REFLECTIONS REFRACTIONS

of the University Lowbrow Astronomers

January 2002

The University Lowbrow Astronomers is a club of Astronomy enthusiasts which meets on the third Friday of each month in the University of Michigan's Physics and Astronomy building (Dennison Hall, Room 130 or 807). Meetings begin at 7:30 PM and are open to the public. Public star parties are held twice a month at the University's Peach Mountain Observatory on North Territorial Road (1.1 miles west of Dexter-Pinkney Road; further directions at the end of the newsletter) on Saturdays before and after the new Moon. The party may be canceled if it's cloudy or very cold at sunset. For further information call (313) 480-4514.

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A Night to Remember on Peach Mt. Was the Horsehead really there?

This Month: Due to prevailing weather conditions thru January & February
January 12th Informal Open House at Peach Mt. Observatory -Check E-mail and / or Voice Mail
January 19th Informal Open House at Peach Mt. Observatory -Check E-mail and / or Voice Mail
We will not be advertising these Open Houses in the Media
January 18th Lowbrow Meeting at 7:30pm in Room 130 of the Dennison Bldg. Speaker: Bob Gruszczynski, "Tales of the Black Forest Star Party"

Next Month: Due to prevailing weather conditions thru January & February
February 9th Informal Open House at Peach Mt. Observatory -Check E-mail and / or Voice Mail
February 16th Informal Open House at Peach Mt. Observatory -Check E-mail and / or Voice Mail
We will not be advertising these Open Houses in the Media
February 15th Lowbrow Meeting at 7:30pm in Room 130 of the Dennison Bldg. Speaker: Matthew Walker, "Shedding Some Light on Dark Matter"

My Affair with Astronomy
Thomas Ryan

It was really my mother's doing that set me on a lifetime involvement in astronomy. If it had been up to my father, or even myself, for that matter, I'd have had a completely different life. My father always hoped that I would grow to follow in his footsteps, to become a businessman or corporate lawyer. He had been an officer in World War II, commanded tanks in Korea, and had become a successful financial analyst for GM and TRW. But it was my mother, a teacher, who turned me toward a different path.

When a boy or girl reaches puberty, they slowly come to understand that they won't be able to live in their family forever. They become aware of a huge world outside the family, beyond protection and security, and realize that they will have to live there and make their own way there forever. A sort of low level panic overtakes them. They become torn between the impulse to run into the world and to hide from it. They are altogether too well aware that they are unprepared for it.

This is a crucial time. Depending on the flavor of one's personality, the tilt of one's friends, the ductility or brittleness of one's family, a person can find many ways through this storm. Into my own maelstrom, into my own time, stepped my mother. With a telescope.

Now, by itself, a telescope is a simple thing. On a flimsy tripod, it may appear as gangly and awkward as oneself. It doesn't always move in the direction you'd expect, like one's feet do sometimes. But a look through it entices, with impossibly sharp details and vibrant colors. Distant objects, previously beyond your reach, rush toward your grasp. And when you show your friends the stars and planets at night, and listen to their gasps of delight, you are seduced.

Of course, one night does not make a life together. But Astronomy has depth and breadth. Being inexperienced, I was immediately attracted to a field where experiments wouldn't have terrible consequences. I knew and feared the mistakes of the Sorcerer's Apprentice. Then my mother started taking me to meetings of the local amateur astronomers. Because my father worked all the time, I think she went to the meetings for the intelligent conversation, but I was there too, soaking up information and learning how to act as an adult. And when the adults treated me as an adult myself, the seduction turned into an affair.

I enrolled in a telescope making class, and when I formed a parabola in a piece of glass, accurate to a millionth of an inch, I knew I could master this new life.

Like many affairs, mine has had it's ups and downs. My father never said anything against the love of my life, but his silence, and his eyes, made it clear what he thought. But he was old, and Astronomy would take me far. The years I spent getting a degree in astronomy slowly taught me that a good companion at play may not be a suitable one at work. Perhaps meeting my companion's professional family soured my feelings a bit. For some reason, despite my best efforts, I didn't fit in, and I didn't know why. My own college advisor was amazed when I successfully completed a project for him. When I finally realized that he, who should have known me best, had no faith in me, I quit astronomy and the people in it. I drifted for a few years, trying to figure out what went wrong. I tried a number of different jobs, and finally settled on working as an engineering consultant, working for small and large companies, analyzing their problems and designing solutions. I can somehow easily, naturally, step into a company on the executive level, very much like my father.

My interest in making things work well has led me to look at the field of personality testing, and how some kinds of people work best in particular jobs. When I took the occupational/personality tests myself, I saw that I did not have the personality type (and it is a type) of a professional astronomer. A marriage had not been in the cards, and on some level, my advisor knew it. But I had been seduced. And seduction can blind a person to many things.

My own son has reached puberty. I try to stay away from him, to avoid contaminating him with my own hopes for him. He's crazy about trains, which I privately think are infantile. But my wife has started taking him to the train meetings, where he is building models and giving talks. He says he wants to be an engineer. A train engineer.

A Radio Map of the Sun
By Douglas Warshow

Many moons ago, when I was an astronomy undergraduate, I had a course entitled, "Observational Techniques." One of the lab practicums that were given to us was to use the 26-meter radio dish atop Peach Mountain to make a map of the Sun.

