to attend and look forward to each year is always very exciting. So, when the good folks of the Barnard-Seyfert Astronomical Society in

Nashville invited me to speak at the 2003 Tennessee Star Party (TNSP), I was only too happy to pack the car with astro-gear and head for the hills!

The TNSP is a young event—2003's edition, held on 26-27 September, was only its 4th year—but it is off to a good start due to both its good skies and a location that offers excellent facilities. It's held at a private girls' Summer camp, Camp Nakanawa, that's located near the small town of Crossville, Tennessee in the East-Central part of the state. This camp has been around since the 1920s, is situated in beautiful scenery and offers functional and comfortable facilities. There's a nice, comfortable dining hall (the food was quite good as star-party-food goes) and a decent-sized if not over-large meeting hall (if the star party grows beyond its current 150-200 attendee level, there are a couple of other larger possibilities for programs on-site).

The drive from Mobile was approximately 8 hours, with the last 2 hours of this on two-lane state highways. I was a little concerned about traversing miles of "farm roads," but this part of the trip turned out to be a nice experience, as Dorothy and I were treated to just-plain-lovely mountain scenery on the way up until we climbed to the elevated plateau where Crossville and Camp Nakanawa are situated. We made this into a two-day trip, spending the night just over the Tennessee-Alabama state line, but if we'd been able to get an earlier start this would have been a reasonable one-dayer from the Gulf Coast.

Following registration, we dropped our luggage at our cabin, a tiny two-bed affair that Dorothy pronounced "adorable," and headed for the observing field. Couldn't want much more in that regard. It's big enough for the star party to grow many times its current size. In fact, the set-ups on the field were dwarfed by

its expanse. But that's a good thing. I prefer a little elbow-room on the field rather than fighting for space as is the case at many events lately. I brought my NexStar 11 SCT, and had it set-up in short order, awaiting the coming of night.

There was a large open pavilion-type building on the Western edge of the field that served as a vendor's hall and also provided hot coffee-chocolate during the wee hours. Vendors present this year were Bill Burgess (Burgess Optical) and Ken Dausat (Ken's Rings and Things). Bill had brought an impressive array of equipment, including a couple of his new achromatic refractors. I got a quick look at Mars through his 127 F/8 scope and was fairly impressed. I ain't exactly a refractor kind of guy, but I must admit Mars looked nice and sharp and that on-axis color was quite acceptable for an achromat. Ken brought some samples of his fine products, including a couple of customized ETX 125 OTAs with metal rear-cell assemblies that lacked flip mirrors but which were equipped with 2" capable rear-ports. These were custom 125s made and sold originally for the laser-communications business by Meade, and, though the correctors were not coated, the scopes seemed optically excellent. Couple this with a 50mm finder and a distinctive white paintjob and this was quite an interesting little item!

I'd be the first to say that Friday night wasn't exactly perfect. Oh, the sky started off decently enough, but the moisture content was high, meaning that a light-dome from a nearby town (Crossville, I assume) was more prominent than it should have been. However, this didn't prevent me from getting some good looks at favorite objects. The Veil was surprisingly prominent for this semi-hazy night, and little NGC 404 (right next to Beta Andromedae) was more easily visible than it usually is. Maybe the skies weren't quite as bad as they looked at

times? At any rate, I soldiered on, viewing mainly bright favorites until clouds closed us down at about midnight. This was not *too* disappointing, as I was pretty tired after the drive, and weather reports promised a front passage that would bring really good weather on Saturday.

Or so I hoped. Saturday began with thick clouds that just grew worse and worse, with serious rain and thunderstorms continuing from 3am 'til the afternoon. I didn't worry too much, however, as I was more concerned with presenting my talk (The Care and Feeding of a CAT(adioptric)) and listening to the many, many excellent presentations. We were treated to outstanding programs, both Friday and Saturday, on a wide variety of topics covering everything from video astronomy to cosmology. I was particularly gratified to see that the organizers had taken pains to provide some programs and activities for younger/beginning amateurs. If you ask me, too many star parties ignore the kids (and novices of all ages).

By late afternoon, it was clear that the front *would* pass through, bringing cool temperatures, and, we hoped, clear skies. This did indeed happen, and by 10 pm, the skies were beginning to look gorgeous. My "object of the night" wasn't anything obscure. It was the good, old Eagle Nebula. I've seen this legendary cloud from many locations, but I will say that on this night, with a 35mm Panoptic and a UHC filter, it looked as good or better than I've ever seen it—including from the Texas Star Party. It was particularly interesting to check it out in Dennis Williams' Stellacam-equipped 10" LX200. This deepsky-video camera provided quite a view of the nebula's central region. The famous "finger of god" dark lanes made famous by the Hubble images were easily visible. Yes, the Stellacam provides real-time video of even faint objects, and

can actually show more than can be easily seen visually. I never thought this would be possible with video, but it's here.

