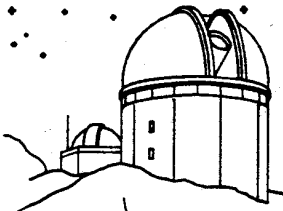
EPHEMERIS

OF THE SAN JOSÉ ASTRONOMICAL ASSOCIATION.



NOVEMBER 1987

NOVEMBER 7TH 8PM
LESLIE WICKMAN
BUILDING THE SPACE STATION
MAINTENANCE AND REFURBISHMENT OF STRUCTURES IN SPACE

NOVEMBER 7 GENERAL MEETING 8 PM LOS GATOS RED CROSS BUILDING. LESLIE WICKMAN, LOCKHEED SPACE STATION.

NOVEMBER 14 BOARD MEETING AT 8 PM, LOS GATOS RED CROSS BUILDING.

NOVEMBER 21 FIELD EXPEDITION FOR ASTRONOMICAL OBSERVATION TO FREMONT PEAK STATE PARK. DUSK TILL DAWN.

NOVEMBER 28 INDOOR STAR PARTY AT THE LOS GATOS RED CROSS BUILDING. DOORS OPEN AT 8 PM.

DECEMBER 5 GENERAL MEETING 8 PM LOS GATOS RED CROSS BUILDING. NASA FILMS NIGHT!

DECEMBER 12 BOARD MEETING AT 8 PM, LOS GATOS RED CROSS BUILDING.

DECEMBER 19 FIELD EXPEDITION FOR ASTRONOMICAL OBSERVATION TO FREMONT PEAK STATE PARK. DUSK TILL DAWN

FIELD OF VIEW
BY: JOHN GLEASON

ASTRONOMY AND TELESCOPE MAKING RENEWALS

It's renewal/signup time for Astromedia publications. If you are receiving either magazine through the SJAA, please contact Jim Van Nuland as soon as possible to continue or drop your subscription.

If you subscribe to Astronomy independently, and your subscription will expire in 1988, you may convert to the club rate. Send a mailing label and $1.17 for each month to complete 1988. If you do not subscribe to Astronomy, send $14 for the 1988 calendar year.

The existing club Telescope Making subscriptions run through number 32, but T.M. is not run on a year basis. You may convert your independent subscription to club rate by sending a mailing label and $7 to extend for 4 issues.

Closing date is November 7 at the General Meeting. Jim Van Nuland can be reached at 408-371-1307 days or evenings until 11:00 pm.

NOVEMBER 7TH GENERAL MEETING

The construction of space structures, in particular the space station, will be the topic of our General Meeting this evening. The SJAA is pleased to have as our guest, Leslie Wickman (Lockheed) who uses an underwater simulator for the maintenance and refurbishment of space structures like the Space Station and Space Telescope. Leslie's responsibility at Lockheed is feasibility studies and projects for the repair and the replacement of components in space. If you have ever dreamed about working in the high frontier, then this program is for you! Be There!

EPHEMERIS CONTRIBUTORS NEEDED

Do you enjoy telling others about astronomy? Have a few observing tips that you would like to share? Bored with life and need something to do on those lonely full Moon nights? If so, how would you like to become a regular contributor to the Ephemeris? Currently I am looking for additional contributors who would be willing to write a regular column around such subjects as; telescope making, observing techniques, equipment reviews, astrophotography, star party reports, and a monthly "what's up" celestial calendar. Your Editor is still looking for a monthly Presidents message as well as news from the Board of Directors regarding information that is of importance to you, the membership. Every month Bob Fingerhut, Jim Van Nuland, Jay Freeman, and Don Machholz have provided you with excellent articles that the Ephemeris has built a reputation upon. The requirements are easy; Each article should be typed, and submitted by the 12th of the month to the editor.

DON MACHHOLZ RECEIVES GREGORY AWARD

The Dr. A.B. Gregory award was presented to Don Machholz at the October SJAA General Meeting. Don is a worthy recipient of this award which is given to SJAA members for outstanding contributions of time and effort to others in amateur astronomy.

Don has been sharing his enthusiasm about comets and observing for many years, not only to the SJAA but with school groups, scout troops, and the news media. His popular column "Comet Comments" appeared in the Ephemeris more than eight years ago and continues to be a vast source of information about comet hunting, and comets that are visible each month. Don is also well known among comet hunting circles as one of the few American amateurs with three comets credited to his discovery.

