Skywatch

'Serving Mobile's Amateur Astronomy Community'
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Dark Mississippi Nights!

MSRSG '95

If you want clear dark skies, French Camp's got 'em--that's what the *many* observers who attended the 3rd annual Mid South Regional Stargaze (MSRSG) at Rainwater Observatory during the last weekend in April quickly found out. Rainwater Observatory is part of the French Camp Academy, located in French Camp, Mississippi, about 90 miles north-northeast of Jackson. In this rural area, far from the thousands of streetlights which we've become used to, the skies really allow deep sky observers to stretch their legs!

While Dorothy and I had never attended the MSRSG before, a glowing report from Leland Cox, who'd attended the stargaze last year, helped us make up our minds to head for French Camp. The list of speakers for MSRSG '95, which included radio astronomer Dr. Geritt Vershuur, and TV's Star Hustler, Jack Horkheimer, also contributed a lot to our decision to attend! This year's stargaze officially began on Wednesday, 26 April (though we discovered that quite a few deep sky fanatics had been on-site since Tuesday), but our schedules prevented us from leaving for French Camp before Thursday evening. Since this is a 5-6 hour drive over *mostly* two lane highways, we didn't push it, stopping in Meridian for the night. We got an early start Friday morning and made it to French Camp before noon.

After arriving at French Camp Academy, we checked-out our cabin, and soon headed on to Rainwater Observatory, which is located about a mile or so from the main campus. There, we were greeted by the Stargaze's organizer (and the director of the observatory), Jim Hill. We were immediately impressed by Mr. Hill and by the observatory/astronomy complex he's built. Rainwater Observatory consists of a new planetarium/classroom/warming room (with bathrooms!), storage buildings, a dome for the observatory's 12" LX200, a roll-off observatory for a 16" Meade DS 16, shelters for several other scopes, and observing pads with electricity for 20" and *32"* Dobs. The Observatory is on the crest of a small hill, and has virtually unobstructed horizons in all directions.

Jim pointed-out the stargaze's large observing field just below the observatory. This area had been temporarily fenced off (to keep out cows), and was supplied with electricity by heavy power cables with receptacles. Not long after we started setting up, the remainder of the MAS contingent arrived.

As has become typical for recent regional stargazes, the Mobile Astronomical Society was represented by a surprisingly large group (considering the time of year and the relatively long distance to French Camp). Besides Dorothy and myself, in attendance were Leland Cox, Phyllis Dunnavant, Ginny and Tony Kramer, and George Byron. We also noted many familiar faces from recent Deep South Regional Stargazes, and had a nice reunion with members of the Baton Rouge Club.

Jim Hill's stated goal for this event was that nobody go away *mad* or *hungry*. Certainly, no one went away mad, and there was no way anyone was going away <u>hungry!</u> After we had all finished setting-up our equipment, it was getting close to the dinner hour, so we jumped into our cars and headed back to French Camp Academy. The 'camp' part of French Camp Academy, the 'Camp of the Rising Son' (sic), consists of a number of cabins and a 'lodge' which includes a dining hall and

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somewhat more elaborate accommodations than the rustic cabins offer. The food at MSRSG was, in a word, FANTASTIC! It was well prepared, served in beautiful surroundings and was certainly plentiful!

Toward the end of the meal, I noticed heads turning and necks craning. I turned-around to see what the fuss was about and saw The Star Hustler walk in. I'm *sure* that it was all that *every one* of us could do to keep from jumping up and running-over to greet Jack and thank him for the *years* of enjoyment that his PBS program has given us. But, commendably, everybody kept their cool, and allowed Mr. Horkheimer to relax from his journey in relative peace.

Since our scopes were set-up and ready to go, we chatted with fellow attendees until time for the first speaker of the stargaze, Dr. Geritt Vershuur. Dr. Vershuur spoke on NEOs (Near Earth Objects--comets, asteroids, etc.) and the prospects for and results of collisions between these bodies and the Earth. His talk was very well done and interesting (as well as a bit *unsettling*). Following the lecture, we all returned to the observing field to wait for nightfall. It seemed obvious from the appearance of the skies, as we sat in the gathering darkness, that we were in for a fantastic, exceptional night, and we weren't disappointed!

Before twilight even ended, I had my Ultima C-8 SCT pointed at *Orion*. Though the mighty hunter was rapidly plunging from the heavens and into the western horizon, I had easily as good a view of M42 as I usually do on the best nights back home. While the nebula wasn't more than 25 degrees above the horizon, it was simply stunning! Pulling my hungry eye away from my scope, I looked up at the sky and saw that darkness was truly arriving. We usually think of Spring Skies as being somewhat barren. After all, the Winter Milky Way has set, and the gems of Summer have yet to rise. But the dark skies of Rainwater Observatory were *anything* but barren. For most of us it had been a while since we'd been out under really dark skies, so we can be excused if we wasted some observing time simply standing awestruck and staring at the star-crowded firmament. Testimony to both the darkness and clarity of these skies was given when I looked toward the zenith and noticed a bright misty patch which seemed larger than the full moon. With some difficulty I picked out the constellation Cancer (there were so many stars visible, that dim constellations like Cancer were almost overwhelmed!). Before long, I realized that this misty patch was open cluster M44. *Now* I knew why the ancients had called this spectacular object 'THE BEEHIVE.' In these incredible skies it looked for all the world like *a swarm of heavenly bees!* Back to the telescope. I observed many objects on this night, but my favorites were these:

M3: Globulars are probably my favorite variety of deep sky objects, and this sometimes overlooked gem is one of the best! In these skies it was fiery, and seemed resolved to the core. It was at *least* as beautiful in my 8" SCT as it usually is in my 12.5" Newtonian! It was also striking in George Byron's 4" Astroscan. With some resolution evident even in this aperture and at low power, it was made most lovely by being set in a very wide field amid myriad stars.

M53: This globular often disappoints when viewed from less than perfect skies--even when fairly large apertures are used. But from Rainwater there was much resolution with the 8", and, at high power, it filled the field with countless tiny stars!

M104: One of my favorite objects since I was a beginner, The Sombrero Galaxy revealed so much structure that it was difficult to take my eye away! The dark lane was as obvious as I've ever seen it in an 8".

M87/M86: These bright galaxies were just for starters! When I had my scope centered in this area, in the midst of The Realm of the Galaxies, every small twist of declination control brought more galaxies into view!

M13: Hercules was rising. How could I *not* observe the king of the *northern* globulars, M13. As can be imagined, it was quite a spectacle under these skies, and I almost felt as if my eyes lost their dark adaptation by my lengthy viewing of this cluster--it was that bright!

Omega Centauri: Since Centaurus was about as high in the sky as it ever gets from this latitude, I felt that a view of this huge cluster was in order. A quick look through my 7X50 finder easily revealed the cluster (in fact it looked almost as large in my finder as some globulars do through the main scope back home). From reasonably dark Gulf Coast skies (like the MAS's old Dark Site), this object really does come close to putting M13 to shame. Farther north in French Camp, however, the loss of a couple of degrees of latitude seemed to have taken a large toll on this usually AWESOME globular. Oh, it still looked good, but it just didn't have the 'snap' one usually expects out of it. I then decided to see if a little more aperture would help. Taking the 'controls' of Rainwater Observatory's 20" f6 Dob, I quickly placed Omega in the field. Once again, it really *did* look good, but not as good as I've seen it from our area.