The only fly in the ointment, so to speak? The 8 hour drive home Sunday morning. I knew I had to quit at a reasonable hour, and shut down the NS11 and did some packing before midnight. I wasn't quite ready to call it a night, though. I spent at least another hour viewing many deep sky marvels on Dennis' Stellacam monitor screen. I also had some remarkable views through some big-dobs (yes, I admit it), thanks to the kindness of their owners. After checking a couple of SCTs' collimation at their users' requests, it was time for some Rebel Yell and a last look or three at the sky before bed.

The biggest recommendation I can give the TNSP? They left me wanting MORE! Thanks very much to my fellow attendees and the good folks at the Barnard-Seyfert AS for having us and for being so darned nice!

If you're interested my TNSP presentation (.ppt), "The Care and Feeding of a CAT," is available on my website at <http://members.aol.com/RMOLLISE/inde.html> click on "Uncle Rod's Presentations."

# The Taming of the Moon

Jay Rasmussen

For many of us the moon is just an ugly rock that interferes with otherwise "important" observing. It is also one of the five basic observing programs of the Astronomical League. So, if you are intent, as I am, of working toward the Astronomical League Master Observer award, the AL Lunar Club

award is a necessity. In spite of a somewhat negative attitude toward the moon, I decided to try and make it fun. And fun is what it turned out to be. To my amazement, the enjoyment came from some unexpected areas.

My immediate goal was to complete the program in a month or just a little more. Some of the features on the moon can only be properly seen when the lighting (time of the lunar cycle) is right. As it turned out, the weather was also a factor. A plan was needed. The plan ended up being "get started and get out there whenever it is clear." I started just before the new moon at the end of December. This allowed me to pick up both the waning and waxing crescents. Because I get up at 5 AM anyway, one was easy. The other required just a little patience at sunset waiting for the moon to pop out from between the clouds.

Now things got serious. I had to break out the binoculars and open up the observatory. The program suggests certain things be observed with the naked eye, some with binoculars and some with telescope. The weather wasn't completely cooperative. I had to take advantage of any cloud free nights that came along. Fortunately, the temperatures in early and mid January hovered around freezing and didn't dip below zero as can easily happen at that time of year. Throughout the first quarter to a little past full, I was able to get out on a succession of nights and identify the required features.

Then came the realization that the remainder of the features would only be visible in the early morning hours. I needed a clear night and a two AM alarm, yuk. Pretty quickly it looked like I'd have a clear night. So, I set the alarm and went to bed at 8 PM. I didn't really want to get up, but get up I did. It turned out to be a beautiful night. It wasn't too cold and it was completely still. The

night was incredibly quiet. There were no cars on the road, just the stars, the moon and I. I set to work and by 5:30, I'd filled in the rest of the list. I still had a few minutes so I swung the scope around to Jupiter. The giant planet was amazing. Seeing was outstanding. At 250X, I had the best view of Jupiter ever and I had the moon to thank. I probably could have used higher power, but by then it was time to close up and head off to work.

The AL Lunar Club turned out to be a nice project. The moon is interesting on a feature-by-feature basis. It was a challenge, but now I know and appreciate a lot more about the moon. Just looking at the moon can be very boring. Looking for something on the moon makes all the difference. The quiet and solitude of the early morning hours is inspiring. That alone made getting up worthwhile. Give some thought to pursuing the AL Lunar Club. I recommend it.

# Tycho!

Chuck Taylor

## INTRODUCTION

A little over 35 years ago, on January 7, 1968, a two-stage Atlas Centaur SLV-3C [1] lifted off from launch complex LC36A, at what was then known as Cape Kennedy. Perched atop the two stage rocket sat a 1,036 kg payload. It was the last in the Surveyor series --- soft landers who had proved the moon's surface would hold the weight of a space vehicle.

