

SJAA ephemeris

OCT '81

- Oct. 3 Indoor Star Party at the Los Gatos Red Cross, 18011 Los Gatos Saratoga Rd, Los Gatos. 7:30 pm on. There is an on-going telescope makers' workshop in addition to an impromtu star party in the parking lot, plus lots of interesting conversations (and sometimes slide shows.) Everyone is welcome! Take Hwy 9 west off Hwy 17 south and continue up Los Gatos-Saratoga Rd about a mile and a half. The building is on the right, just before Rose Ct.
- Oct. 10 General meeting. Tonight will be reports on the July 31st Solar Eclipse trips that many of our SJAA members went on. Gerry Rattley and Bobby Fingerhut will give a slide show on their Hawaiian expedition, and hopefully, the Siberian version will be represented by Ernie Piini. 8:00 pm. The general meeting is held in room S-34, across from the Planetarium ay DeAnza Community College in Cupertino.
- Oct. 13 Full Moon
- Oct. 16 Board meeting at Jim van Nuland's. Note: this is a change from previous announcements. 3509 Calico Ave., San Jose. 371-1307. 8:00 pm. Any interested members or associates are invited to attend.
- Oct. 17 Indoor Star Party, Los Gatos Red Cross Building, 7:30 pm on.
- Oct. 21 New Moon
- Oct. 24 SJAA Close-in Star Party at Sanborn Canyon County Park. Take Hwy 9 up through Saratoga heading for Big Basin. About two-three miles out of town turn left just after the white bridge. (On the right is a private campground). Follow the sign to Sanborn Canyon Park. The club sets up in the upper parking lot. If the gate is locked the SJAA combination will be on it so use 4565 to open.
- Oct. 31 Indoor Star Party at the Los Gatos Red Cross. 7:30 pm on. The moon should be favorable for a gathering of telescopes and their keepers in the parking lot. Yes, you can see the Milky Way from Los Gatos! Even on Halloween....
- Oct. 31 End of Daylight Savings Time. Set your clocks back 1 hour!
- Nov. 7 General meeting at DeAnza Community College, room S-34. 8:00 pm.
- Nov. 11 Full Moon
- Nov. 13 Board meeting at Steve and Patty's, 1272 Mills St., Menlo Park. 326-8614. 8:00 pm. Everyone welcome.
- Nov. 14 Grazing lunar occultation expedition to Greenfield. More information next month.
- Nov. 14 Indoor Star Party at the Los Gatos Red Cross. 7:30 pm on.
- Nov. 21 SJAA Star Party at Fremont Peak State Park.
- Nov. 26 New Moon
- Nov. 28 SJAA Star Party at Fremont Peak State Park.

Observations

Lunar graze

As mentioned last bulletin the SJAA Graze Team, under the able direction of Jim van Nuland, is gathering its forces for another expedition and everyone is invited to help out!

Date: Oct. 18-19, 1981, Sunday-Monday
(Late Sunday evening.) All times are PDT.

Circumstances: Excellent. Flattish profile may yield multiple events for some observers. Cusp is far from bright star. Come down Saturday for a linear star party.

Sunday
Location: Turner Island Rd, east of Los Banos in the Central Valley. Go down Hwy 101 and take Hwy 152 east across Pacheco Pass. Cross I-5 and continue east 14.6 miles (through Los Banos). Turn right on ~~Wetzel~~ for Brito Rd. and then 0.2 miles further turn left on Turner Island Rd. Continue three to five miles north until you find Jim van Nuland and his VW van. Come early for general observing before moonrise at 11 pm.

Site/Weather update: Jim will call Florence van Nuland during the day, again just before 7:00 pm, and also later if there are any late updates. Call her (408) 371-1307 after 7 but not later than 11:00 to get the weather forecast. Call her before 6:45 to pass information to Jim, especially that you can or can not come.

CB: Channel 14. The group handle is "Graze Chasers". Jim's handle is "Sunspot." Bring ch. 14 Handy-Talkies; they can talk to a car from half a mile or so.