NGC 5128: The peculiar galaxy, Centaurus A, has always been another

of my favorites--in photographs, anyway--and I've also been lucky enough to have some rather nice views of it from various dark sites along the coast. Since it's higher in the sky than Omega, I figured that it would be less affected by the loss of altitude. This was indeed the case. Through the 20", the two lobes were easily visible, and much detail was on the edge of visibility. This said, it's also true that I've had views almost as good back home with 8" scopes.

M108: Returning to my SCT, I homed-in on Ursa Major's little galaxy, M108. Under normal, fairly dark skies, this object resembles a small M82 with some hints of dark 'blotches' like those in M82 being visible in this similarly 'disrupted appearing' galaxy. Under these skies, though, M108 was very bright and I was able to use enough magnification to turn M108 into a seeming twin of M82. It was so beautiful that I must have stared at it in wonder for at least half an hour.

M57: The night was now growing older and colder. But I was still hungry for the deep sky: 'Hmmmm....Lyra's pretty high in the sky...I wonder what the Ring would look like through a 32" TELESCOPE?' Making my way up the hill to Rainwater's observing pad, I joined the hard-core deep sky observers who, eager for more observing treats, had gathered at the 20" and 32" scopes. After tracking down some obscure Abell Galaxy clusters, everyone seemed ready for a more spectacular sight. I mentioned M57, and soon we were pointing the monster scope toward the bright gems of Lyra. Observing the Ring Nebula's central star (a white dwarf, of course) is one of deep sky observing's 'holy grails.' So I eagerly mounted the tall ladder and pressed my eye to the eyepiece. Would I see it? *'Yes,* there it is...it's easier to see than I feared, but not as easy as I hoped!' I did indeed see M57's central star that night, but the brightness of the nebula almost overwhelmed it and made it difficult to 'hold steady.' In fact, through the 32", the nebulosity which fills the ring's 'donut hole' was brighter than the ring itself usually is through lesser telescopes! What did the nebula itself look like? This was one of the *few* times when my real-time view of an object matched long exposure photographs. While there was really no hint of color in the nebula, *in other respects it looked exactly like photos taken by professional observatories!*

Too soon, it was time to pack the scope up for the night, and head for our cabin. After arriving back at the camp area, a few things became evident. The late April night had gotten quite COLD, the cabins had only screen doors, Dorothy and I had only brought a couple of army blankets to use to keep warm, the bathrooms were a good distance from our cabin, and it was *very* dark! All of these things conspired to make our stay in the rustic lake cabin a little less than acceptable. As a matter of fact, we roughed it for only a few hours, during which time neither of us really got any sleep, and then, at first light, packed-up and headed for a motel! Now, none of

The MAS Gang! Photo Courtesy Dorothy Mollise.

this is the fault of the Stargaze or its organizers. The cabins are actually very nice in their own way. They are extremely clean, and are perched on the edge of the lake and have beautiful views. *The thing is*, neither myself nor Dorothy are 'camper types'. Other attendees who were a little bit better prepared seemed to enjoy their cabins immensely. Also, it should be remembered that the Academy does offer motel-like rooms in their Hall Lodge. In retrospect, this is what *we* should have signed up for. But we were happy with our motel which was only 20 minutes away; just off the scenic Natchez Trace.

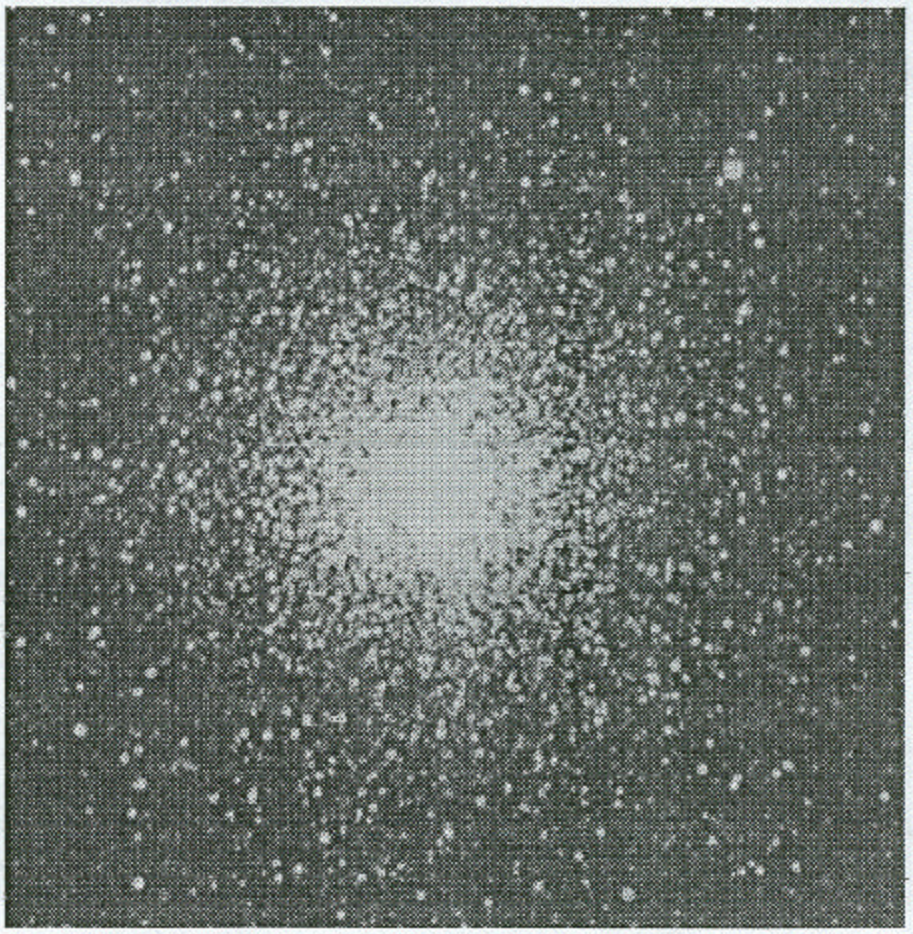
After getting settled at our new accommodations, we returned to French Camp just in time for lunch. Lunch Saturday was provided by the Council House Cafe which is in the same area as the Academy's gift shop. Jim Hill had warned us to bring doggie bags and, indeed, the huge sandwiches on homemade bread were just too much for most of us to finish (and they were also *delicious*). Since seating was limited at the cafe, the MAS group turned lunch into a picnic by the lake. Sitting in the cool shade of the picnic area we had a wonderful meal.

After lunch, we spent the next couple of hours at the Observatory, visiting with fellow observers, taking a good look at the new (and incredible) planetarium building, and searching for bargains at the swap tables. Before we knew it, it was time for the first talk of the day (earlier on, in the morning, a teachers' workshop was held, which was by all accounts excellent).

Like the other talks, Jim McMurtray's (of NASA's Stennis Space Center) lecture was held in the Academy's Tabernacle, a beautiful chapel. The subject of Jim's talk was recent activities of the Hubbble Space Telescope. It was very interesting and well received, and we had the opportunity to ask quite a few questions both about the HST and about NASA's astronomy/planetary science programs in general. I'd also certainly be remiss if I didn't mention the art exhibition that was held in the lobby of the building. Featured were works by Edwin Faughn (of Memphis' Pink Palace Planetarium), many of whose paintings have been featured in *Astronomy* magazine (His painting of M42 formed the cover for a recent issue). I've long admired Edwin's work, and was happy to finally have the opportunity to tell him so.