The Sun is an extended object, that is, it is not a point source. Therefore, one must make a series of "slices" across its face in order to cover the entire object. That may sound simple enough, but bear in mind that the Sun appears to move across the sky. If this motion is not taken into account, you're going to end up with a warped map.

First, one has to determine the "daily motion" of the Sun, i. e., the rotation of the Earth. This amounts to 360 per 24 hours or 1 arcminute every 4 seconds.

Next, to take into account is the "yearly motion of the Sun, otherwise known as the revolution of the Earth around the Sun. This is equal to 360 every 365.25 days or about 1 arcsecond every 24 seconds. For this motion, however, one also needs to take into account the fact that the Earth is tilted 23.5 with respect to the ecliptic (the plane of the Earth's orbit). Therefore, the declination motion must be multiplied by the sine of 23.5 or 0.399, and the right ascension must be multiplied by the cosine of 23.5 or 0.917.

The resolution of the radio telescope depends on both what wavelength one is looking at and what the size of the telescope is. We were using an 8-gigahertz feedhorn, which corresponds to a wavelength of 3.75 centimeters. The ratio of this wavelength to the antenna width yields a resolution angle of about 5 arcminutes. (At the Sun's distance, this represents a width of just over 200,000 km.)

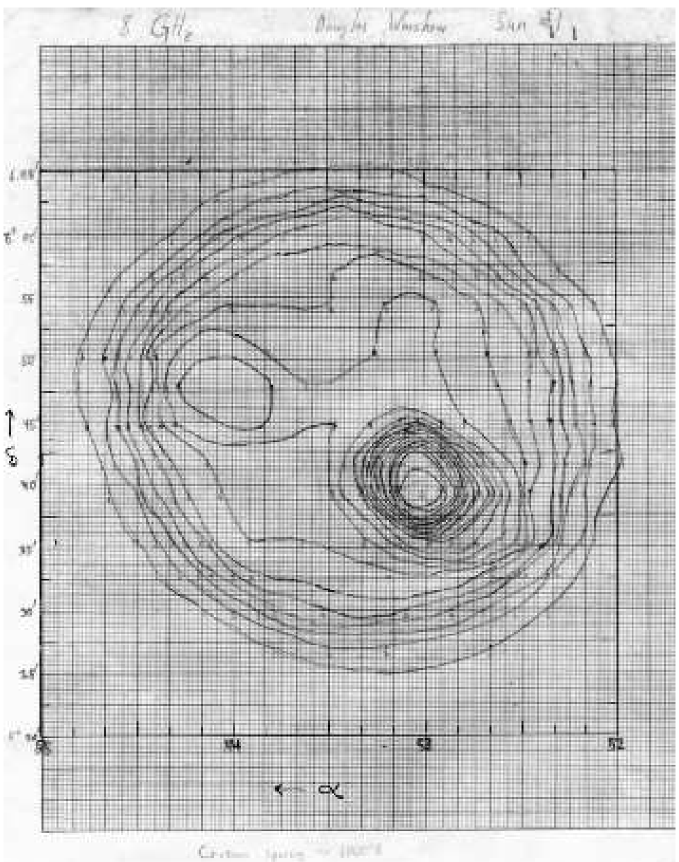
The actual scanning process entailed four students - one to move the antenna, one take readings off the chart recorder, one to record the right ascension and declination of each measurement and one to note the times of the readings (yours truly). For each sweep, measurements were taken at 1000 K intervals.

There is a second feedhorn on the telescope. Its purpose is to monitor the sky background for comparison. The background is then subtracted from the original map.

After all the sweeps were complete, we made the radio map by taking the raw positions, subtracting the appropriate locations differences from the R. A. and Dec. coordinates due to the motion of the Sun, and then plotting the intervals and connected like temperatures with contour lines. Note: when you do this yourself, remember that *declination minutes and seconds are not the same as right ascension minutes and seconds*. We realized this just after making our first football-shaped Sun.

Anyhow, you can see results here. As you can see, we were fortunate to have a very prominent sunspot available for our project.

My thanks go out to George Latimer for his help in the writing of this article.



Radio map (hand drawn) of the sun. All points and lines were plotted from data collected by Doug Warshow and three other students. The contour spacings are ~ 1000K. R A. and Dec. are plotted. Doug did not want to divulge the year or date that this data was collected.

Telescope Topics

By Tom Ryan

When I made my first 6" f/8 telescope mirror in the telescope making class of my youth, I was taught to bevel the edge of the mirror to prevent scratches. As grinding proceeds, the edge wears down and becomes sharp. If it isn't beveled, chips of glass will break off, fall between the mirror and tool, and will scratch the surface of the mirror. This isn't really a problem when rough grinding (scratches, that is), but becomes one in the finer grits.

So I carefully beveled the edge of the mirror with a hand stone they had there. It wasn't too coarse, and wasn't too fine, but it was just right for putting a clean, sharp bevel on a piece of glass.

I spent a lot of time doing this. In retrospect, I think I must not have had the best roughing stroke, because glass is supposed to come off the center of the mirror, not the edge. Nevertheless, I spent a lot of time beveling, and got to be pretty good at it. My bevels were at a 45 degree angle, were uniform at just the right width, and blended imperceptibly into one another (beveling is local, but the bevel itself is global).