Although Surveyors 2 & 4 had failed, Surveyors 1, 3, 5 and 6 had landed on Flamsteed P, Oceanus Procellarum, Mare Tranquillitatus and Sinus Medii respectively. They had proven the orbital mechanics

and landing abilities of the craft, and thoroughly tested the lunar surface. Now it was time for a final Surveyor flight, and with the testing requirements of Apollo taken care of, the last flight could be directed on a purely "science" orientation. And so it was that three days after liftoff, on January 10, at 01:05:36 UT, Surveyor 7, successfully soft-landed within 1.5 miles of its target site, 18 miles north of Tycho's rim. [2]

Surveyor 7 carried a television camera with polarizing filters, an alpha-scattering instrument, a surface sampler, bar magnets on two footpads, two horseshoe magnets on the surface scoop, and auxiliary mirrors to see underneath the spacecraft. [3] The alpha-scatter equipment jammed but was later lowered to the surface by using the soil-sampler scoop. [4]

Perhaps the most impressive result from Surveyor 7 was the panorama made by carefully combining the many photos into a magnificent mosaic of the highlands terrain. You can see it here along with a photo of the trenches dug by the soil scoop. <http://www.hq.nasa.gov/office/pao/History/SP-350/ch-5-4.html#mosaic> A larger view of the panorama is at [http://nssdc.gsfc.nasa.gov/imgcat/hires/su7\\_68\\_h\\_40.gif](http://nssdc.gsfc.nasa.gov/imgcat/hires/su7_68_h_40.gif) The large block casting a shadow is a half meter in size. The horizon is about 13 km away.

It wasn't the first time a spacecraft had photographed the results of the Tycho impact. Ranger 7 had been the first, impacting the moon on July 31, 1964. Although its impact site was over 900 km distant from Tycho, secondary craters in the photo were identified as being from Tycho [5]. Ranger 7's first photos were taken at a height of 2110 km. The last photo showed features as small as a half meter. [6] In between were 4,308 photos of never before seen clarity. As a result, the area surrounding the impact site was renamed Mare Cognitum --- the "Known" Sea.

## VIEW AT FULL MOON

At star parties, even first-time viewers will often spot Tycho and ask what it is. Even science fiction authors have employed Tycho. Movie watchers will remember seeing 2001, where the monolith was uncovered in Tycho. As Lunar craters go, it is respectable, but not overly large, being only 85 km in diameter and 4,850 m deep. But as every lunar observer quickly learns, it is not the size of Tycho that matters, but its brilliance and extensive rays that allow it to dominate the full moon. Even in infrared it shines brightly as can be seen at: <http://www.ipac.caltech.edu/Outreach/Gallery/MSX/moon.html> Those interested can find photos of the moon at other wavelengths at <http://sirtf.caltech.edu/EPO/Messier/moon.html> Make sure you follow the link to the wonderful photo at <http://antwrp.gsfc.nasa.gov/apod/ap010809.html> where you can see Tycho's visible light outshine the many larger craters that surround it. Click on the photo to get a larger picture.

From our viewpoint, Tycho is closer to the rim than the center of the moon. Lunar Orbiter took photos that were centered on Tycho, showing the rays reaching across nearly a full lunar hemisphere.

[http://www.lpi.usra.edu/research/lunar\\_orbiter/images/img/iv\\_107\\_m.jpg](http://www.lpi.usra.edu/research/lunar_orbiter/images/img/iv_107_m.jpg)  
[http://www.lpi.usra.edu/research/lunar\\_orbiter/images/aimg/iv\\_107\\_m.jpg](http://www.lpi.usra.edu/research/lunar_orbiter/images/aimg/iv_107_m.jpg)

You can also find a similar pair at [http://www.lpi.usra.edu/research/lunar\\_orbiter/bin/info.html?364](http://www.lpi.usra.edu/research/lunar_orbiter/bin/info.html?364) This view does not show Tycho's rays as clearly but readily shows the ringed basin nature of Mare Humorum.

To help you get oriented, there are Orbiter close ups of area with maps at

[http://www.lpi.usra.edu/research/lunar\\_orbiter/bin/info.html?321](http://www.lpi.usra.edu/research/lunar_orbiter/bin/info.html?321)  
[http://www.lpi.usra.edu/research/lunar\\_orbiter/bin/info.html?338](http://www.lpi.usra.edu/research/lunar_orbiter/bin/info.html?338)

Views showing the dominance of the Tycho ray system at full or nearly full moon can be seen at [http://www.lpi.usra.edu/research/lunar\\_orbiter/bin/info.html?364](http://www.lpi.usra.edu/research/lunar_orbiter/bin/info.html?364) (by John French)

[http://www.lpi.usra.edu/research/lunar\\_orbiter/bin/info.html?364](http://www.lpi.usra.edu/research/lunar_orbiter/bin/info.html?364) (by Russell Croman)