Time: Start continuous record at 12:39 AM. Central graze time is 12:49 AM. End record at 12:54 or when star is well clear of moon. Be ready by midnight. Allow time fore finding station, setting up, testing equipment, finding star, trying eyepieces, etc.

Graze position angle: 354 deg

Vertex angle: 51 (left)

Csup angle: +13N

Watts angle: 346

Limit: Northern

Sun Elevation: -63 deg

Moon elevation: 18 deg

Azimuth: 76

Illumin: -8 days, 58%

Moon RA(1981) Midnt: 7h04m

Declination +21.5 deg

Star: Zc1086

Constellation Gemini

Magnitude: 6.5

Spectrum: Yellow, G5

RA (1950) 7h 7.1m

Declination +21.3 deg

Sunset: 6:24 PM

Civil Twilight: 6:51 PM

Astro Twilight: 7:51 PM

Moonrise: 11:08 PM

Astro Twilight: 5:50 AM

Site Longitude: 120 42.5'

Latitude: 37° 6'

Elevation: 95 ft.

Bring a time source (short wave radio or Time Cube) and a cassette tape recorder.

For those who want to get involved in a lunar grazing occultation but fir' a Sunday night in Los Banos a bit too much, there'll be another chance in November on a Saturday at Greenfield, between King City and Salinas. Try that one!

This editor would like to thank everyone for the great turnout at the last general meeting. We had the best attendance in months to view the NASA films and Steve and Patty's film footage from the Saturn Voyager encounter at JPL.

Also, thanks to Norm Neinchel for hosting the September picnic board meeting at his house. We actually had more members and associates there than board members! It was a typical board meeting, punctuated by Norm's cat falling into the swimming pool, some great deep-sky slides shown by John Gleason, and an appearance by the FBI.

As of November 1st. Sky and Telescope is raising its rate to \$10.00 and believe it or not the SJAA is solvent enough to absorb this cost. So no dues increase!

Steve Greenberg is trying to arrange a SJAA field trip to the Space Telescope at Lockheed. It would be on Dec. 4, in the evening, and by reservation only, so if you're interested keep that date open.

The two club telescopes have been loaned out. Since the loan agreements are for two months both the six-inch and the twelve-inch will again be available for use in mid-Nov. The six-inch is at George Deiwert's, 257-6658, and the twelve is at Wolf Hanisch's, 998-0861. Please contact these people directly if you wish to borrow one of the scopes. They may maintain possession until mid-Nov. and then until somebody wants one.

As many of you know, October was to be my last month as editor of the Ephemeris. The average stint in that position has been two years and I'm now into two years, six months, (and four days, but who's counting!). Patty Winter and Steve Greenberg were to take over in November, but after some consideration (space shuttle launch and landing schedules, etc.) we decided it would be better if I hung on for one more month and turned the bulletin over in December. So, how about it? I want my last newsletter to be a good one. I want to see some star party reports, graze reports, eclipse news, shuttle results, etc. Write something for the club! We'll read anything....

Bulletin deadline will be Oct. 24th.

Thanks!

Denni

SJAA EPHEMERIS

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comet comments

These few final months of the year are "prime time" for amateurs to discover comets, yet so far this year we have had no comet discoveries by amateur astronomers. Of the 11 comets picked-up thus far this year, 6 were recoveries of returning comets and 5 were discoveries by professional astronomers who were involved in other projects and accidentally picked-up comets.

In every year since 1975, by this time (Sept. 13) there was at least one amateur comet discovery. Following is a list of each year, the number of amateur discoveries by this date, and the number of amateur discoveries made during the remainder of the year:

Year	Amat. Disc. before Sept. 13	Amat. Disc. after Sept. 13
1975	3	4
1976	2	0
1977	1	0
1978	4	3
1979	1	2
1980	1	3
1981	0	?

And, as you can see, there have been as many amateur comet discoveries (12) before this date as after this date.

In the past month one comet has been discovered by a professional astronomer; details on this follow.