The time I spent beveling actually served me well later, when I took a job in a machine shop. The old German who ran the place asked me if I was a machinist, I lied and said yes, and he put me on a job that involved only filing. After I spent several days filing sharp edges into gauged radii, the German explained that a really good machinist doesn't need a mill or a lathe; just a sharp file. Then he put me on a mill. (Come to think of it, I believe that the first really accurate lead screws for interferometer ruling were filed, so he was probably right).

Despite this wealth of experience, I don't bevel the edges of optics with a hand stone any more. Karl Mueller (an old German himself) taught me a better way. Karl uses a sheet of 220 silicon carbide sandpaper, and just sands down the edge with the paper pressed against the palm of his hand, and a little water to carry away the dust. (He does this before moving beyond 220 grit, of course). This results in a radiused edge, which is much stronger, and actually better looking, than a beveled edge.

It just goes to show that it's never too late to have the skills of a lifetime be made obsolete.

Items For Sale

For Sale:

Ebony Star Formica
Great for building Dobsonians
approx. 1" x 22" strip
13" x 23" attached to chipboard.
First $12 takes both pieces.
Tom Ryan 734-662-4188.

For Sale:

- **8 in. Celestron Ultima w/P.E.C.**
- **Very good optics (star tests very good inside and out)**
- **Digital setting circles w/upgraded encoders (mountain instruments-same as JMI Max)**
- **8x50 finder w/illuminated reticle for polar alignment**
- **Adjustable tripod w/2 EQ wedges (1 celestron & 1HD homemade).**
- **Real nice sliding counterweight system**
- **Declination motor**
- **Mead F-6.3 Focal Reducer**
- **1 1/4" visual back**
- **Orion Dew Zapper**
- **Bob's collimation knobs**
- **Nice E.P. holder**
- **Hard shell case for O.T.A.**
- **Instruction manuals for scope and D.S.C.**
- **Price: $1,250.00**

Call Gary Perrine at 517-424-4061 or e-mail me at: cywinzeler@yahoo.com

EYEPIECES… THE OTHER HALF OF YOUR SCOPE

By Charles Nielsen January 2, 2002

So you got that new or first telescope, and maybe an eyepiece or two came with it. But what quality are they, and are they the best match for your optics. Whether you own a reflector, refractor, or catadioptric, consider this. You have one objective, which is only one element in a reflector and two three or four in a refractor. You may have a secondary mirror or diagonal, but that only redirects the light. The objective is the element that concentrates the light to a small point. The rest of the "work" to produce the image you see is done by the eyepiece. This eyepiece will have a minimum of three elements, or has as many as eight, and is responsible for magnifying that little point of light produced by the objective. So shouldn't we give our eyepiece selection as much consideration as the scope itself? And back to those eyepieces that came with your scope. Except for some very high-end scopes, most do not ship with the quality eyepiece that will bring about the best performance the scope is capable of. Usually you get a Kellner (sometimes called "modified achromat") or at best a mediocre quality plossl. As an example, I bought a 90mm short tube refractor (f/5.6) about a year ago, which came with a 26mm Plossl that I was very familiar with and thought was a pretty decent eyepiece. A few weeks later I bought a Celestron Ultima 18mm. The improvement was dramatic. Better edge sharpness, contrast, and resolution. A Lanthanum Superwide (22 mm) was even more impressive. And believe this or not, a 7mm Nagler yields a field that has stars as pinpoints right at the field stop. Yes, this is with a $300, f/5.56, achromatic, Chinese refractor! One of our club members has a 10-inch DOB that he has always thought had a somewhat inferior mirror. One night at Peach Mountain I had him try the Ultima and Lanthanum in his scope. As he put it, "It's like lifting a film off my optics". It was that much sharper and had better contrast.

So what is the best eyepiece for your scope? The answer is dependent upon what type of scope you have, the scope's focal ratio, the type of observing that you prefer, whether you have a clock drive, and of course, what you can afford. Let's consider the type of scope you have and your focal ratio. Focal ratio is actually the much more significant factor. Why? One obvious reason is magnification. The focal length of your scope divided by the focal length of your eyepiece yields magnification. So what does focal ratio have to do with it? Given equal apertures, a longer focal length (therefore larger focal ratio) will bring the convergent cone of light from the objective to a focus at a shallower angle. Therefore the eyepiece has less light concentrated at its edges, where aberrations are at their greatest. This is why less well corrected eyepieces usually work better in longer focal length scopes than they would in a shorter focal length scope, given the same aperture. Does this imply that shorter focal ratio, or faster scopes, need better eyepieces? Sorry light bucket owners, but the answer is yes. Also, a fast reflector will have a correspondingly larger secondary obstruction, which reduces image contrast. Therefore with these instruments, better contrast on the part of the eyepiece is of great benefit. Refractors, having no central obstruction at all, tend to have better contrast than reflectors. Would this be why many serious planetary observers prefer refractors? Refractors can also use comparatively lower powers than reflectors. This is because the reflector's secondary mirror will severely affect the center of the field of view below certain limits. At this point you can begin to actually see the shadow of the secondary in the field of view!