And our own Denis Joye at <http://djoye.chez.tiscali.fr/Clavius%2001-03-05.jpg>

## APPEARANCE CHANGES DURING THE LUNAR CYCLE

But of course, Tycho is not always putting on the display it presents during the full moon. Last month I was observing as the terminator was just brushing Tycho's eastern rim. There was only a tiny part of the rim catching the sunlight and I had to check the map to make sure I had the right spot. Tucked there in the midst of so many craters, Tycho blends in and looks almost insignificant. Yet as we have seen, at full moon, the other craters fade into the background and Tycho really shines forth. The other craters fade at the full moon because it is high noon for them. The sun is close to being straight overhead, and there are only the smallest of shadows to indicate the relief features. Tycho is no larger, but it is newer and its surface and the material in its rays have not been exposed to the solar radiation for as long. The highlands have less iron and titanium, and are therefore brighter than the maria, but exposure to solar radiation darkens them over time. Since Tycho and its ray system are younger than the surrounding material, they shine much brighter. So

in the spirit of the “before and after” pictures, here is a series of photos taken with the terminator closer to Tycho and then near full moon.

<http://www.lpi.usra.edu/research/cla/images/img/G17.jpg>

The nearness of the terminator does allow us to see the raised rim of Tycho and that it is in much better shape than its older neighbors.

[http://www.lpi.usra.edu/research/cla/images/close\\_up/G16.jpg](http://www.lpi.usra.edu/research/cla/images/close_up/G16.jpg)  
<http://www.lpi.usra.edu/research/cla/images/img/G16.jpg>

Here Tycho is almost hidden in the jumble of craters, as in these views

<http://www.lpi.usra.edu/research/cla/images/img/G15.jpg>  
<http://www.lpi.usra.edu/research/cla/images/img/G14.jpg>

But the “after” photos show a different picture as the other craters fade. Even the much larger craters reveal themselves primarily through the shadows that reveal their relief. And when high noon removes those shadows, they fade out. Solar radiation has aged their surfaces so they are no longer as bright. And other impacts have erased their ray structures. But the young soil of Tycho and its rays becomes brighter and brighter until it dominates the surroundings.

<http://www.marcush.net/astronomy/FullMoon-051800.jpg> (by Marc Huber)

<http://www.lpi.usra.edu/research/cla/images/img/GIII.jpg>

The sequence of photos at <http://www.pa.msu.edu/people/frenc/hj/moon/index3.html> will give you a quick overview of how Tycho’s appearance changes with different phases of the moon.

**DATING TYCHO**

But how young is Tycho? Some of the key dates in Lunar history are:

- Nectarian Basin formed: 3.92 billion years ago (aeons)
- Imbrium Basin formed: 3.85 aeons
- Eratosthenes formed: 3.2 aeons
- Copernicus formed: 0.81 aeons

Each of these marks the start of the period named after them. So the Nectarian period was from 3.92 to 3.85 billion years ago. This is when most of the still visible impact basins were formed. This was also the time of heaviest bombardment. The Imbrium period (3.83-3.2 aeons) marks the slowdown in the bombardment. Few significant craters are younger than Copernicus. But Tycho was thought to be the most significant exception. However, as late as Apollo 16, this was still not verified. And so, just as the last of the Surveyors landed near Tycho, the last of the Apollo landings would date Tycho.

On December 12, 1972, Apollo 17 landed in the Taurus Littrow region. [http://www.lpi.usra.edu/expmoon/apollo\\_landings.html](http://www.lpi.usra.edu/expmoon/apollo_landings.html) The second EVA traveled southwest to the South Massif [http://www.lpi.usra.edu/images/sapo/sapo\\_S37.gif](http://www.lpi.usra.edu/images/sapo/sapo_S37.gif) An earlier photo at [http://www.lpi.usra.edu/expmoon/Apollo17/A17\\_Lsite.HRvertical.gif](http://www.lpi.usra.edu/expmoon/Apollo17/A17_Lsite.HRvertical.gif) shows the landing site (arrow) and to the left is the south Massif.

If you flip back and forth between this photo and the map of the EVA, you can identify the craters and the area of “Light Mantle.” It was thought that the Tycho impact threw material 2,250 km. It landed here, resulting in the craters Camelot & Horatio and causing the landslide that formed the “Light Mantle” area. When the samples were returned they agreed on an exposure age of 109 million years (plus or minus 4 million). With that, Tycho was dated. It is interesting to note that although this makes Tycho a very young lunar crater, this date puts it in the Cretaceous Period. At this point, the

dinosaurs still had 40-48 million years to rule the earth before being upstaged by the mammals.