Comet Howell (1981k): Discovered by Ellen Howell at Mt. Palomar on a photograph taken with an 18" Schmidt on Aug. 29, this comet was in the constellation Pisces and moving southwest. It was magnitude 15 at discovery, and I presently have no orbit on it. Should it be getting brighter, I'll let you know.

Great Comets: Comet Swift-Tuttle (1862 III): Discovered July 15, 1862, this comet (magnitude 7.5 at discovery), became several magnitudes brighter and even projected a faint tail pointing towards the sun.

A recent study (Dr. B.G. Marsden, 1973) indicates that this comet is responsible for the Perseid meteor shower seen every August. Since this comet has a orbital period of $119.98 + 0.63$ years, this comet is due back soon. A search ephemeris has been published, and several comet hunters regularly search for this comet. One is a professional astronomer, Charles Kowal, of Palomar Observatory. One or twice a year he photographs the region with the 48" Schmidt, which should record everything down to 20th, magnitude.

There was some talk that the Perseid meteor shower should intensify prior to the comet's arrival. While the rates were high last year, this year's rates seemed to be about normal.

Don Machholz
(408) 448-7077

"It's my opinion that I'm here." Steve Greenberg at the September SJAA board meeting.

THE CELESTIAL TOURIST SPEAKS

The August 29, 1981 SJAA star party at Fremont Peak State Park was well-attended and quite successful. Some fifty or sixty people were there -- perhaps half club members. The largest telescope was Kevin Medlock's 18-inch Newtonian. Charlie Stifflemire had his 16½-inch Dobson, Earl Watts had a 16-inch Dobson, Bill Dillings brought his Celestron 14, and so on down. During mid-evening the fog rolled in over the coastal plain, producing tolerably dark skies. Temperatures remained warm nearly all night, except for a few short intervals when it got breezy.

Several people got to compare different brands of nebular filters of a view of the Veil Nebula through Kevin's 18-inch: Bob Fingerhut has a premium filter from Lumicon that gave a beautiful dark background and showed vast amounts of detail. It was also interesting to use these filters monocle-fashion, held up to the naked eye with no telescope beyond, for improved views of some of the nebulous portions of the Milky Way.

Kevin, Jerry Rattley, Bill Ramstad, Bob Fingerhut, and I looked at an assortment of objects with the 18-inch. NGC 6818, the "Little Gem" planetary nebula in eastern Sagittarius, was a delightful blue-green oval. Barnard's Galaxy, NGC 6822, was fairly difficult to see -- Bill Ramstad accused me of having had too much to drink, thereby stimulating my imagination!

Janice Smith had set up her 6-inch Newtonian close by Earl Watt's 16-inch, and spent a while comparing views of the same objects in the two instruments. She came down with a severe case of aperture fever, immediately.

I did not get to talk much to Jim van Nuland during the evening -- he had set up his eight-inch at the east end of Coulter Camp and was observing steadily. I believe that Jim has had a run of bad luck at Fremont Peak: the 29th may have been the first night he has been there when the weather has been good.

In the small hours of the morning I spent a little while looking for the Sculptor Dwarf Galaxy, at (epoch 1950) $0^{\text{h}}57^{\text{m}}$, $34^{\circ}00'$, using Charlie Stifflemire's 16½-inch Dobson at 68X and 110X.

This large (about a degree) faint member of the local group of galaxies is a midget elliptical galaxy, thinly populated with stars, about 270,000 light years off. I know of no sightings of it by visual observers. For a while I thought we had seen it: Charlie and I were not absolutely sure we could see anything, but we did agree on a position for whatever it was that we were or weren't looking at. (Charlie's exact words were "It's right there, if it's there at all.") I made a drawing of the field, but on comparison with a photograph at home, I am not sure whether what we saw was a bright patch in the galaxy or a bunch of foreground stars. The photo, incidentally, accompanies Walter Scott Houston's column on page 119 of the August, 1971 issue of Sky & Telescope.