What type of objects do you like to observe? Now we need to consider resolution, contrast, and field of view. For larger, more diffuse objects a wide field of view is important. This may be to see the whole object or to nicely frame it with background stars. Good contrast also helps you to see dim objects against the background sky. Fine resolution is nice, but many deep sky objects are "fuzzy" anyway. On the other end of the scale, let us consider the Moon and planets. Here resolution and contrast reign. Now we are studying small objects and/or looking for very fine and sometimes faint detail. Since we are concentrating on a relatively small area of the available field of view, a wide field eyepiece is only a luxury. The one exception to this is in the case of using high magnification (which we probably would be on planets) with a non-clock drive mounting. A wider field makes it easier to find the object, and gives you more time before it drifts out of the field of view. I believe this is one of the biggest advantages of the shorter focal length Nagler eyepieces. Resolution and contrast are also the most important factors for double stars, especially faint or unequal pairs. Excellent contrast also helps us to see fine and fainter details on a planet's surface and the lunar terminator. Looks like contrast is important in either scenario, and indeed it always is something to be desired.

OK, so all we need is good contrast and good resolution for planets and small deep sky objects, and good contrast and wide fields for those medium and larger "faint fuzzies". So why not super resolution, excellent contrast, and wide field of view in the same eyepiece?

It can be done, but not easily (or usually inexpensively). This is where reality can spoil the party. The problems start with apparent field of view. The first culprit is that optical aberrations in an eyepiece get harder to control as apparent field of view increases. To maintain good resolution and a flat field now requires more optical elements. This means more glass, larger size, more weight, and more cost. More glass for the light to pass through reduces contrast. Then to pour salt in the wound, wide apparent fields and long eye relief do not live on the same side of the street. Yes, the big bummer, eye relief! Eye relief is the distance between the eye lens of the eyepiece and the point at which the image is concentrated, and the whole field of view of the eyepiece can be viewed comfortably. This spot of light is referred to as the "exit pupil". Normally as apparent field of view increases, eye relief rapidly gets shorter. The same thing usually happens as focal length of the eyepiece decreases. This can become so extreme that you almost have to put your eye on the lens to see the whole field of view. This is very uncomfortable, and for eyeglass wearers, impossible. So then what good does the wide field do if you cannot see it? So can you spell compromise? First, how wide is wide enough? My peripheral vision is very good and I can just barely detect both sides of a 65-degree field of view without moving my eye around. So an 82 degree field is only noticably wider if I intensionally look for it. Not really a big deal. I would prefer a "comfortable" 65 degress to a "cramped" 82 degrees. Even a 50 degree field can appear pleasantly wide if eye relief is long enough. I find a huge difference between 50 and 45 degrees. There are brands of eyepieces that offer 20 mm of eye relief and 60-65 degree fields. With these you can see the whole (or most) of the field of view while wearing glasses. They are not cheap, but very much worth it! If you really want those 65+ degrees, you will have to accept short eye relief. As mentioned earlier, eye relief is better with larger focal length eyepieces, so at about 20 to 25 mm and higher wide fields are easier to achieve without a big sacrifice in eye relief. For this reason many premium quality eyepieces employ a built in Barlow lens assembly. By doing this the manufacturer can make say a 20 mm eyepiece with eye relief and an eye lens diameter more typical of a 40 mm eyepiece. The trade off is the addition of glass elements used. With good design, quality glass, and good coatings, this is a trade off that is definitely acceptable.

Let's think about optical coatings. The robber of contrast is light loss due to reflection and dispersion. All glass suffers to some degree from both. Lower dispersion, high quality glass of the correct type help, but of course at higher cost. Optical coatings reduce reflections off the glass elements. The more surfaces involved the more critical this becomes. The whole idea is to pass as much of the light as possible through the glass and into your eye. We don't want light bouncing off the glass surfaces or scattering around inside the glass. I believe any quality eyepiece should have at least a coating on every air to glass surface. This is usually referred to as "fully coated". "Multi-coating" usually implies that at least the outer two glass surfaces have at least two layers of coatings. "Fully multi-coated" means that every air to glass surface, internal and external has received at least two layers of coatings. I believe the "multi" and "fully multi" models are considerably superior. Fully coated lenses usually have a bluish or less frequently a reddish tint. Multi coatings usually display a greenish (preferably a dark green) tint. Fully multi-coated lenses display a purple tint and all of the colors mentioned above, depending on the angle of your view and amount of light available.

Now for some good news on that pesky eye relief issue. That involves the sometimes over looked exit pupil situation. Again, the exit pupil is the circle of light from the eyepiece where the image is concentrated and brightest. It is also the point at which you can see the whole field of view (or as much as the eye can handle). The human eye pupil can open as much as 7 mm when we are younger. At an older age this may drop to 5 mm. This means that eyepiece that delivered a 7 mm exit pupil can not all be taken in when you are older. This "extra" light is therefore wasted. Your pupil now becomes an aperture stop for your telescope! On the other end of the scale, when you get down to about 1 mm and below, that spot of light is not much larger than some of the "debris" floating around in the fluid of your eye. At 0.5 mm this really becomes a problem. The result is you actually start to see it. No, those were not dark clouds you were seeing on that planet! So a very small exit pupil can be uncomfortable and dim. On the other hand, a larger exit pupil will hit more of the edges of the lens in our eye. Just like optical lenses, our eye's lens has more aberrations near the edges. So as you are probably thinking, is there a good point in the middle? There is a point when a you have the advantages of using mostly the center of your eye, but without losing too much brightness and starting to see "ghosts". The magic number is 2 mm. The eyepiece in your collection that comes the closest to this number when used in your scope will produce the most detailed image that your optics and your eye can deliver. Below this number you will see a larger image, but dimmer, and with a loss in resolution. Does this mean you should avoid anything smaller? No. Sometimes you will just plain need the extra magnification. Below 0.5 mm is practically unusable. Between that 0.5 and 2 mm is where the good news for glasses wearers comes in. Most faults with vision involve the shape of our eye and its lens. Just like an eyepiece, these faults can be reduced if we avoid using the edges of the lens in our eye. You can actually demonstrate this to yourself. Take a card or piece of paper and poke a small hole in it. About a pin size or a little more is adequate. Now take your glasses off and look at objects near and far through the hole. Pretty cheap prescription or emergency glasses, but not exactly a fashion statement! The much clearer image you see is because that narrow spot of light coming through the whole "avoids" most of the imperfections with your eye. So that good news finally…when you get down into those smaller exit pupils, you can start to use your scope without your glasses on. The magic number will vary per individual. I personally have a lot of astigmatism and yet when I start approaching about 1 mm exit pupil, I can take my glasses off and see as clear as with them on. Near sightedness and far sightedness can be compensated for by merely re-focusing the scope. Remember that as eyepiece focal length gets smaller, so does eye relief. But as you can see, there will be a point at which you can still deal with short eye relief, even if you normally wear glasses.