**THE STRUCTURE OF TYCHO**

Smaller craters, up to about 15 to 20 km in size, appear as simple holes in the ground. Those larger in size have a central peak, like Tycho. Those larger than 170-200 km have central rings. The largest are the ringed basins which on this side of the moon later flooded with lava and became the familiar maria. Craters in the 20-170 km range have a more complex structure than the smaller craters. They show fairly flat floors and terraces on the inner rim walls. The central peak is formed when the ground rebounds after the initial impact. More can be read at: <http://www.unb.ca/passc/ImpactDatabase/essay.html> and <http://www.lpi.usra.edu/expmoon/science/craterstructure.html> We’ll come back to this in a little bit.

In the meantime, you can see some similar sized craters on earth at these sites:

An earth crater with a similar central peak can be seen at Manicouagan crater in Canada. At 100 km, this is slightly larger than Tycho.

[http://www.lpi.usra.edu/publications/slidesets/craters/slide\\_28.html](http://www.lpi.usra.edu/publications/slidesets/craters/slide_28.html)

Other similar sized craters on earth are:

<http://www.unb.ca/passc/ImpactDatabase/images/morokweng.htm> (70 km)

<http://www.unb.ca/passc/ImpactDatabase/images/puchezh-katunki.htm> (80 km)

<http://www.unb.ca/passc/ImpactDatabase/images/chesapeake.htm> (90 km)

**CHANGING ILLUMINATION**

As the terminator first begins to reveal Tycho, it looks like any other crater. Michael Richmond's photo at [http://www.tass-survey.org/richmond/ritobs/mar25\\_1999/magin2.jpg](http://www.tass-survey.org/richmond/ritobs/mar25_1999/magin2.jpg) shows the crater with most of the floor still hidden in shadow, and the central peak just catching the sun's rays.

Ralph Pass' photo at <http://rppass.com/moon-03.htm> shows Tycho under a slightly fuller illumination.

<http://cic.cstb.fr/amsee/repoto/moon/tycho/920723/ctpc1.gif1> by Patrice Poyet shows the built up area around Tycho. This view lets you see that it is not just a hole in level ground, but a raised rim that then drops deep to the floor.

Craig Zerbe has many outstanding photos at <http://www.astroimaging.com/Lunarsmail.htm> including links to three photos of Tycho. Click on the three Tycho photos to see details. The top photo takes you to <http://www.astroimaging.com/image/s/TychoA092000.jpg> where you can see a myriad of secondary impacts. Look directly below Tycho and you see lines radial to Tycho, just as in earlier LFM articles we have seen similar (though larger) gouges radial to the Imbrium Basin. Craig stacked 160 photos to bring out this amazing level of detail!

Another Orbiter photo, showing the area just to the north of Tycho is at <http://www.lpi.usra.edu/expmoon/orbiter/5lo128h2.gif> Here you can see the north-south structure of deposit material that was flung out by the impact. Surveyor 7 landed in this type of material, but it was considered too dangerous for a manned landing.

Internal structure of the crater can be seen in this Orbiter photos <http://www.lpi.usra.edu/expmoon/orbiter/5lo125m.gif>

[http://nssdc.gsfc.nasa.gov/planetary/lunar/lo5tycho\\_big.gif](http://nssdc.gsfc.nasa.gov/planetary/lunar/lo5tycho_big.gif)

[http://daac.gsfc.nasa.gov/DAAC\\_D\\_OCS/geomorphology/GEO\\_10/geoimages/P-1/PlateP-1.jpeg](http://daac.gsfc.nasa.gov/DAAC_D_OCS/geomorphology/GEO_10/geoimages/P-1/PlateP-1.jpeg)

<http://www.lpi.usra.edu/expmoon/orbiter/5lo151m.gif> and in this large shot by Clementine <http://www.seds.org/pub/images/planets/moon/clementine/jpg/Tycho-UVis.jpg> The center peak is formed as the surface "rebounds" after the initial impact. As a result, it is formed of rock that comes from deeper in the crust. False color photos show that different materials are found there.

[http://nssdc.gsfc.nasa.gov/imgcat/hires/clm\\_usgs\\_14.gif](http://nssdc.gsfc.nasa.gov/imgcat/hires/clm_usgs_14.gif) shows three views taken by Clementine. The left hand picture shows the presence of rock with more iron and magnesium by showing the ratio of different colors. The right hand view reveals these colors by exaggerating the color differences. This shows how the center peak is slightly bluer than the surrounding area, due to the different chemical composition. The central picture stretches the color differences even more. These color exaggerations allow us to clearly see that the central peak is formed from rock with a different composition. And of course this is exactly what we would expect with our theory of crater formation that says the central peak is formed of material from deeper in the crust that rebounded up at the initial impact.