I recently finished a project I mentioned in this column several months ago -- chasing down all the Messier objects with a 60-millimeter Tasco refractor. The toughest objects were M76 and M89 -- both difficult due to faintness. I used 28X for all my observations, and used a good eyepiece, a 25mm Meade modified achromatic, instead of one of the junky ones that all too often accompany small refractors. At this magnification, most of the open clusters were granular or resolved, no globular cluster was resolved, no galaxy showed any detail beyond an occasional nuclear brightening, and diffuse and planetary nebulae showed only their coarsest features. A 60-millimeter refractor is still a common beginner's telescope, and those who have them

should not feel that their observing must be restricted to the Moon, planets, and the bright double stars.

I have been through the Messier catalog seven times in all, each time with a different instrument. Besides the 60-millimeter Tasco, I have used 7 X 50 and 11 X 80 binoculars, 4-inch (Meade) and 14-inch (Celestron) Schmidt-Cassegrains, and 6-inch and 8-inch Newtonians. For almost all the objects, the best views were with the C-14 -- the exceptions are a few of the open clusters, which are too big and too sparse to show well at the narrow field widths required by larger telescopes. The most fun, though, was with the 7 X 50: It was the most challenging. The easiest survey was with the 11 X 80: Plenty of power and aperture, with a field wide enough to make it easy to find things.

Anyone who has looked at all the Messier Objects and wants new worlds to conquer, should know about two handy lists of spectacular deep-sky objects. The first of these appears in recent editions of the annual Observer's Handbook, which is published by the Royal Astronomical Society of Canada. It is a list of 110 of the finest non-Messier NGC objects north of about 30° south declination, compiled by Alan Dyer. This list picks up most of the spectacular objects that Messier missed, such as the Double Cluster in Perseus; and also includes a fair selection of medium-sized bright planetary nebulae, which presumably appeared starlike at the low powers Messier used for comet hunting.

The second list is a little pamphlet, The Finest Deep-Sky Objects, by James Mullaney and Wallace McCall. It was compiled after extensive observations with apertures from three to thirty inches, to provide a list of spectacular objects for viewing on public nights at Allegheny Observatory. These 105 objects include about 30 "Messier objects, about 20 other star clusters, galaxies and nebulae, and over fifty double stars. The Mullaney-McCall list would make a useful adjunct to any public star party.

The Messier catalog, the Dyer list, and the Mullaney-McCall list together contain about 280 deep-sky objects, nearly all of which can be seen well with apertures of four to six inches. The Mullaney-McCall list is published by Sky Publishing Corporation, who also stock the R.A.S.C. Observer's Handbook.

One of the big problems with observing the Moon is keeping the names of the features straight. The map of Luna is as confused as the map of medieval Europe -- there are too many countries, they all look alike, and they're all unpronounceable. I have been trying to cope with this problem in my own observing, and have come up with a few useful hints and mnemonics. I will put some of them in this column from time to time.

First is a mnemonic that may help with remembering the names of the major Lunar maria. It is "Can frozen non-terrestrial seas inspire poets? Fancy names help." The first letter of each word (underlined) are the first letters of the major maria, in a certain order which I will now describe.

In Figure 1, I have sketched the Moon's maria. The figure orientation is upright and unreversed, as seen by a naked-eye northern hemisphere observer when the Moon is on the meridian. The zig-zag dashed line goes through the maria whose names correspond to the first sentence of the mnemonic (from right to left): Mare Crisium, Fecunditatis, Nectaris, Tranquillitatis, Serenitatis, Imbrium and Oceanus Procellarum. The dotted line is for the last sentence also right to left: Mare Fregoris, Nubium, and Humorum.