The final dinner of the stargaze was again held in the lodge and featured *tasty* catfish (brought in by the local volunteer fire department). We had a very nice supper, and spirits were high in anticipation of the Stargaze's featured speaker, Jack Horkheimer. Unfortunately, clouds, which had been moving in all day, became more threatening, and as supper started, a light rain had begun to fall, putting the prospects for clear skies somewhat in doubt. By the time we had finished eating, the rain was harder and the skies darker, dampening our spirits a little.

Jack Horkheimer gave his outstanding talk to the assembled stargaze participants (registrations were now near the 150 mark!), many of whom were very curious as to whether Jack Horkheimer and The Star Hustler were *one and the same person*. The brief answer is: yes and no. While, in my opinion, Jack Horkheimer himself is a much more engaging character than the Star Hustler, he retains the ENTHUSIASM



M3: A sometimes overlooked gem of the Spring/early Summer skies!

for astronomy that is The Star Hustler's *best trait*. Suffice it to say that the audience was held spellbound as Jack told us the story of *The Comet that Killed Cleopatra*. Mr. Horkheimer's lecture continued until about 9:00pm, and most of us had pretty much given up on the idea of doing any more observing by then--the chapel had resounded to thunder booms earlier. But Jim Hill stepped outside for a moment and then quickly returned with the announcement: 'I'm serious...I can see Sirius!' While the skies did not attain anything like the clarity of Friday night, some observers were able to get in some final runs. It should be noted that *every other night* of the event was crystal clear.

The next morning, as Dorothy and I headed for home, my final impression of Mid South Regional Stargaze '95 was basically one of surprise. How could a stargaze that's only been around a couple of years come together so quickly? The answer of course is simply: Jim Hill. Thanks for a wonderful weekend of astronomy, Jim, and we all hope to see you again soon!★

--Rod Mollise

Telfaq II

As promised, here is Part II of the Telescope Purchasing FAQ (the conclusion). Please remember that the opinions expressed herein are those of the authors and do not necessarily reflect those of your editor. I think you'll enjoy this, though; the only criticism I have is that the section on computer software is SERIOUSLY out of date. Next issue, 'From City Lights to Deep Space' returns, but I expect to continue publishing some of the more interesting internet astronomy material as space permits...

Purchasing Amateur Telescopes FAQ
Part II

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7. OK, Where Do I Buy My Telescope?

Well, there are three basic places:

A Store

Yes, the obvious--you find a store (NOT a department store) which sells telescopes and write a check (or, if they won't give you a cash discount, use a credit card that offers buyer protection, or gives you bonus miles, or some such). The advantages of this method is that you have someplace to return the telescope to if you have problems with it. Some places even offer your money back if you change your mind within some grace period. The 'droids that work in the store may even attempt to offer some advice. My experience is that this is usually 100% wrong, but that's actually as useful as advice which is always correct, but you have to know to invert the sense. The disadvantage is that you generally pay more for the telescope itself, and you pay sales tax.

Mail Order

There are two sorts of mail order: the discount stores that sell all sorts of stuff through the mail, and telescope stores that sell through the mail in addition to selling from their store. The advantages and disadvantages of mail order are obvious: you cannot take the merchandise back easily if something goes wrong, but it's cheaper (and you probably pay no sales tax).

Other People

You can find some great deals in used telescopes. Many people buy expensive telescopes, use them two or three times, get bored and sell them. The advantage is strictly monetary: you pay significantly less (and, of course, no tax). The disadvantage is that you are buying something "as is"--which you may want to think twice about doing if you are buying an expensive telescope. Also, both Meade and Celestron offer (limited) lifetime warranties on their optics, which are not transferable. All that having been said, here is a list of places you can buy telescopes, with comments as applicable. Note that all will sell direct or will ship.

Orion Telescopes
P.O. Box 1158
Santa Cruz, CA 95061
(also San Francisco and Cupertino)
800-447-1001
sales@oriontel.com

Orion Telescopes carries a wide selection of binoculars, telescopes,and accessories (Celestron, TeleVue, and their house brand; they do not carry Meade). They have a 30 day "no questions, satisfaction guaranteed" refund policy, which they do seem serious about. A fair number of people (myself included) have bought at Orion and all are very satisfied with the way they were treated. This place is fairly expensive, and they have the unfortunate policy of charging a "stocking fee" if you buy from the store, which always seems to be the same as the postage and handling fee for mail ordering from their catalogue(which they will send you for free if you call

them).If you need technical assistance when you call, ask for Steve or Eric.

Lumicon
Livermore, California
(see S&T or Astronomy for Address)

This is where I ended up buying my telescope. No complaints, but there really was no opportunity for anything to go wrong: I drove up knowing exactly what I wanted and what their price was, paid by credit card, and drove my new telescope home. And it is not all that impressive that they had it in stock--I bought one of the most popular telescopes around at the time.

Astronomics
(see S&T or Astronomy for address)
Norman, OK

Higher prices than Adorama and Focus (see below), but lower than Orion and Lumicon. Enthusiastically recommended by a couple of people on the net. As with all mail order, make sure the shipping price is included.

Pocono Mountain Optics
(formerly Wholesale Optics of Pennsylvania)
(see S&T or Astronomy for Address)

Not to be confused with Pauli's Wholesale Optical in Danbury, CT (see below). Enthusiastically recommended by a few people on the net. Owned by Glenn Jacobs who goes to most of the astronomy get-togethers in the NY-NJ-PA-CT area so you actually meet him if you live in the area. Often willing to cut a package deal if you are buying big ticket items. No problems returning things with which you are dissatisfied.

Roger Tuthill
(see S&T or Astronomy for Address)

Enthusiastically recommended by a person on the net. Not the least expensive, but top-notch service. Roger unpacks, inspects and collimates every 'scope he sells, and is very good about refunding your money if you are dissatisfied.

University Optics
(see S&T or Astronomy for Address)

A few people have reported using University Optics, and all report receiving good service. I have heard no complaints.

Kenneth Novak & Co.
(see S&T or Astronomy for Address)

A couple of respondants have bought accessories from here, and are very happy with them.

Parks Optical
(See S&T or Astronomy for Address)

A couple of people have mentioned that shipment can be pretty delayed, but the quality of their equipment appears to be high, and improving. Salespeople vary from knowledgeable to bubbleheaded.

Adorama
42 West 18th Street
New York, NY 10011
orders: (800) 223-2500
info: (212) 741-0052

Along with Focus Camera (see below), the lowest prices you will find. Expect no dealer support, and make sure you find out how much they will charge for shipping before placing your order. And pray that the optics arrive intact. I really would recommend that you not buy telescopes from these guys. Eyepieces and other accessories, however, are probably worth the risk if the price difference is significant.

Focus Camera
4419-21 13th Avenue
Brooklyn, NY 11219
orders: (800) 221-0828
info: (718) 436-1518

Refer to Adorama. Same comments apply.

Pauli's Wholesale Optical
Danbury, CT

A fair number of people on the net reported having bad experiences with these people. The most common seemed to be being lured into driving 4 or 5 hours to the showroom and then being treated very rudely. Only one person seemed even moderately happy with them.

7.1. What About Buying Used?

Think long and hard before spending a lot of money on a used telescope. You will not have a warranty, and you have no assurance that the optics are in good shape. If you decide to buy used, get a subscription to The Starry Messenger and/or The Cosmic Exchange and look at their ads. Also check your local paper for classified ads selling telescopes--this is where you will find your best deals, as they are selling to the smallest audience.