Extreme (visible light) close-ups of the floor can be found at <http://www.astro.washington.edu/labs/clearinghouse/labs/Lunartop/tycho.html>

Let's proceed to what we will see. Those wanting to reorient themselves may find Naoyuki Kurita's photo and atlas at [http://www.ne.jp/asahi/stellar/scenes/moon\\_e/moon\\_a3.htm](http://www.ne.jp/asahi/stellar/scenes/moon_e/moon_a3.htm) to be helpful.

You can also look at Parramatta High School's site at <http://www.faxmentis.org/html/scien>

[ce9f.html](#) Move your mouse over the photo to have the names popup. A similar photo at <http://www.faxmentis.org/html/scien/ce9f2.html> shows how much the view changes over the course of a couple of days. In the second photo you can barely make out many of the craters that are very prominent with a lower sun angle. Notice in particular how even the mighty Clavius is all but invisible. Those who feel intimidated by webcam photography might enjoy looking at Parramatta High School's lunar page at <http://www.faxmentis.org/html/scien/ce5d.html> There are a number of very good photos here, all taken by high school students. Keep up the good work!

## SURROUNDING AREA

Northeast of Tycho is a delightful chain of craters curling around each other. Orontius, Huggins, Nasireddin, Miller, C, A, B, C form a swirl that reminds me of the graceful lines in a snail shell that has been cross-sectioned. According to LPP (Lunar Phase Pro) software, sunrise on Orontius will be on 2/9/03 at 11:50 UT. Sunrise at nearby Sasserides will be on 2/9/03 at 21:14 UT. I suspect this later time will give the best illumination for viewing the snail shell effect. Incidentally, LPP lists sunrise at Tycho to be on 2/10/03 at 00:24 UT. (And as you may have noticed, the sunrise/sunset time prediction feature in LPP is rapidly becoming my favorite software). The snail shell appearance lasts only for a few hours. Caught at the right moment it is very dramatic. But like freshly cut roses, the beauty can fade quickly. Fortunately it is renewed twice each month at both sunrise and sunset.

Clavius, Maginus and Tycho form one of my favorite clusterings of craters. They are not as closely linked as Ptolemaeus, Alphonsus and Arzachel, but for me, they form a nice sequence in size and structure. Clavius is magnificent in its size and complex structure, with

the arcing chain of craters across its floor. Maginus is next in size, but worn and weary. And finally Tycho -- smaller, but with the crisp beauty of youthful lines. Of course, if we continue on that line of exploration, we reach Deslandres and eventually Rupes Recta, but that area has already been explored in LFM 2.

**TYCHO ITSELF**

Without a doubt, the most prominent feature of Tycho is the extreme change it undergoes each month. At full moon, it can be fun to trace the rays as they work their way across the surface of the moon. But beyond that, there are details to watch for within Tycho. It starts with sunrise on the eastern rim. At this point Tycho is just a tiny "C" shaped but of light, hiding the glory it will later reveal.

As the sunrise continues, the central peak begins to catch the light, as in Michael Richmond's photo we saw above:

[http://www.tass-survey.org/richmond/ritobs/mar25\\_1999/magin2.jpg](http://www.tass-survey.org/richmond/ritobs/mar25_1999/magin2.jpg)

Finally, the sunlight hits the far rim and we can make out the full circle. At this point the terracing of the walls begins to be seen. The terraces provide plenty of detail making this a challenging object to draw, especially as the appearance is changing rapidly at this point in time.

The floor is largely flat. Lunar Orbiter photos reveal what appears to be pools of lava flow, suggesting to some that the impact may have triggered volcanic activity. But eventually it was realized that the immense energies of the impact melted rocks, allowing the lava to pool in the presently observed patterns.

At the middle is the central peak, whose appearance changes from a small bright dot in a sea of black, to

a complex mountain, to a washed out mountain and back to a complex shape before again fading to a tiny dot and then disappearing until the next sunrise. Craig Zerbe's photos above can help you familiarize yourself with the shape so you can look for detail during your observing time.

Additionally, at sunrise and shortly afterwards, you can make out the raised rim. The initial view of the rim is possible because it is raised above the surrounding area. And as the sunlight reaches the western rim and slightly beyond, that same raised rim will cast a shadow, again showing its height. This explains how the crater can be 4,850 m deep, but the floor is only half that distance below the surrounding area. At times, this raised area can look like a square shaped area around Tycho. As it gets closer to sunset, the eastern rim remains illuminated all the way to Pictet, again showing how this area is raised above the surrounding terrain.