Exit pupil, since it relates to image brightness, has a big influence on using nebula or light pollution reduction filters. All nebula filters work by increasing the contrast between the object and the background sky. They do not make the object brighter; it just seems that way because the background is now darker. So there is a specific range where each filter works at it's optimum. The size of the exit pupil and the amount of light pollution that we are dealing with determine this range. In a "dark sky" situation, say limiting magnitude 6 (don't we wish), a broadband (such as the Orion Skyglow) filter works best between 1 and 4 mm exit pupil. For a narrow band (like the Orion Ultrablock) the number is 2-6 mm. For a line filter (such as the Lumicon O3) the numbers are 3-7 mm. As you can see, the more you filter out, the more brightness of the image is required. As light pollution increases, so does your necessity to filter it. As an example, that nebula that looked good with a broadband from the country, might need a narrow band in the city. Also a different eyepiece may be required to stay in a filter's optimal exit pupil range. By the way exit pupil is calculated by first determining the magnification being used, which is the focal length of your scope divided by the focal length of your eyepiece. Then divide the diameter of your objective lens or mirror by this magnification to determine the diameter of the exit pupil.

OK. We have looked at the importance of resolution and contrast, and how better coatings can improve contrast. We considered the significance of eye relief and how it relates to "useable" field of view. The advantages and disadvantages of using more optical elements or lenses, and lastly, the very important subject of exit pupil and how it relates to the human eye. But the seemingly easy question was "what are the best eyepieces for my telescope?" Not so fast; stay tuned for the sequel **"Eyepieces…The Other Half Of Your Scope, Part 2".** Although you probably already have some good hints, in part 2 I will finally come right out with. Also, I will explain some of the testing and comparisons I have done with various eyepieces, and my opinions of them. Just remember the opinions expressed are not necessarily those of this Newsletter, the University Lowbrow Astronomers, or anyone else for that matter. Stay tuned….

The Meade ETX 70 AT

By ClaytonW. Kessler February 2001

This interesting little scope was purchased to provide an airline portable wide field scope to observe with while in Arizona. I spent some time looking at the alternatives for a "lookin' through" scope to use while my 4" refractor and G11 were working hard taking astrophotos. I researched many alternatives, 8" dobsonians, 4" f5 short tube scopes, a 6" or 8" reflector mounted on my existing SVD mount. All of these had something going for them - but also had many drawbacks. The most common was the physical size. None of these would fit aircraft "carry on" luggage. It would be possible to build an 8" or even a 10" carry on dobsonian telescope but it would not be a small chore. It would take a lot of careful work to craft a scope of this nature.

I was Christmas shopping up at one of the local malls when I drifted into a store that specialized in science and nature items. I noted that the store was stocking up on Celestron telescopes and the Meade scopes were all on sale. A little conversation with a salesman confirmed that a "brand change" was taking place. I took careful note of the 60mm and 70mm ETX style refractors that were on display. These scopes had an identical focal length (350mm) and while they would never be high powered planetary scopes I suspected that widefield views would be quite nice. I popped an eyepiece into the 70mm version and took a look at a light fixture out in the mall. As you would expect the achromat design of this refractor showed color fringing on a bright light source. On the other hand, the view was fairly sharp across the whole eyepiece. Hmmmmm…….

I must admit to some curiosity about the mount. The ETX mount included the "Autostar" computerized controller. This, if it worked, would make it quite easy to find objects and also opens up the possibility of tracking satellites with this thing. I have never owned a "GOTO" telescope before and this intrigued me quite a bit. A couple of weeks after Christmas I stopped by the mall again and purchased a 70mm sample of this scope.

To those of you familiar with the ETX90 the telescope controls are no mystery. The focus knob is in the back and moves the front lens cell in and out to achieve focus. This worked well but it was somewhat hard for my fat old fingers to reach in and turn this knob. Fortunately "Scopetronix" makes a focus knob extension that replaces the stock knob and is very easy to use. There is a "flip mirror" to allow mounting a camera in the back of the scope. I think this will work well for terrestrial photography but the mount is not robust enough for astrophotography with this scope. The computer control works on 6 "AA" sized batteries that are supposed to power the system for 20 hours.