It appears that most people want to get about 75% of list when advertising in the astronomy rags (Starry Messenger, S&T, etc). This is probably not enough of a discount to make it worthwhile. If you can find something at 50% of list, you might want to think about it. You certainly want to see the telescope before you buy. A used telescope is just as good as a new one if it's been properly stored, transported and used. A little dust on the optics is generally a sign of a telescope which hasn't been cleaned

frequently, which is usually better than one which has. Get the May 1990 issue of Astronomy magazine which had an article on star testing a telescope (Test Drive Your Telescope by Dick Suiter). If you don't live close to the seller, try to get someone from the net to go inspect the telescope for you. You probably want to send them the money in this case and get them to ship it for you. This is a major imposition, please note, so you will probably have to do some serious begging to talk anyone into it, but it lessens the chance of fraud).

7.2. What About Building A Telescope?

This section was written by Andy Michael.

We just took a rather unusual approach to getting a beginning telescope: we took John Dobson's telescope building class and built an 8" and a 12.5" reflector on Dobsonian mounts (of course). We went this way for a few reasons: to get large aperture for seeing deep sky objects and higher magnification with good resolution when compared to small refractors in this price range, to keep the price down, and to soak up John's wit and wisdom. The down side is that these telescopes are not suited for astrophotography (at least not without building a different mount) but that didn't bother us. Also they are large. The 8" tube we broke into two pieces for easy portability, but the 12.5" one will probably go on the roof rack. These are about f/7 telescopes so the tube lengths are 56" and 7' respectively. Of course, when you build yours you can make whatever size you want. On the other hand you can pack your clothes in them; try that with an SCT. The cost was about $250 for the 8" telescope, $450 for the 12.5"er plus about 24 to 30 hours of work and 16 - 24 hours of class. It's a challenging project but the first time you focus on something with a mirror you ground is an incredible thrill. Another benefit is that we now know a lot about telescope design and if we ever have problems with them we know how to fix them.

If you don't have access to John's (or other peoples') classes then you can try building one by reading his book and by watching the video. Our class was the first to see parts of the video and had great success at finishing the telescopes fast and without needing to correct the mirrors very much. Coincidence? Class consensus was no. The book (excerpted from the order form): "How and Why to Make a User-Friendly Sidewalk Telescope" by John Dobson with Norm Sperling. To appreciate why Dobson makes each factor just so, learn how he thinks about it. His philosophy of star-gazing perfuses his tele-scopes and his book. The book includes the only detailed biography; wonderful vignettes from the Sidewalk Astronomers' many expeditions;their own special way of describing celestial objects; and, of course,complete details for making a Dobsonian. 169 pages; 154 clear, friendly line drawings; 9 photos. Hardbound in plywood, Dobson's favorite material. Exclusive source. Send $39.95 + $5.00 shipping to Everything in the Universe, 185 John Street, Oakland, CA 94611.

The video (also excerpted from the order form): For the first time on video, John Dobson shows how you can build your own low-cost Dobsonian Telescope. The 90-minute video is a complete step-by-step guide, covering telescopes from 8 inches to 16 inches in diameter. $39.95 +$3.50 shipping, same address.

8. What Accessories Will I Need?

In addition to a telescope, you absolutely must have a mounting and a tripod. You will also need a few eyepieces--a telescope with only one eyepiece is like a piano with one key.

These accessories don't come cheap--expect to pay as much for the mounting and tripod as you paid for the optical tube. For a first telescope, you probably will want to buy an entire system--it tends to be less expensive that way. It is also easier.

Which eyepieces should you start with? I'd suggest three or four,maybe a 30mm, 25mm, 20mm, 8mm and a 2x Barlow (which will give you coverage of 30, 25, 20, 15, 12.5, 10, 8, and 4 mm. Buy eyepieces of like quality to your telescope. Putting a $300 Nagler eyepiece on a $150 telescope is pointless (it would also probably tip over the entire telescope).

9. What Are Digital Setting Circles

This section was written by Jim Van Nuland

9.1. What Are They?

Digital Setting Circles (DSCs) are a small special purpose computer, mounted on or near a telescope. The scope has shaft encoders attached to sense the motion of the scope's axes, and the computer then converts these motions to the position of the telescope, and displays it(for instance) in Right Ascension (RA) and Declination. An 8-conductor cable runs from the computer to the encoders, with 4 wires to each encoder. RJ-45 telephone connectors are used at the computer.

They do NOT move the scope. You push it by hand, and the DSCs tell you which way to move and how much.

What makes DSCs so desirable is that they work on

alt/az-mounted scopes; and, even with equatorial mountings, it is not necessary to polar align the mount. (However, it's desirable to have the mount at least roughly polar-aligned so it follows an object.)

Additionally, most models have an internal catalog and a "guide" mode. One selects an object (or, in some, a planet), and the DSCs tell which way to move each axis.

They are marketed by Lumicon, Jim's Mobile, Inc., Celestron, and Orion Telescope Centers. The various brands and models differ mostly in their internal catalogs of celestial objects. All are actually manufactured by the same company, Tangent Instruments of Palo Alto, California, USA, who, however does not sell directly to individuals. I own the NGC-MAX from JMI, so some of my statements may not apply to other versions.

9.2. Must the ground board be leveled?

No. An alt/az mount must have a fiduciary mark such that the tube can be placed accurately at 90 degrees to the elevation axis. One way to do this is to (one time only) level the ground board, then the tube. Make the mark in such a manner that it can be adjusted when something changes. Some models of DSCs allow an alt/az mount to be initialized in a vertical position. When starting the DSCs, the tube must be set horizontal (or vertical), and then two stars are used to align. The stars must be at least 20 degrees apart in the sky (90 is ideal), and the first may not be Polaris.

9.3. How does one set up an equatorial mounting?

If the mount is known to be accurately polar aligned, you may still use two stars as mentioned above. Or you may set the DSCs to take advantage of the known alignment, and it will require only one object, and no zero degree reference mark is needed.

If an equatorial mount is not polar aligned, it must have a reference mark at zero degrees declination, and must use the two-star setup. For a German mount, the mark may be on either side of the scope (tube pointing east or west), and the DSCs set to correspond. The mount maybe driven or undriven. As for an alt/az mount, the stars must be at least 20 degrees apart, and the first may not be Polaris.

9.4. Do the DSCs support a Poncet platform?

Probably depends on the model. The NGC-MAX provides telescope type ET(equatorial table). It assumes that the table is carrying an alt/azscope, and that the scope is initialized with the tube horizontal. I believe that an equatorial mount could be used, but have not tried to simulate it.

9.5. How accurate is the device?

The position of the scope is displayed to one minute of RA and 10 minutes of dec. Guide mode displays position error to 0.1 degree of arc. The actual accuracy depends on the care with which the alignment was done, the accuracy of the mounting, accuracy with which the shaft encoders were installed, the resolution of the encoders, and a bit of luck. If the level or zero was not set accurately, the system will work poorly, and it should be re-started. If star settings were done carelessly, one can simply re-do one or both of them.

The "luck" factor stems from the digital nature of the shaft encoders. If the encoder is on the verge of a step, you could be off by one step.

The absolute theoretical resolution is three encoder steps, assuming everything else is perfect. In practice, I get about 0.2 to 0.3 degrees, and closer near the alignment stars. If I move a long way across the sky, the error is perhaps 0.5, but then I re-align on a convenient nearby star. It's not too unusual to get 0.1 if all has gone especially well during alignment. This with 4000 step encoders.

Accuracy is best between the alignment stars, and the DSCs calculate a "warp" so as to spread out the error. When re-aligning, only one starsighting is needed. The DSCs retain only the two most-recent star settings, provided they are at least 20 degrees apart in the sky.