Finally, for those interested in the man Tycho, biographies can be found at:

<http://www.physics.northwestern.edu/classes/2002Spring/Phyx103taylor/brahe.html>  
[http://es.rice.edu/ES/humsoc/Galileo/People/tycho\\_brahe.html](http://es.rice.edu/ES/humsoc/Galileo/People/tycho_brahe.html)

**The Celestron Advanced Series Computerized Goto Newtonian C10 N-GT Scope with Optional GPS Unit.**

**Buck Harley**

The basic features of this new Celestron scope's computer are an Auto Guide port and a 45,492 object database with room 400 user-added objects. Tracking modes available are sidereal, Solar and Lunar. The scope arrived well-packed in 3 boxes with no dings or dents. The

finish is very nice. Unfortunately, two of the three standard equipment counter weights were missing. After unpacking and setting up I went to the Primary mirror. First thing was to note that the center had been marked for fast collimation. I checked and found it to be about 1/2" out of collimation

I then used the Easy Tester by Jack Schmidling. This will give you a rough idea of the quality of the Mirror. In my Stone Age way of testing I would say that the mirror was 1/12<sup>th</sup> wave or better. An excellent mirror for the price. The Mirror cell is cast aluminum and drilled and tapped for a 3" Cooling Fan that I installed. The secondary was mounted firmly with no flex, and was offset as it is supposed to be. The Focuser is cast Aluminum with plastic knobs, six push pull screws to square it with the optics. I replaced the plastic knobs with chrome plated brass knobs from TeleVue. The Mount it is the best I have seen from Celestron in many years. It now has 2" stainless steel round tube tripod legs. It is rock solid and if the astro-imagers out there want something at a low price to take images with, this is the ticket. It has the adaptors and a built in T-ring to do the job.

The tube balance is tricky but easily done even by a one armed guy like me. The Computer is a complete function Goto system with on line updates for some functions. The drives are US Digital DC servo encoder both axis, with stainless steel worm gears and an Oil Lite worm shaft with ball bearings on the R/A mount. I did take it apart as per the instruction on:

<http://www.astronomyboy.com/cg5/>

Be careful of the black grease it will get everywhere. Clean it off with mineral spirits and a brush. Regrease all parts with a synthetic grease such as Mobile One or Slick 50 One. Or white lithium. These all

will work in hot or cold weather and do not outgas.

## (un)Fasten your Seatbelts

Patrick Barry and Tony Phillips

The “fasten seatbelts” light turns off, and you get up to ask the stewardess for a pillow; it’s going to be a long flight. Only a kilometer ahead in the cloudless sky, a downward draft of sheering winds looms. When the plane hits these winds, the “turbulence” will shake the cabin violently and you could be seriously hurt.

You don’t know about those winds, of course, and neither does the pilot. Today’s weather satellites can’t see winds in clear skies: they rely on the motion of clouds to infer which way the winds are blowing.

“Believe it or not, their best indication of wind sheer right now is warnings from aircraft that have gone through it ahead of them,” says Bill Smith of NASA’s Langley Research Center.

But a new satellite technology being pioneered by NASA and NOAA could improve this shaky situation. It’s called GIFTS, short for Geosynchronous Imaging Fourier Transform Spectrometer. GIFTS is an infra-red sensor that can detect winds in cloudless skies by watching the motions of atmospheric water vapor. Water vapor is mostly invisible to the human eye, but it reveals itself to GIFTS by the infra-red radiation it absorbs.

Smith is the lead scientist for EO-3, a satellite designed to test out this new technology. Slated for launch in 2005 or 2006, EO-3 will carry GIFTS to Earth orbit where it can produce 3-dimensional movies of winds in the atmosphere below.

These wind data will not only improve safety, but also help the airlines save money. Knowing the winds along a flight route allows airlines to adjust the plane’s fuel load accordingly, thus reducing the weight that the engines must lift. Saved fuel means saved money and less pollution.

GIFTS can help planes avoid another potentially lethal problem, too: Ice forming on their wings. If a cloud contains “supercooled” water droplets whose temperature is below freezing, those droplets will form ice on the wings of planes that pass through it. By looking at about 1700 different frequencies of the light coming from clouds, GIFTS can measure the temperature of the cloud top and determine whether it contains water droplets that could cause aircraft icing. With information from GIFTS in hand, pilots can simply avoid clouds that appear dangerous.

Once EO-3 demonstrates the accuracy of GIFTS, airlines will be able to capitalize on this potential to make flying a cheaper and safer experience.