There are two maria whose names begin with n, and two whose names begin with f. If you

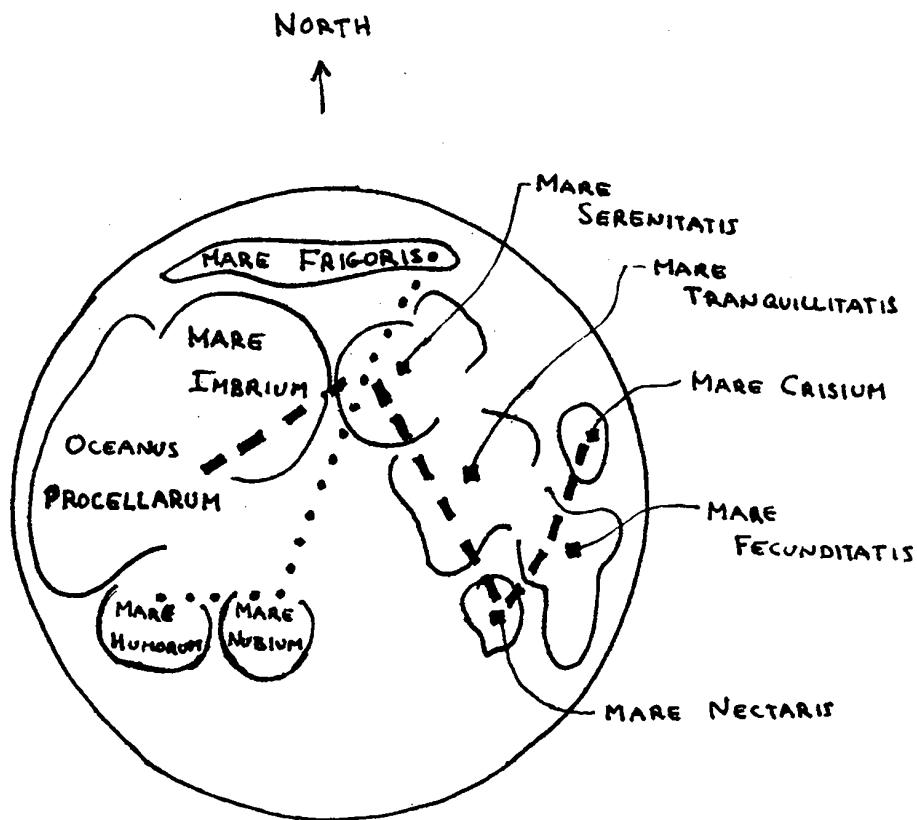
CELESTIAL TOURIST continued

happen to know that the Nubians were one of the southernmost peoples in classical civilization, you can remember that Mare Nubium is the southernmost of the maria. And Mare Frigoris is obviously a frigid place, so it must be next to one of the Moon's poles. Sensible? Well, maybe.

Scūltor contains two magnificent bright galaxies. Many people in the SJAA like to look at NGC 253, at (epoch 1950) $0^{\text{h}}45.1^{\text{m}}$, $s25^{\circ}34'$. This seventh magnitude object is over a third of a degree long and a tenth of a degree wide. It is a barred spiral, though the high inclination of the galaxy to the plane of the sky makes the bar difficult to detect, even on a photograph. The other bright galaxy is NGC 55, at (epoch 1950) $0^{\text{h}}12.5^{\text{m}}$, $s39^{\circ}50'$. NGC 55 is about the same size as NGC 253, and is not quite a magnitude fainter. Both galaxies are plotted on Norton's and on the Skalnate Pleso.

Before Cygnus disappears into the west, take a look at IC 5146, the Cocoon Nebula, at (epoch 1950) $21^{\text{h}}51.3^{\text{m}}$, $n47^{\circ}02'$. This object is a ten arc-minute bright nebula with a few stars in it, which lies at one end of a long streamer of dark nebulosity. The Skalnate Pleso shows both the bright and dark nebulosity, Norton's shows nothing. I have had good views of the bright nebulosity in 8-inch and 16-inch Newtonians. The dark streamer is visible in a 60-millimeter finder.

-- Jay Freeman



I BOUGHT MY CELESTRON 14
BECAUSE
IT WAS CHEAPER THAN A BIG DOBSON

by Jay Freeman

This article is dedicated to Bob Kestner, who told me not to write it.

Now that you are all frothing at the mouth, I will back off and explain that this is really an article about telescope costs in general -- I am using my decision of what telescope to acquire only as an illustrative example. Notwithstanding, the apparently outrageous statement made in the title is in fact true. I will explain it qualitatively, right now, so that the bottom line doesn't get lost in the details to follow.