Some models allow alignment on ANY catalog object, which is helpful, but I find that accuracy is best on stars or very round objects. I find that planetary positions are especially suspect. The computer carries only the date, not the hour. (Use UT date.) I have often had poor alignments when using planets, and do so only for daylight set-ups; I re-align on stars as soon as I can find any. Open clusters are especially unreliable; galaxies are not much better.

9.6. What objects are in the internal catalog?

This is the major difference between models. All have a few dozen named stars, used especially for initial alignment. Some have the planets. The Lumicon models have a catalog of planetary nebulae, which is Dr. Jack Marling's specialty.

The NGC-MAX version 3.94 (July, 1992) has the planets; 28 user-defined objects; the Messier

catalog (including M40 and M110); the full NGC,including the so-called "non-existent" objects; about half of the IC catalog; a catalog of 951 interesting stars (multiple, red, variable); and a list of 367 additional deep-sky objects, many of which are very faint.

For each object, the catalog has the position, magnitude, size (diameter or separation), constellation, name (if any) and/or catalog number, and the type of object. Some have a word or two of description. This probably varies with the brand and model.

9.7. May I add my own objects? Comets, for instance?

The NGC-MAX accepts user objects, and I presume most other high-end models do as well. I like to put in the Sun and Moon, so that I can align during the day. This must be done carefully, with the Sun filter attached. THIS IS DANGEROUS, as the filter must be removed when sighting on the Moon, and if you come back to the Sun, you MUST have first re-attached the filter! The moon is a poor alignment object because it has up to a degree of parallax, and it moves about 0.5 degrees per hour. But it provides a start, and it may be enough to locate some bright stars, and re-align.

9.8. What is "identify" mode?

Identify mode is present in the NGC-MAX, and probably other models. One specified the class of object, and the faintest magnitude, then the DSC selects the nearest to the telescope's position. Very nice, but in the Realm of Galaxies, alignment is critical and then there are too many to be certain. To check, read out the magnitude and description, and go to Guide mode and see how far away the object is.

It's especially useful in clouds, as one may point the scope into a clear spot, then ask what is nearby. One must separately search for galaxies, clusters, etc.Identify mode runs continuously, so that, as the scope is moved, the DSCs will (after a few seconds), indicate the new (or nearest) object.

9.9. Can it replace star charts?

For comparatively easy objects, probably. In a crowded field, no. Some models support the Tiron Atlas 2000 and the Uranometria 2000, by indicating, for each object, the page on which it (the object) will be found. These models also indicate the chart corresponding to the position of the scope, regardless of specific object.

9.10. What other functions are present?

This varies heavily with model. The NGC-MAX (here we go again) has two that have not already been discussed."Timer" counts up in hours, minutes, and seconds. It can be stopped,reset, and re-started, but can't be restarted without first being reset.

"Encoder" shows the encoder positions in degrees. If an alt/az scope was pointed north when the DSC was powered up, then encoder mode will read elevation and azimuth, if the scope is also standing reasonably level.

9.11. How is it powered? How long does the battery last?

There is an internal 9-volt transistor battery. The load is 18 to 40mA (NGC-MAX), depending on how bright the display is. I suppose this might depend on the model, too. The maker claims 30 to 50 hours on an alkaline battery. They do last a good long time. There is a "low battery" indicator which would turn on at about 4.5 volts, but in practice, I get "encoder error" messages before that. Some models have a second connector (serial port) by which external 9-15 volts DC may be supplied. This does not require the internal battery to be removed; the two supplies are in parallel with diodes to prevent back-circuits. It does not recharge the internal battery.

9.12. How accurately SHOULD the mount be constructed?

The brief answer is, as accurately as you'd like the DSCs to operate. For an equatorial mount, there must be little flexure; the RA axis must be perpendicular to the dec axis, which in turn must be perpendicular to the optical axis of the tube.For an alt/az mount, the ground board must be rigid, the azimuth bearing surface must be flat, dent-free and stiff; and the side bearings must be the identical height, that is, the elevation and azimuth axes must be accurately perpendicular. In addition, the optical axis of the tube must be perpendicular to the elevation axis. There is a terrible irony here: the Dobsonian mount works precisely because its kinematically stable design does NOT require that it be accurately constructed!

9.13. How accurately should encoders be installed?

Again, the short answer is, as accurately as you'd like the DSCs to operate. One can't do the job with a hand-held drill. OTOH, careful work with a modest lathe and drill press is quite sufficient, especially if performed by a

modest machinist. Most astronomy clubs have such a person.

Best accuracy is obtained with high-resolution encoders. Standard encoders have 2048 steps per revolution, and high-res type has 4000. One can also use gears to provide greater resolution, but see below.

If the encoder is connected directly to a shaft, the hole in the shaft must not be oversize. It must be straight, well centered, and parallel to the axis. The body of the encoder must be held so that it cannot rotate with the shaft. If it is connected by gears, the shafts must be parallel, and there must be no backlash.

Encoders are not especially delicate, but they do not like to be bent. They require very little torque, and rotate continuously. The setscrew should not deform the shaft. The 4-wire connector should be looped so it does not pull on the encoder. They may be mounted such that the shaft is stationary, with the body moving, or the usual way;the direction is set in the DSCs' setup option.

In an alt/az mount, the azimuth encoder is typically mounted atop the center bolt. In this case, the bolt must be nicely perpendicular to the ground board, and the comments about shaft mounting (above) apply.If the rocker box has any side play, it will be nearly impossible to avoid some run out. This can be reduced by using a very long lever arm to hold the body of the encoder.

Both side bearings must be round (especially the one with the encoder), the center must be carefully located, and the encoder shaft parallel to the elevation axis. Any run out here will cause serious inaccuracies when moving across the sky.

9.14. How accurately MUST the mount be constructed?

Please don't feel that only a million dollar mount can be equipped with DSCs. My 1972 Optical Craftsman (German) mount works very well, even with about 0.5 degrees of error if I shift the mounting and return to an object. This was the economy model! A machinist friend helped me drill the holes for the encoder shafts.

I used UGMA grade 10 precision gears to step up the dec shaft speed. The designer of the DSCs was amazed at that, and admitted that he used UGMA 4 with adequate results. I don't know how to calculate how much more accuracy I might be getting from my expensive gears. My alt/az mount, crafted of wood in my shop with only hand tools, carries a 108mm f/4 scope, and *always* puts an object in a low-power field. OTOH, if I re-collimate the scope, I must also re-position the vertical mark. I usually re-align after moving far across the sky.

If the mounting is less than perfect, it means that you will need to realign more often. But if the mount is *really* sloppy, it probably will not be satisfactory.

9.15. Can I connect the DSCs to my own computer?

Yes, for some models. The NGC-MAX, and probably others, has a serial port that may be used with an external computer, so that the screen shows a dynamic star map, identifies objects, etc. But the attached computer must take over ALL functions, including the prompting for "level me," pointing at particular alignment stars, guiding, calculating the conversions for RA and Dec, etc. I under-stand The_Sky, from Software Bisque, does all this, but I have not seen it in use nor heard from a live user.

The port is a modular telephone connector (RJ11). It has four wires:B+, data in, data out, and ground. External to the NGC-MAX, the cable must route DTR back to the attached computer as DSR, CD, and/or CTS,as needed by the attached computer. The 4th wire is +Battery, a 9 to 15 volt external power supply, which does not charge the internal battery. It is not necessary to remove the internal battery,

When the NGC-MAX is operating in "BBOX" mode, it blanks its own display, and does nothing but pass the shaft encoders' values over the serial port. It multiplies them by the encoder ratios (the latter set in the NGC-MAX setup function), and scales them such that 00000 is the position at power-on, and 32767 is just under 1 rotation.