Learn more about the GIFTS instrument and other advanced

technologies being tested on the EO-3 mission at [nmp.jpl.nasa.gov/eo3](http://nmp.jpl.nasa.gov/eo3). Kids can go to The Space Place to play a data compression game related to EO-3 at

[http://spaceplace.nasa.gov/eo3\\_compression.htm](http://spaceplace.nasa.gov/eo3_compression.htm)

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

### Image caption:

*EO-3, carrying the GIFTS instrument, will be in a geosynchronous orbit for extended monitoring of large regions of our planet and enabling observation of weather patterns at higher resolution than possible with existing geostationary satellites.*



# 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."



*"HUH, HUH, HUH, Here comes...uh...uh...the Easterbunny with lots of eggs or something." The horror, the horror! Butthead dressed as a giant white rabbit! The only consolation was that one of his slightly soiled eggs turned out to be hollow, its plastic shell containing the latest...*

## Rumours

It seems like it's mainly "Celestron" in the rumor mill this month, with the most gab being occasioned by Celestron showing a prototype of a BIG telescope at a recent trade show...

What did Celestron have to show this past winter? Well, what got everybody chirpin' was a big new telescope. No, not the return of the C22, alas. This is a big Dall-Kirkham Cassegrain on a huge GEM. Celestron says:

*Celestron offers a complete and totally new computerized telescope system. The corrected DK scope features a revolutionary optical design for people who demand the highest performance available. This astrograph delivers pinpoint stars across the entire field and is mounted on a brand new, rock-solid, high-performance computerized mount that will rival any heavy-duty mount in the industry*

Well, that's purty cool, I guess. But it's unlikely I'll find the spare 30K dollars this baby will cost. I probably couldn't have afforded a C22, either, but something inside me still wants to see a larger than 14 inch SCT go back on sale. Come on Celestron!

**That was not the only thing Celestron was displaying, either.** Also on view were a series of dobsonians. Yes, Celestron is back in the business of selling dobs, years after discontinuing their somewhat innovative but lukewarmly received array of push-to-go scopes. Like the previous models, these are not made by Celestron, this time coming from the Chinese/Taiwanese firm **Guan Sheng**. What the anonymous one is trying to figure is how this fits in with **Hardin Optical's** supposedly exclusive distributorship of the GS scopes. Well, Celestron also sells Synta equipment, even though Orion U.S. is supposed to be the only firm dispensing that Mainland gear. Confusing, to say the least. Want to be more confused? I've been told by someone who should know that the new Celestron dobs have OTAs by Guan Sheng but rocker boxes by Synta! Doh!

**Not much out of Meade at the moment.** Maybe they're taking a rest after introducing a slew of new scopes. By the way, many owners are telling the AA that the Meade LX200 14 GPS is the best LX200 scope ever made. Huh! I'll be the judge of that...someday...

**Whither AstroPhysics?** Small birds have cheeped the word that the esteemed Roland Christen, the man who is Astrophysics, the renowned maker of refractors and lately MCTs, is thinking “retirement.” This apparently means the sale of AP, and apparently there are some interested parties.

**I see on the Internet that that other refractor guru, Tom Back,** is temporarily out of action due to back surgery. I’m sure we all wish Mssr. Back a speedy recovery—after all, he just *has* to keep pumping out those great telescopes of his.

Hoo-hoo...that’s about all for this issue. Expect lots more Rumours in the Summer Number, what with all the good gossip that’s gonna be accumulated at the coming round of spring star parties!

*The Anonymous Astronomer*

## The Wrap-up...



How *did* the smart young miss in the picture at the lower left cause such a *commotion* on Usenet’s sci.astro.amateur newsgroup? Well, this young thing, quickly dubbed “CATgirl” by the cognoscenti on s.a.a., did so by posing in her catsuit with a Meade LX90.

*However,* the catsuit in question was, *ahem,* quite a bit more *revealing* than is obvious in this picture. After all, this *is* a more or less **family-oriented** publication. The posting of the link to The CATgirl’s website with its series of, uh, “interesting” pictures, caused days and days and days of charges of smut-peddling, counter-charges of blue-nosed meddling, and, as you might have guessed, plenty of *trolling* by certain individuals who shall remain unnamed here. So it goes! Some things never change, and least of all, good, old s.a.a. But...**SCT porn**? Now I *have* seen it all!

As *always,* I’m looking for articles on any aspect of **amateur astronomy**: Observing, equipment/book/software reviews, poems, personal experiences, star party reports, fiction, cartoons, you name it!

If you have something for me, well, send it on to Uncle Rod at [RMOLLISE@aol.com](mailto:RMOLLISE@aol.com)

See you all in July!

--Yer Old Uncle Rod