In 1985 and 1986 Don arranged a Halley's comet observing program at Branham Lane Park that made it possible for hundreds or people to witness this latest appearance of Halley's Comet. Don also gave television interviews, presentations and co-led a group of amateurs to New Zealand to view the spectacle. Don is indeed a worthy recipient of the Dr. A.B. Gregory award. Don, thank you and congratulations.

ART OF THE COSMOS EXHIBIT AT LHS

A collection of over sixty strikingly beautiful artistic depictions of what we now know and what we surmise about the Cosmos will be on exhibit for the first time at the Lawrence Hall of Science, November 21 1987 - February 14, 1988. ART OF THE COSMOS brings together many of the finest artists who have been inspired by the Universe. Among them are official NASA artist Andreas Nottenbohm; Ralph McQuarrie, noted illustrator for the National Commission on Space and for Lucas Films; and Dr. William Hartmann, noted astronomer, artist, and author of several popular books on astronomy.

The exhibit includes realistic or scientifically accurate renderings as well as surrealistic and abstract works. Each piece was inspired by our current understanding of the Universe and selected by a panel of scientists and artists. Many of the paintings depict scenes on other worlds that no spacecraft or telescopes have yet been able to show us. Each painting will be accompanied by a caption explaining the science and inspiration behind the art. The Hall is open Monday - Saturday 10 am - 4:30 pm, Sundays Noon - 5 pm. Admission (including ART OF THE COSMOS) is $2.50 for adults; $1.50 for young people 7-18 years, students, and senior citizens; and free for children under 7 and LHS members. Call (415) 642-5133 for more information about the Hall's exhibits and programs.

A PROGRAM ABOUT EINSTEIN AND HIS WORK

November 7 and 8, astronomer Andrew Fraknoi and phyiscist Alan Freidman will present a special nontechnical program entitled Einstein: The Man and His Legacy. Sponsored by U.C. Berkeley Extension and the Astronomical Society of the Pacific, the program is scheduled from 9 am to 5 pm each day at the Life Sciences room 2000 on the U.C. Berkeley campus. No Science background will be assumed. Both Fraknoi and Friedman have extensive experience in presenting complex scientific topics in clear, everyday language. Topics to be covered include: *Einstein's education, life, and reputation. * Einstein's theories of space time, and relativity. * Einstein and the bomb -- myth and reality. * Black holes and time machines. * New ideas of gravity and the realm within the atom. * Einstein's influence on fiction and music. * Einstein as a symbol of science in our time. The program is open to the public; admission is $75 for the two days, including written materials. For more information and a registration brochure, call U.C. Extension at 415-642-4271.

SHERWOOD HARRINGTON WINS AANC AWARD OF MERIT

Sherwood Harrington, the Education Coordinator of the Astronomical Society of the Pacific, has won the 1987 Award of Merit of the Astronomical Association of Northern California, given each year to a professional astronomer who has made outstanding contributions to fostering amateur astronomy. He is being honored, among other work, for the widely-prased series of slide sets and other educational materials he has developed to allow amateur and professional astronomers to share the excitement of modern astronomical research with the public.

Harrington is the Associate Editor of Mercury, a popular level magazine on astronomy and of The Universe in the Classroom, a newsletter on teaching astronomy in grades 3-12. For five years he was co-author of a nationally syndicated newspaper column on astronomy and has appeared on both radio and television explaining new developments in the field.

Since 1973, he has been instructor of astronomy at City College of San Francisco and served as the first director of the CCSF observatory. He also designed the curricula for several of CCSF's Astronomy courses. He received his undergraduate degree from Amherst College and holds a masters degree in astronomy from the University of California at Berkeley. Harrington is also known among astronomy buffs as the "voice of the A.S.P. Hotline," a 3-minute taped message of new developments in astronomy, which he has written and recorded every week for the past five years. The hotline has received ten of thousands of calls from around the U.S. and can be reached at 415-661-0500.

ASTRO ADS

TELESCOPE: 8" Tinsley Cassagrain with 2" diagonal, 2" focuser, 2" straight through adapter. $500. Call Bob Maraschin Wkdays: 415-960-0964, Eves: 408-253-5477

FOR SALE: 6" f/4 reflector, "RFT". Coulter mirror, equatorial mount, tripod, finder, $250. Also, 2.4" refractor, eyepiece, alt-azimuth mount, no tripod, $45. Contact: Robert Sheaffer, 408-354-5637.