The scope came with a 25mm MA and a 9mm MA eyepiece yielding 14x and 38x respectively. While these are not Naglers, they offer a reasonable amount of magnification to use with this little beast. One small complaint, they are not even close to parfocal! It took many turn of the focus knob to change them. After the first time I focused with the 9mm and slid the barrel of the 25mm out until rough focus was obtained. I need to try some parfocal eyepieces with this, maybe some Edmund RKE's will work well.

On my arrival in Arizona the weather was not the best. I arrived about a day or two after the new moon and by the time the rains stopped (4 days later) there was too much moon for astrophotography. For a while I did not think I would get to use this little scope. Fortunately a night spent at Roger Tanner's Rita Ranch observatory gave me the opportunity to put this thing through it's paces. I borrowed a Bogen photo tripod to set the scope on and it proved to be a very sturdy support for this mount. The setup of the computer control was straightforward - I just followed the instructions on the hand controller (I don't need no stinkin' manual!). The scope has you center two stars in the FOV. I thought it was somewhat odd - I had to slew the scope up 10 degrees or so to center each star. Then I realized I had the "position" set as "Ann Arbor Michigan" instead of "Tucson Arizona". I decided to leave this setting alone and see if the scope could cope with this "casual" setup. I got an alignment complete message so I set the scope to slew to M42 which was high in the east. The ETX 70 AT is not as loud as the LX200 scopes - but you can tell that they come from the same family. Once the slewing stopped and the scope "beeped" me to indicate it was finished I peaked into the eyepiece. M42 was almost dead center. Even with the bright moon I could see a lot of nebulosity. A quick change of eyepieces to the 9mm showed the four trapezium stars resolved at 38x. Not Bad……

Now for something a little harder - a planet. In order to slew to a planet the scope must know what day and time it is. This is set as a part of the initial setup. I told the scope to find Jupiter and after a little growling - presto! The banded planet and it's moons. This scope will never be a high power planetary scope but I could easily see the four moons and the major belts on the planet at 38x. Saturn clearly showed it's rings - although Cassini's division was absent with the supplied eyepieces.

I have to admit being impressed with the performance of this inexpensive GOTO mount. As an experiment I slewed to M44, the beehive cluster. I then left the scope to track by itself in Alt-Az mode for about 2 hours while we hunted and killed a "pizza". During that 2 hours the beehive barely moved from dead center of the eyepiece field of view. In fact everything that I asked it to slew to ended up in the field of view. This included a couple of trips across the sky to look at M31 and the double cluster. Like the LX200 it is easy to center an object and re-synchronize the mount to refine your alignment. On this moon washed night the dimmest object that I could see was M104 - the Sombrero Galaxy. It was just a dim oval patch but it was there in direct vision. On a darker night I suspect that most or all of the Messiers will be possible with this scope.

Conclusion:

This is looking to be a very nice scope. The size of this scope is such that it can be placed in a small duffel bag and carried onto an airplane. I am impressed with the ease of use and performance of the GOTO mount. As long as one does not expect to use high magnifications this satisfies the requirements for a "grab and go" scope for an experienced observer. In my opinion this also represents a fine scope for a beginner - as long as one does not expect to use high magnifications. I suspect that - atmosphere permitting - 100x will be the max usable on this system, and this will be a rare night indeed. On the other hand I am anxious to try my 7mm and 4.8mm Naglers in the scope. I suspect they will be very nice at 50x and 73x. As the weather warms I will try to get out to Island Lake some weekend if anyone is interested in getting some eyepiece time with this interesting telescope

A Night on Peach Mountain

By Mark Deprest

Sunday December 9, 2001 dawned cloudy and cold, but forecasters were calling for clearing skies by noon and clear skies overnight. Since the Open House for Saturday night was cancelled I was looking for some half way decent weather to do a little observing and this could be it, I decided early that I would open the Observatory up early. I had no idea what kind of a night I was in for but I knew it would be cold.

I sent out an E-mail letting those who check, know of my plans to open up at 17:00 that evening. As the morning turned to afternoon the skies began to clear and by 13:00 the weather prognosticators were validated with pristine skies. David Lacko called to let me know that he and his 10" Meade SCT would be joining me on the "Hill" at about 17:00. John Causland called me around 14:30 trying to decide between going up to Midland to spend some time with a friend or freeze for some faint, fuzzy photons up on Peach Mt. - no contest, he could see that friend in Midland anytime, but chance to do a little *observaytin'* on the hill in December only comes around, well once every 12 months or so. I gave Chris Sarnecki a call and he said that he was working but he might be able to break away for a little while.

Well, the as I began to set up for a night of cold weather astronomy, David Lacko showed up and was noticing that the sky was not only clear but seem to be very transparent and steady. As we continued to set up our equipment, Mike Radwick, with his ETX made it to the top of the hill and the sky continued to darken. The first indication that this night would be special was when David pulled out his Caldwell book and began to hunt down some of those faint fuzzies. I took a look at the area of the sky where Comet C/2000 WM1 should have been (barely 20 degrees above the southeast horizon) and there it was, "naked eye" visible. I carefully pointed the 12.5" f/5.6 truss tube Dobsonian I was using that night toward the comet and could make out a nicely defined 2 degrees plus tail and a very bright coma area. The sky seemed darker than usual and the stars seemed brighter. I managed to get very good collimation on the scope and the stars were beautiful points of light at low power and textbook "Airy" discs at higher powers.