Communication is at 9600,8,N,1. When the NGC-MAX powers on, it sends a hello message such as "V2.94". When the attached computer sends a character (the sample program uses "Q" but anything seems to work) down the port; and the NGC-MAX replies with 13 characters of the format "+00000t+00000" where the "t" is ASCII 9, and the 00000s are the two encoder values. I don't use this facility, but I'm too curious not to have tried it. I used my modem program to supply the computer side. I use the NGC-MAX whenever I'm doing general observing, and I like it very well. But I don't have a portable computer to use with it, and don't too much see the need. OTOH, if I fell into a lap top, I'd surely want to try connecting them.

10. Why Should I Start With Binoculars?

The quick answer is because you already have them, so you do not have to spend any money. Certainly going

right out and buying the Fujinon 25x150 Astronomical Binocular ($11,000 list price) would be a pretty stupid thing to do, no matter how good the binoculars are. You should also avoid the quick-focus binoculars, as they are easy to de-focus as well.

The remainder of this section was written by Paul Zander.

Based on my experience, I suggest that you start with a pair of 7x50 binoculars. This is the most popular size and hence good ones are available from many stores, even some of the discounters. Be sure to get ones that have anti-reflection coatings on the mirrors and lenses.If you wear eyeglasses, you may be able to find binoculars which can focus without them (unless you have significant astigmatism). Make sure the image is sharp at the center and edges at the same time.

"7x" is the magnification. Most people can hand hold these without needing to bother with tripods, etc. The "50" means 50mm (~2 inch)objectives (aperture). This gives light gathering ability similar to many small telescopes. Many advanced star gazers regularly use binoculars to either locate items to focus telescopes on, or just for the wider field of view.

When trying to view near the zenith, use a reclining lawn lounger: you can lie back and support your arms on the chair, giving a steadier view. You also will not get a crick in your neck.You might also use a plastic pad to lie on.

10.1. How Do I Hold Binoculars?

This section was written by Jay Freeman.

If you don't have a tripod (and tripods are sometimes a little clumsy,and are often difficult to use when the binocular is pointing near the zenith), it is important to know how to hold a binocular correctly to achieve maximum steadiness.The way most people tend to hold a binocular is with one hand on each side of the middle of the body--roughly where the prisms are in a conventional 7x50, say, so that the left hand is directly to the left of the center of gravity of the instrument and the right hand is directly opposite it, to the right of the center of gravity. For most people, there is a better position. Imagine that you are holding the binocular to your eyes, with your hands positioned as just described. Now, slide your hands along the body of the instrument,toward your face, until only your pinky and ring fingers are curled around the back end of the binocular body. In this position, the binocular feels a little nose-heavy, because you are supporting it behind its center of gravity.

Now curl each thumb up as if you were making a fist, and flex your hands so that the second bone in from the tip of your thumbs are pressed up against your cheekbones (counting the bone in the part of your thumb where the thumbnail is, as the first bone). This makes a quite solid structural connection between the body of the binocular, through your hands and thumbs, to your face, and markedly improves how steadily you can hold the instrument. Similarly, curl the first and middle fingers of each hand around the corresponding binocular eye-piece, to provide a little more structural connection (and perhaps also some protection from stray light). In this position, your hands are not far from where they would be if you brought them to your face to block out stray reflections while peering through a store window at night.

For most people, this position leads to markedly steadier viewing, but if the binocular is especially long and heavy (say, a 10x70 or an 11x80), the out-of-balance position can be quite tiring. In that case, move *one* hand out to the objective end of its side of the binocular, so that you are supporting the instrument on opposite sides of its center of gravity, but with some structural connection between it and your face; namely, the other hand. When the hand way out there gets tired--just switch hands.

For each person, there is a limit to how heavy and/or how powerful a binocular can be, before there is no way for that person to hold it steady enough. I am an averaged-sized adult male in reasonable physical condition, and I find I can hold a 10x70 (Orion's) steadily enough to use indefinitely on astronomical objects. But I have an old Celestron 11x80, that doesn't look much bigger or heavier than the 10x70,that I can only use for a few minutes before my arms get tired. As a 12-year old I am sure I could have used a 7x50 indefinitely with no problem, but at a younger age I might have had difficulty using one continuously. Your experience may vary with your strength, size and condition. Try before you buy, if at all possible.

11. What Books and Star Charts Are Recommended?

If you don't know the constellations, you might want a book that will help you learn them. A "fun" book for those just learning the stars is The Stars, A New Way of Seeing Them by H. Rey, which presents a non-orthodox way of drawing the constellations so they are easier to visualize.

You will probably want a beginner's guide, such as the book by Sherrod mentioned above. Sky Publishing has some introductory

materials which would probably be as useful, which you get for free when you subscribe to Sky and Telescope.

Petersen's Field Guide to the Stars and Planets comes highly recommended. It is very inexpensive ($13), small and handy to use at the telescope. It has a good discussion about stars, planets, nebulae, and galaxies; and has a very complete albeit small-scale star chart, along with a the usual tables. It has long lists of deep-sky objects for each area of the sky.

You will need a bigger star chart than is included in Petersen's. Try Sky Atlas 2000.0, by Wil Tirion. The field edition, which has white stars on a black field, is probably more useful than the desk guide.It is also printed on heavier paper, so is more resistant to dew and the rigors of the night. For beginners, buying Uranometria 2000.0 is probably a mistake. Yes, it is the "best" star chart, but the scale is impossibly small--when the Orion constellation takes up four separate pages it is really hard to use for beginners. Burnham's Celestial Handbook ($36). This three volume set is billed as "An Observer's Guide to the Universe Beyond the Solar System"--a rather all-encompassing claim, which it manages to live up to. Information on every item of interest you can think of: galaxies, doublestars (optical and binary), variable stars, nebulae, etc. More information than you could use in a lifetime. I consider this a necessity.

Sky and Telescope's 100 Best Deep Sky Objects. About $5, which is kind of expensive for a list, but it sure makes it easier to figure out what to look at when you are just beginning. The items are sorted by Right Ascension, which makes it real easy to figure out which ones are currently up.

All the materials listed are available from:

Sky Publishing Corporation
P.O. Box 9111
Belmont, MA 02178-9918
USA

Their catalog is free.

11.1. What About Computer Programs?

There are basically two types of astronomy programs: calculations of astronomical things and computerized star charts. I don't consider either of them worth buying as a tool to help an observer. On the other hand, some of them (particularly the star charts) can be a lot of fun to play with during the day or on cloudy nights. Before you buy any, you should probably check out the ones available on the net(see next section).For a good example of the variety of programs which will calculate things, look for Zephyr Software's ad in Sky and Telescope (or,presumably, Astronomy). They list two pages of programs, for about $60 each, which can calculate things like solar eclipses, or lunar phases, or ephemerides, etc. To my mind, your money would be better spent on eyepieces, or a bigger telescope to begin with.

As for computerized star charts (usually $100 - $250), these can be very nice. Most will draw in the constellation lines if you like,will let you click a mouse on an object to have it identified, find objects by name, and so forth. Also, the fact that they can scroll the sky is much nicer than having to turn pages in a printed chart. The fact that they can show the stars as they are tonight, as opposed to a fixed time (such as 2000.0) is so pointless as to be laughable. The only problem is that you will probably never be able to use your computer at your telescope, which means that this is something you will use indoors. This strikes me as a nice recreation, but again,you would be better served by spending the money on a better telescope.