The problem is that my car is exactly the wrong sort for transporting a large telescope: I have a two-door notchback subcompact, which cannot even enclose a C-14, much less a Dobson telescope of comparable aperture. I was able to find a light-weight enclosed trailer big enough for a C-14 to fit inside, and small enough for my car to tow; but all the enclosed trailers that I could find that were big enough to enclose a (for example) 14-inch f/5 Dobson, were too heavy for my car to haul. (My drives to observing sites go through fog, dew and an occasional winter rainshower -- I want my telescopes to have an inside seat, thank you.)

Therefore, if I had chosen to build a big Dobson, I would have had to buy an additional vehicle -- such as a used van -- to carry it around.

And now for the finances: My C-14, plus goodies, plus trailer, sets me back some \$7,000; which makes me live leaner and hungrier than I would otherwise, because that \$7,000 came out of a money-market certificate where it was earning lots of interest -- about ten percent, after taxes. Now a 14-inch Dobson plus a used van don't cost anywhere near \$7,000, but the van has substantial annual costs for extra gasoline, more maintenance, additional car insurance, and another vehicle license. Furthermore, the van will wear out long before the telescope does, whereupon I'll have to buy another. When all is said and done, the average annual costs are about equal.

In order to display numerical calculations which will elaborate upon the last few paragraphs, I must first discuss how one figures out the average annual cost of buying something expensive, the so-called annual capital cost. My Celestron 14 plus etcetera costs \$7,000 and has a lifetime of something like thirty years: (It will turn out that the exact lifetime matters but little to the numerical results.) Is the annual cost of ownership therefore \$7,000/30, or \$233 per year? No, because as I just mentioned, that money came from an account where it was earning some 10 percent per year, after taxes.

Let's try again. To the \$233 per year we just calculated, let's add \$700 per year (10 percent of \$7,000), to make up for the interest lost. The total is \$933 per year. Is that right? Still no, because as we put money back into our bank account to replace the \$7,000 withdrawn, it starts earning compound interest from the moment it goes in. Once the compound interest correction is made, the average cost of buying a \$7,000 what-have-you, with a 30-year lifetime, when the after-tax interest rate is 10 percent, is \$742.55. I have put the formula whereby this number is obtained in an Appendix -- those of you who have studied certain kinds of business or economics may recognize it.

Now we can proceed. The C-14 has some other costs: I have it insured, at about \$150 per year. I allow \$50 per year for miscellaneous maintenance on it. I am not including my automotive costs when I tow it around in the trailer, because when I get to figuring out the costs for the Dobson, I will merely figure out how much more it costs to run a van than to run my subcompact. Therefore:

Annual costs of Celestron 14:

Cost of capital (\$7,000, 30 years, 10% after taxes)	\$742.55
Insurance	150.00
Miscellaneous maintenance	50.00
	TOTAL: \$942.55

Now for the Dobson-plus-van: A reasonably-made 14-inch Dobson, with finder, eyepieces, and occasional use of commercial hardware for things like focuser and spider, would probably cost about \$700, and would probably last the same nominal 30 years that I assumed for the Celestron. Applying the formula from the Appendix, we obtain an annual cost of \$74.26, for the \$700 that comes from our bank account. The Dobson is probably cheaper to maintain than the C-14: Let's allow \$25 per year for that. Forget the insurance.

But how about the van? Suppose we pick up a used van, in decent condition, for \$3,500; and figure that it will last for 10 years. The formula in the Appendix yields \$569.61 per year as the cost of taking the money to buy the van out of the bank. Licensing it might cost fifty bucks (I'm guessing), and buying additional car insurance for a second car might run \$75 a year (another guess.) Since I would be driving the van to star parties instead of the subcompact, I would save on maintenance costs for the latter vehicle, but I doubt that the savings would pay for the entire maintenance costs for the van -- even if it were sitting on blocks and never driven, metal would rust, water would condense in the oil, and rubber and plastic would rot in the smog and salt air. Let's allow \$100 per year for maintenance. (Note that a van in worse condition would cost less to buy, but would run a greater risk of substantial costs for major maintenance -- a \$1,000 van might not be cheaper to own than a \$3,500 one.)