With Saturn well above the trees to the east, I slid the scope around and centered the "ringed" planet in the eyepiece. As I began to study the view of Saturn at about 150x, I realized that the view was very sharp and could definitely stand some more power. Okay, pull out the 12mm Plossl and insert the 7mm Nagler … take a look and WOW, that looks good! The view of Saturn at 250x was absolutely stunning. The Cassini Division was razor sharp and could be seen all the way around the ring system. Seven moons were easily visible and the Crepe Ring could be observed with no prob lem. John Causland showed up on the hill right about then and began to set up his 18" version of the scope I was using. John commented on how dark and steady the sky seemed and all of us agreed that the night was a good one. We didn't realize at that time just how good the night was going to be.

As David went back to hunting down Caldwell objects and Mike was picking of Messiers and the occasional double star, I started flipping through my charts of "Overlooked Object" by Brent Wilson, and began knocking them off one at a time. David wanted to know if I had ever seen the "Bubble Nebula" in Cassiopeia, a.k.a. NGC 7635, I had but it was a very tough object to see and even nebula filters don't seem to help. Well, he thought he could see it in his scope, and I'll never pass up an opportunity to see a really tough object. So I took a look and what do you know, he had the brightest area dead center in the field of view … it was still just barely visible but it was there! Well, in my charts of "Overlooked Objects" was a chart for the Bubble Nebula, lets see if the 12.5" does any better. After a minute or so, BINGO, I had the elusive emission nebula, and it did look a little better with more aperture. As the night wore on and John got the 18" set up, David had moved on to an even more difficult object, the "Flaming Star Nebula" in Auriga. IC 405 is a reflection and emission nebula that is notoriously hard to see. John decided that this was a job for the 18" and with careful star hopping and the use of an H-Beta filter they picked it off.

I decided to go back to observing Saturn for a while, as it had moved high over head and into very steady air. I put the 12mm eyepiece in and thought that the view was good, with the 7mm eyepiece it was better, but could it take the 4.8mm Nagler and about 370x … the answer was WOW! I could not believe how sharp the image was; I could see the Encke Division and thought I could see the disc through the Cassini Division. John said, "lets put the scope up on the platform, and try the 3mm Radian." Some quick math and I figured that was about 600x, or "Tasco-Limit" as John put it. Right about this time is when Bob Gruszczynski showed up. A few minutes later John got his platform out and we moved the 12.5" up on to it and slipped the 3mm eyepiece in. One by one we all took a look at Saturn, pumped up to 600x and for all of us it will be a view we long remember and one that almost any other "great night" will be compared to. There was no doubt of the Encke Division or the disc of Saturn being visible though the Cassini Division. John commented that he had never had steady enough skies to use that eyepiece. It was in a word "INCREDIBLE!"

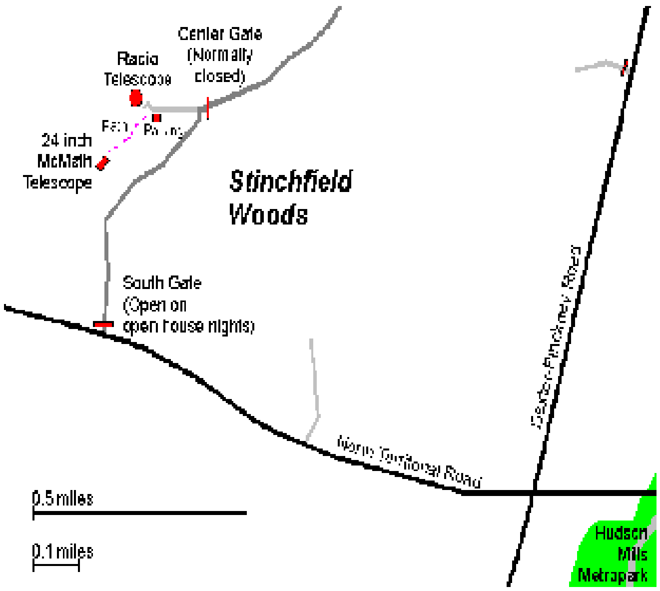
It was getting late and I had to get up at 4:30 am the next morning for work, so I started to pack up my equipment. It was just about then Bernard made an appearance on the hill, and he also agreed the night sky was darker and steadier than he had seen it for a long time. Well, I had to get some sleep so I left the hill at that point, but Bob, Bernard, Mike, David and John stayed up there until 3:30 am. The last hour and a half was spent looking for a visual glimpse of the Horsehead Nebula. David swears on a stack of finders charts that he could see it in John's 18" with a filter, the others think there could have been something there, but to say they actually saw the Horsehead nebula … well, you ask them.

It turned out to be one of those fabulous nights in Michigan that we always hope for, but rarely get. The air was steady, the sky was extremely clear and the atmosphere was very transparent. These factors combined to make the sky actually darker, because there is little or nothing for city lights to reflect off of. A number of very faint objects were seen by those of us who were wise enough to venture out and we will always be thankful we did.