As for recommendations for programs, both Dance of the Planets ($200),and The Sky 4.1 ($75 - $175, depending on the size of the database of objects) tend to get rave reviews in the magazines. Both are only for IBM PCs and compatibles. The former is available from

A.R.C Science Simulation Software
P.O. Box 19558
Loveland, CO 80539
(303) 667-1168

The latter is available from

Software Bisque
912 12th St.
Suite A
Golden, CO 80401
(303) 278-4478

For the Macintosh, a program called Voyager is the dominant program.

David Nash comments that:

1) It has a lot of features for the planets.The accuracy of its position probably isn't as great as some more dedicated program like Dance of the Planets, but it is more than sufficient for ordinary observers. And it does a lot: in addition to the standard "plot the planets against the stars" mode, you can get conjunction searches(handy for finding eclipses), planets displayed with disk and phase indicated, a "tracking" mode that plots planet positions at a given interval (say, steps of 2 days or 1 month), and a bunch of little features that come in handy, such as a program that produces those magnitude - vs - time and angular size

- vs. time plots that you see in the astronomy magazines.

2) NICE interface compared to most programs I've seen, including Mac programs like MacAstro, but then again that is shareware and lessfully-featured. Each starchart has Mac-style scrollbars on each side--one for RA (or Azimuth) and one for Dec (or altitude). This makes navigating around the sky fast and simple -- grab the scroll bars and you're off and running. Similar sorts of controls allow you to zoom in on a region (down to 1 deg. x 1 deg.). Much more flexible than The_Sky for the PC (the DOS version anyway -- I haven't tried the Windows version, so this may not be an entirely fair comparison).

3) Many options for plotting charts. You can get them in equatorial(RA/Dec) or local horizon (alt/az) coordinates (or several others, but these are the most useful). A little counter in one corner of the screen tells you what the coordinates of the cursor are in the appropriate modes. You can add coordinate grid lines, mark important points or areas (zenith, horizon, ecliptic, etc.).

4) Miscellaneous fun stuff: a 3-D map of the ~50 or so nearest stars to the Sun (click on the axes to change the view), an "orrery" mode that shows the Solar system from above, making it easy to see planetary relationships (conjunctions, oppositions, etc)It also has a fairly comprehensive deep-sky database.

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Astrobytes

Tips for Using Modern Astronomy Software

Modern astronomy software is reaching the point where manufacturers, having provided the basics, are beginning to vie with each-other over how many features can be included in their packages. Where we were once *mightily* impressed by advanced astronomy programs which included a couple of hundred thousand stars (the SAO catalog) and *maybe* 7 or 8 thousand deep sky objects (the NGC and IC catalogs), we now expect just about any self-respecting program to feature the Hubble Guide Star Catalog (14 *million* stars) and at least 50 or 60 thousand deep sky objects from catalogs that are obscure even in professional circles! And don't forget *plenty* of high-resolution images and, oh, maybe a few dozen *movies*! The result of these trends is software that is rapidly becoming second only to DOS games in demanding high computing horsepower. I often hear from fellow amateurs who are very disappointed in recent astronomy programs. And these are not fly-by-night programs--they have often been highly touted in the magazines, but they simply don't seem to run very well at all on *typical home systems*. Though you obviously, you can't expect to run RedShift on an XT computer (or much else at all, anymore!), there are a number hints I can give you to maximize your enjoyment of the 'new' astronomy programs:

- Make sure your *processor* can handle a new program before you invest in it! Most of the astronomy software on the shelves today requires *at least* a 40 MHz 80386 to run decently. As a practical minimum, I would suggest that you should upgrade to a 486 machine. If this is not possible, a cheap solution is a math co-processor. 80387 math coprocessors are quite inexpensive these days (<$100.00), and can really help many astronomy programs (which often do the intense math and graphics which are the forte' of these math chips). Another recent option is the *Overdrive Processor*. If your system can accommodate one of these chips, your problems may be over. Be careful, though. For some computers, Overdrive chips can cost $400.00+. You may find that it's a lot more cost effective to simply upgrade to a more modern system. Also, a new computer will most likely work much better than your old one with an Overdrive Processor installed. Computer manufacturers have done a lot lately to upgrade the PC bus (VESA local bus/PCI bus), so your old box may not equal the performance of a new computer even if a processor upgrade makes your 'old reliable' just as 'fast' as that shiny new system!

- Do you have enough memory? For Windows programs, 4 megabytes has been the minimum, but this figure is very rapidly being bumped-up to 8 megabytes. There are still quite a few very good DOS programs (e.g. *Skyglobe* and *Deep Space 3-D*) which run well in the ol' 640K base memory, but even DOS programs are beginning to demand megabytes of extended/expanded memory. The good news is that the price of memory is finally starting to fall, with 4 megabyte SIMMs now going for under $200.00.

- Is your hard drive big enough? I know, I know! That 200Mb drive that seemed GIGANTIC when you bought that new '486 a couple of years ago is now bursting at the seams! With many new Windows programs *demanding* 20-30 megabytes, it doesn't take long to fill-up a hard drive. One solution is to use Doublespace, Stacker or some other disk 'doubler' (compression program) to free-up some space. I have used Doublespace since DOS 6.0 came out with absolutely no problems, so don't believe all the horror stories you hear. If this solution doesn't appeal, you'll find that the prices on new hard drives have really dropped (540Mb drives can be had particularly cheaply). But if you don't want to fill-up your drive with gigantic catalogs of obscure deep-sky objects, there is another way to go...

- It's getting to the point where a CD ROM drive is required for using astronomy programs. The big object catalogs that we covet are naturals for this medium. It's no surprise that most of the elaborate (and popular) new astronomy programs (RedShift, Megastar, Guide, The_Sky) are all CD ROM applications. Even some of the old standbys from the earlier days of astronomical computing are converting to this medium (Deep Space 3-

- vs. time plots that you see in the astronomy magazines.

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Modern astronomy software is reaching the point where manufacturers, having provided the basics, are beginning to vie with each-other over how many features can be included in their packages. Where we were once *mightily* impressed by advanced astronomy programs which included a couple of hundred thousand stars (the SAO catalog) and *maybe* 7 or 8 thousand deep sky objects (the NGC and IC catalogs), we now expect just about any self-respecting program to feature the Hubble Guide Star Catalog (14 *million* stars) and at least 50 or 60 thousand deep sky objects from catalogs that are obscure even in professional circles! And don't forget *plenty* of high-resolution images and, oh, maybe a few dozen *movies*! The result of these trends is software that is rapidly becoming second only to DOS games in demanding high computing horsepower. I often hear from fellow amateurs who are very disappointed in recent astronomy programs. And these are not fly-by-night programs--they have often been highly touted in the magazines, but they simply don't seem to run very well at all on *typical home systems*. Though you obviously, you can't expect to run RedShift on an XT computer (or much else at all, anymore!), there are a number hints I can give you to maximize your enjoyment of the 'new' astronomy programs:

- Make sure your *processor* can handle a new program before you invest in it! Most of the astronomy software on the shelves today requires *at least* a 40 MHz 80386 to run decently. As a practical minimum, I would suggest that you should upgrade to a 486 machine. If this is not possible, a cheap solution is a math co-processor. 80387 math coprocessors are quite inexpensive these days (<$100.00), and can really help many astronomy programs (which often do the intense math and graphics which are the forte' of these math chips). Another recent option is the *Overdrive Processor*. If your system can accommodate one of these chips, your problems may be over. Be careful, though. For some computers, Overdrive chips can cost $400.00+. You may find that it's a lot more cost effective to simply upgrade to a more modern system. Also, a new computer will most likely work much better than your old one with an Overdrive Processor installed. Computer manufacturers have done a lot lately to upgrade the PC bus (VESA local bus/PCI bus), so your old box may not equal the performance of a new computer even if a processor upgrade makes your 'old reliable' just as 'fast' as that shiny new system!