A van will certainly burn more gasoline than a subcompact, so let's kick in \$100 a year for that. (That's three and a third cents a mile extra for 3,000 miles per year.) All in all, we now have:

Annual costs of Dobson plus van:

Capital cost of Dobson (\$700, 30 years, 10%)	\$74.26
Maintenance of Dobson	25.00
Insurance of Dobson	-
Capital cost of van (\$3,500, 10 years, 10%).....	569.61
Van license.....	50.00
Extra car insurance	75.00
Extra vehicle maintenance.....	100.00
Extra gasoline.....	100.00
	TOTAL \$993.87

And what do you know? A big Dobson does cost more than a Celestron 14.

I suppose I should make a few more comments. First, there is obviously a good deal of uncertainty in all of these costs -- I'm sure I could argue either total a few hundred dollars in either direction -- so the point is that the two totals are more or less the same size. They certainly do not differ by anything like the ratio of purchase costs of the two telescopes by themselves. Second, if I had some other use for a van than hauling telescopes, I could legitimately spread some of that capital cost around. But I am not into "R.V." driving, camping out, or hauling bales of hay.

There is no denying that transporting bulky telescopes is a very expensive proposition. Amateur astronomers should not kid themselves about these costs. How many big "ewtonians have sat idle in the garage because there wasn't enough money to get the truck running to go to the star party?

And on the other side of the coin, there is need for much ingenuity in figuring out ways to make cheap telescopes more compact, and ways to transport bulky telescopes more cheaply. How about a Dobson that breaks apart into short, stubby pieces, perhaps that nest inside one another? How about one whose tube assembly is sufficiently well finished and sealed to cope with road dirt and wet weather when stowed on the roof? How about a clever design for a light trainler? How fast can

a Newtonian be before the coma becomes too great? (A 14-inch f/4 will almost go into my trailer.) How about Jones-Bird optics?

Bob Kestner was wary about this article because he thought it might stimulate rancor between "pro-Dobsonian" and "anti-Dobsonian" amateur astronomers. I hope not, and I fell obliged to point out that I have built two and a half Dobson telescopes (the "half" is one under construction), and have written favorably about them elsewhere.

APPENDIX:

The formula is --

$$\text{annual cost} = \text{Purchase cost} \times \frac{r}{1 - \frac{1}{(1+r)^N}}$$

where:

r is the after-tax interest rate your money gets at the bank, as a decimal fraction (that is, if the interest rate is 10 percent, $r=0.10$)

N is the lifetime of the thing you buy, in years

Thus, for the Celestron 14, purchase cost = \$7,000, $r= 0.10$, and $N= 30$; whereby the formula yields an annual cost of \$742.55.

This last number, incidentally, is precisely what the annual payment would be if you borrowed \$7,000 for thirty years, at ten percent (lucky you!), with one loan payment per year.

WANT ADS

For sale: 8-inch Newtonian with Meade tripod (equatorial mounting). Clock drive, photographic set-up, 60 mm guide scope, 9X30 zoom finder. Mirror 1/20 wave. Excellent condition. \$700. Call Bob Davis at (415) 948-2209 eves.

For sale: Family financial struggle requires a cutback in my hobby. 10" semi REFT (f/ 5.5) w/ fiberglass tube, end rings, 2" focuser, Novak nine point cell, Parks equatorial mount, no motor. \$1,000. mint condition.
2" 32mm Erfle, \$85.
Call Dave Gates at 946-4715 eves.
946-4797 days

For sale: 16" fine annealed Pyrex blank, \$400.00
20" " " " " \$650.00
24" " " " " \$1,000.00
Call Earl Watts at 786-2967

*****QUOTE OF THE MONTH*****

"In the following discussion, the dependence of derived quantities on the extra-galactic distance scale is indicated by the dimensionless Hubble constant $h = H/100 \text{ km s}^{-1} \text{ Mpc}^{-1}$; it is now thought to lie somewhere in the range 0.5 h 1.0"

from The Structure & Evolution of Normal Galaxies
by S.M. Fall & D. Lynden-Bell

Hubble CONSTANT?