Above: NGC 7635 - Bubble Nebula in Cassiopeia
Below: IC 405 - Flaming Star Nebula in Auriga
Both images Digital Sky Survey

Places and Times:

Dennison Hall, also known as The University of Michigan's Physics and Astronomy building, is the site of the monthly meeting of the University Lowbrow Astronomers. It is found in Ann Arbor on Church Street about one block north of South University Avenue. The meeting is held in room 130. Monthly meetings of the Lowbrows are held on the 3rd Friday of each month at 7:30 PM. During the summer months, and when weather permits, a club observing session at Peach Mountain will follow the meeting.



Peach Mountain Observatory is the home of The University of Michigan's 25 meter radio telescope as well as the University's McMath 24 inch telescope which is maintained by the Lowbrows. The observatory is located northwest of Dexter. The entrance is on North Territorial Road, 1.1 miles west of Dexter-Pinckney Road. A small maize-and-blue sign marks the gate. Follow the gravel road one mile to a parking area near the radio telescopes. Walk along the path between the two fenced in areas (about 300 feet) to reach the McMath telescope building.

Public Star Parties:

Public Open House/Star Parties are held on the Saturday before and after each new Moon at the Peach Mountain Observatory. Star Parties are canceled if the sky is cloudy at sunset or the temperature is below 10 degrees F. Call 480-4514 for a recorded message on the afternoon of a scheduled Star Party to check on the status. Many members bring their telescopes and visitors are welcome to do likewise. Peach Mountain is home to millions of hungry mosquitoes - bring insect repellent, and it does get cold at night so dress warmly !

Amateur Telescope Making Group meets monthly, with the location rotating among member's houses. See the calendar on the front cover page for the time and location of next meeting.

Membership:

Membership dues in the University Lowbrow Astronomers are $20 per year for individuals or families, and $12 per year for students and seniors (age 55/+). This entitles you to the monthly REFLECTIONS newsletter and the use of the 24" McMath telescope (after some training).
Dues can be paid to the club treasurer **Charlie Nielsen** at the monthly meeting or by mail at this address:
6655 Jackson Road #415
Ann Arbor, MI 48103

Magazines:

Members of the University Lowbrow Astronomers can get a discount on these magazine subscriptions:
Sky and Telescope: $29.95 / year
Astronomy: $29.00 / year

For more information contact the club Treasurer. Members renewing subscriptions are reminded to send your renewal notice along with your check when applying through the club Treasurer. Make the check payable to "University Lowbrow Astronomers".

Newsletter Contributions:

Members and (non-members) are encouraged to write about any astronomy related topic of interest. Call or E-mail to Newsletter Editors at:
Mark Deprest (734)662-5719 msdpressed@mediaone.net
Bernard Friberg (743)761-1875 Bfriberg@aol.com
to discuss length and format. Announcements and articles are due by the first Friday of each month.

Telephone Numbers:

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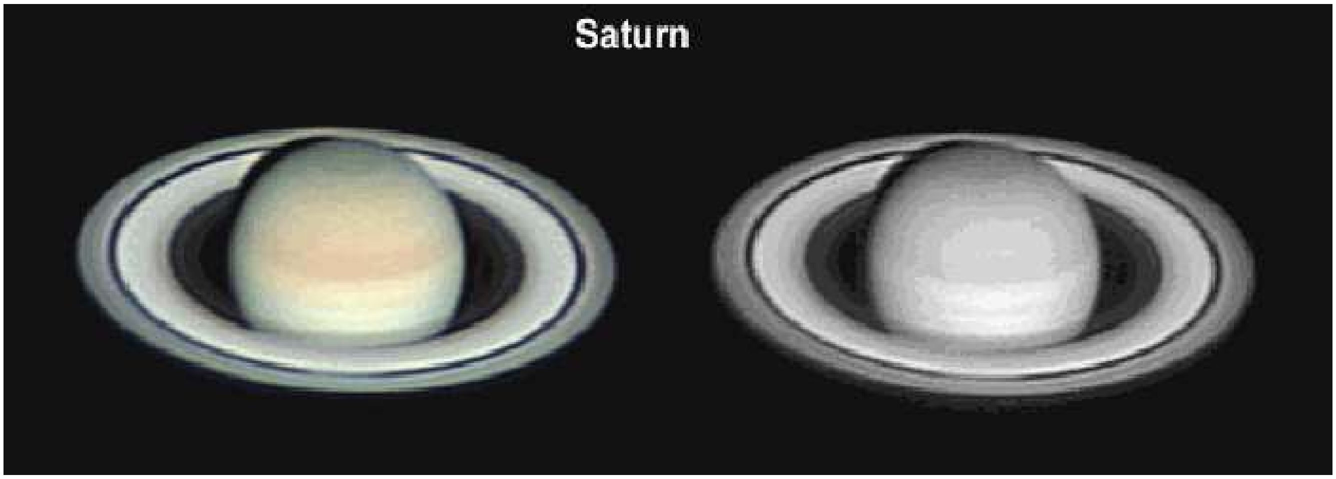
Lowbrow's Home Page:

http://www.astro.lsa.umich.edu/lowbrows.html
Dave Snyder, webmaster
http://www-personal.umich.edu/~dgs/lowbrows/



These CCD images were taken by Ed Grafton of Houston, TX, on December 7th 2001 and are very similar to the views seen by a lucky few on Peach Mt. On Dec. 10th 2001. Reprinted with permission.

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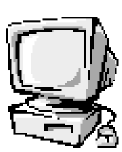

Lowbrow's WWW Home Page:
www.astro.lsa.umich.edu/lowbrows.html
Check your membership expiration date on the mailing label !