- Do you have enough memory? For Windows programs, 4 megabytes has been the minimum, but this figure is very rapidly being bumped-up to 8 megabytes. There are still quite a few very good DOS programs (e.g. *Skyglobe* and *Deep Space 3-D*) which run well in the ol' 640K base memory, but even DOS programs are beginning to demand megabytes of extended/expanded memory. The good news is that the price of memory is finally starting to fall, with 4 megabyte SIMMs now going for under $200.00.

- Is your hard drive big enough? I know, I know! That 200Mb drive that seemed GIGANTIC when you bought that new '486 a couple of years ago is now bursting at the seams! With many new Windows programs *demanding* 20-30 megabytes, it doesn't take long to fill-up a hard drive. One solution is to use Doublespace, Stacker or some other disk 'doubler' (compression program) to free-up some space. I have used Doublespace since DOS 6.0 came out with absolutely no problems, so don't believe all the horror stories you hear. If this solution doesn't appeal, you'll find that the prices on new hard drives have really dropped (540Mb drives can be had particularly cheaply). But if you don't want to fill-up your drive with gigantic catalogs of obscure deep-sky objects, there is another way to go...

- It's getting to the point where a CD ROM drive is required for using astronomy programs. The big object catalogs that we covet are naturals for this medium. It's no surprise that most of the elaborate (and popular) new astronomy programs (RedShift, Megastar, Guide, The_Sky) are all CD ROM applications. Even some of the old standbys from the earlier days of astronomical computing are converting to this medium (Deep Space 3-

D, for eample). You can't go wrong by buying a CD drive, since your whole family is likely to get a lot of use out of it. Double speed (2X) drives are now the norm, and are *quite* inexpensive. While the new 'quad' (4X) drives are becoming more common, they don't yet offer twice the performance of the 2X drives.

- Is your Video system up-to-speed? Super VGA (640x480, 256 colors) is required by many of the new programs. If you don't already have a SVGA card, investing in a modern, high-speed video card will likely improve the performance of most your applications.

- Finally, is your computer 'in-tune'? Are your configuration files, virtual memory, etc., correct for your system? Is your hard disk 'defragged'? Have you gotten rid of unused fonts, overly fancy wallpaper and other system resource hogs? These 'housekeeping' tasks are sure ways to improve your system's performance with astronomy (and all other) software.

Probably none of the above will stop you from lusting after that new 120Mhz Pentium system, but I think that you'll find that there may be some life left in your old system after all. I too certainly keep wishing for that ultimate PC which always seems just *one more upgrade* away! But I also realize that most of my astronomical computing tasks consist of printing finder charts for use at the eyepiece. It really isn't necessary for me to have the kind of speed delivered by the high-end systems. If, however, your astronomical computing activities consist of, for example, image processing, then it would certainly make sense for you to have the most powerful system within your reach!

Note: I realize that this article hasn't addressed the needs of Macintosh users. If there are any Apple fanatics out there, I'd really like to get some input from you on the use of Macs in astronomy.★

--Rod

SpaceCalendar

Historic/upcoming dates concerning astronomy and spaceflight....

July 1995

* Jul ?? - Sich-1 Cyclone Launch (Ukraine)
* Jul ?? - Helios Ariane Launch
* Jul ?? - Telstar 402R Launch
* Jul 01 -SeaStar Pegasus Launch
* Jul 02 - 10 Anniversary (1985), Giotto Launch (Halley's Comet Flyby)
* Jul 10 - FAST (Fast Auroral Snapshot) XL Pegasus Launch
* Jul 10 - Progress M-28 Soyuz Launch (Russian)
* Jul 11 - Prognoz-M2 Molniya-M Launch (Russian)
* Jul 13 - Galileo Probe Separation from Orbiter
*Jul 15 - SWAS (Submillimeter Wave Astronomy Satellite) XL Pegasus Launch
* Jul 15 - 30th Anniversary (1965), Mariner 4, Mars Flyby
* Jul 15 - 20th Anniversary (1975), Apollo 18 Launch (Apollo-Soyuz)
* Jul 16-22 - 1st Anniversary, Comet Shoemaker-Levy Collision with Jupiter
* Jul 17 - 20th Anniversary (1975), Apollo-Soyuz Handshake
* Jul 18 - Progress M-29 Launch (Russian)
* Jul 18 - Nadezhda Kosmos Launch (Russian)
* Jul 18 - 30th Anniversary (1965), Zond 3 Launch (Russian Moon Flyby)
* Jul 18 - Mugunghwa Launch (South Korea)
* Jul 20 - STS-69, Endeavour, Wake Shield Facility (WSF-2)
* Jul 20 - Cosmos Proton Launch (Russian)
* Jul 22-23 - JPL Open House, Pasadena, CA
* Jul 27 - Galileo, TCM-25, Orbiter Deflection Maneuver
* Jul 27 - Comet d'Arrest Perihelion
* Jul 27 - Cosmos Soyuz Launch (Russian)
* Jul 27 - DSCS Atlas 2 Launch
* Jul 29 - Delta-Aquarids Meteor Shower
* Jul 31 -Ulysses,MaximumNorthern Latitude (80.22 degrees)
* Jul 31 - Molniya-3 Molniya Launch (Russian)

August 1995

* Aug ?? - N-Star A Ariane Launch
* Aug ?? - Koreasat-1 Delta 2 Launch
*Aug 01 - Alpha Capricornids Meteor Shower
* Aug 10 - 5th Anniversary (1990), Magellan Venus Orbit Insertion

* Aug 11 - Saturn Rings Edge-On from Earth's Perspective
* Aug 12 - Perseids Meteor Shower (Potential Meteor Storm)
* Aug 17 - 25th Anniversary (1970), Venera 7 Launch (Venus Lander)
* Aug 18 - 10th Anniversary (1985), Suisei Launch (Halley's Comet Flyby)
* Aug 20 - 20th Anniversary (1975), Viking 1 Launch (Mars Lander/Orbiter)
* Aug 21 - 30th Anniversary (1965), Gemini 5 Launch
* Aug 28 - Soyuz TM-22 Launch (Russian)
* Aug 29 - Galileo, Trajectory Correction Maneuver #26 (TCM-26)
* Aug 31 - XTE (X-Ray Timing Explorer) Delta 2 Launch

--The Space Calendar is presented courtesy of Dr. Ron Baalke of JPL★

Club Notes

News of the doings of the Mobile Astronomical Society

At the May meeting of the Mobile Astronomical Society, members and guests enjoyed a slide-presentation/lecture by John Paul Jones of the Mobile Public Schools. John's slide set (which he donated to the ESC) consisted of beautiful images of deep sky objects. Well done!

The *June meeting* will feature a presentation by our own George Byron on the Sun's hydrogen fusion reactions. Should be interesting!★

Astropoem

Darkness

The soft rustling of the distant forest encloses me
As the sun finishes his descent into darkness...
All about me, the Earth settles for another sleep.
But the heavens are filled with blazing life!
The distant stars live their long lives
Scarcely noticed by the little Creatures Below.
But a few of us find their burning hearts.
And bask in beacons of glory
As darkness falls!

--Rod Mollise

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