The Wil Tirion Sky Atlas 2000.0

Being involved in comet-hunting, I find it necessary to use an accurate, comprehensive, compact, inexpensive and detailed star atlas. It is with joy, then, that I read of this new star atlas in the June issue of Sky and Telescope, whose publishers (Sky Publishing Corp.) are also publishing this atlas. Let me make some comparisons between this atlas and the Skalnate Pleso "Atlas of the Heavens," which I have been using.

The new Wil Tirion Sky Atlas has no "Deluxe Edition". The "Atlas of the Heavens" does, though, and this is a large format, with color symbols and a plastic grid over-lay. But both of the atlases come in both the field edition (white symbols on a black background) and a desk edition (black on white.)

The "Atlas of the Heavens" contains 16 charts, 18" x 12.5" and costs \$9.95. Wil Tirion's atlas contains 26 charts, 18.5" x 13.5" and costs \$14.95. Both cost less in quantity. My field and desk editions of the "Wil Tirion Sky Atlas 2000.0" arrived two weeks after I ordered them.

I was pleased to see that each of the 2500 galaxies, clusters, and nebulae were labeled. This is not true of the older "Atlas of the Heavens", and in the past I have taken hours to label each set of charts. Additionally, the "Sky Atlas" scale is larger by about 40%.

I also found some deep-sky objects on the Sky Atlas which were not on the Skelname Pleso atlas. Not-the-least of them being the planetary nebula NGC 1360, a 9th magnitude object in Fornax which is lacking on most other atlases, but included in "Burnham's Celestial Handbook" and observed by me when comet-hunting. Tirion has done his homework on this!

There are also some 32% more stars on this atlas, as the limiting magnitude is 8.0. This will aid in finding and identifying deep-sky objects in the field. The symbols are crisp and clear.

As the name implies, the atlas is drawn for the epoch (year) 2000, the co-ordinates of each object being slightly different than what the 1950 epoch charts show. This makes little difference to me, since there is no grid over-lay supplied and the scale is too small to get accurate measurements anyway.

One disadvantage is that the dark nebulae are not shown on the "Sky Atlas". Additionally, there are some 25 charts to page through, rather than the 16 in the "Atlas of the Heavens."

One final note: How does the "Sky Atlas" compare with the \$39.95 AAVSO Atlas? Well, it depends upon what one wishes to do. The 178 AAVSO charts are a bit bulky. The AAVSO Atlas contains some 260,000 stars to magnitude 9 and most of the deep-sky objects, lots of variable stars, and star magnitudes listed by some stars. However, the AAVSO Atlas labels very few deep-sky objects; it is probably better for locating deep-sky objects than for identifying them after they are in the scope.

All in all, the "Wil Tirion Sky Atlas 2000" is an element in any amateur astronomer's library, for both "desk" work and for field work.

Don Machholz

On Light Pollution:

fire

"We figured that an earthquake, a flood, and an atomic bomb, in that order, is just what we need to put this valley in shape."

- Jim van Nuland



ASTRONOMICAL SOCIETY OF THE PACIFIC

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VOYAGER 2 SATURN ENCOUNTER PHOTOS AVAILABLE FROM A.S.P.

Prints and slides of the new photographs taken of Saturn, its rings, and its moons by the Voyager 2 spacecraft will be available from the Astronomical Society of the Pacific.

(A worldwide non-profit scientific organization, the A.S.P. works to increase public understanding of astronomy through its publications, resource materials, and public programs.)

The Society is selecting the most interesting views from the thousands returned by the second Voyager spacecraft and offering them in sets of high-quality 8 x 10" prints and 35 mm slides. Clear explanatory notes and a table of results will accompany each set.

For a full description and a price list, (as well as information about the Voyager 1 photos of Saturn and Jupiter), please send a stamped, self-addressed envelope to:

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