TELESCOPE WINDOWS - optical windows. Add an optical window to your present or future scope for less than the cost of a good eyepiece. Selling out former Sky Research Co. optical windows - hundreds supplied, highest quality - keeps out dirt, dust, insects, drafts, temperature effects. WHILE THEY LAST:

6"	- $ 29.50	14.25"	- $69.50
8"	- 39.50	16"	- 89.50
10"	- 49.50	17.5"	- 124.50
12.5"	- 54.50	18"	- 131.50
13.1"	- 59.50	20"	- 143.50

Some custom sizes available. Window diameter is 3/4" larger than mirror size listed - fits all tubes. Adds a professional finished look to your scope. Send check or money order to: Rolin Gebelein, 291 Martin Rd., Santa Cruz, CA. 95060. Price includes shipping by UPS (continental USA ONLY), handling, and insurance. Please allow 3-4 weeks for check to clear and delivery.

FOR SALE: MEADE 2" focuser with 1.25 adapter, unused, $50.00. Televue 32mm 1.25", $75.00, like new. Contact: Rick Decker, (415) 956-7070 or 383-6339.

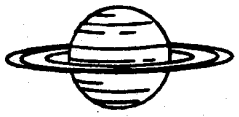
FOR SALE: 5-INCH F/14 REFRACTOR on Super Polaris mounting. With Duel Axis drive corrector. $1200 complete. Contact: Paul Mancuso (408) 946-0738.

REWARD: $200 for information leading to the recovery of ultra-thin (1" thick) 18.75 f/5.6 mirror stolen from my house in Mill Valley on June 23, 1987. Easily identifiable. Contact: Rick Decker, (415) 956-7070 or 383-6339.

NEW: Celestron C-90 spotting scope with accessories. Finderscope - 9mm,6mm and 5mm eyepieces in original boxes. All equipment is in brand new condition, never used. Also Velbon VE3 tripod. $495. Contact: Marvin Altschuler (408) 247-2392.

FOR SALE: 4" Meade telescope. Model 2040A including: 4-inch Schmidt-Cassegrain tube assembly, fork mount with motor drive and 6' power cord, manual slow-motion controls, eyepiece holder for 1.25" OD accessories, 5X24mm viewfinder, table tripod for astronomical observing and photography. Also the following accessories: Porro prism, T-adapter, erecting prism, (2) polorizing lenses, tele extender, T-ring for Olympus 35mm camera, eyepieces (research grade Erfle) 40mm, 20mm, 10mm and 7mm, foam lined carrying case, instructional manual. $900 Contact: George (415) 941-2681

THE CELESTIAL TOURIST SPEAKS
BY: JAY REYNOLDS FREEMAN



I recently moved from Palo Alto back to Santa Cruz, and several months' fussing with house, unpacking and what-not have kept me too busy for my usual column. But I am now pretty well settled, and have been happily enjoying life where the sky is dark enough to do reasonable astronomy from the back yard, so I should now find plenty of write about. Besides, I have a new computer to play with, and that's always an inducement to produce documents.

Considering the professional expertise and technical level of many SJAA members, it is surprising that small computers play no larger role in our hobby. Perhaps one reason is that people interested in astronomy are too much of the numerical aspects of the science, and forget that computers can do other things. After all, much of the history and many of the great breakthroughs of astronomy have stemmed from precise calculations, from the earliest efforts to determine the correct time to plant and harvest, up through the measurement of stellar positions for catalogs, on with the determination of the motion of the planets and finally to the latest cosmological and astrophysical model-fitting. The essence of a great deal of this work is arithmetic computation, but most amateurs have no need to perform such manipulations - most everything is tabulated where the curious can look it up - and few have any special interest in the methods of calculation in their own right.

One possible use of precise calculations might be of wider interest; namely, telescope operation. There are beginning to be commercial products that will point an instrument accurately under microprocessor control, and from time to time we see or read about a home-built example. Yet while today's microcomputers can loaf through real-time spherical trigonometry, precise hardware to drive a telescope or to measure where it is pointing is still esoteric and expensive, and the electronic interfaces between such hardware and home computers are generally custom-built. Thus, for the moment, the construction of computer-controlled telescopes will probably remain a field for only that small group of amateurs who are simultaneously talented with both mechanical and electronic devices.

Fortunately, the use of computers is not limited merely to number-crunching. Even simple home computers are capable of symbolic manipulation of data in a way useful to many amateur astronomers. Take this column, for example. When I started The Celestial Tourist Speaks, six or seven years ago, I wrote it with one of my two old, clattery typewriters. Writing with a mechanical contraption was painful - when I made a big mistake I had to tear up the page and start again. They made opaque "liquid paper" in large economy sizes just so I could correct my errors. And if I wanted to rearrange sentences or paragraphs, no problem - that's what scissors and Scotch tape are for, right?

Wrong. My typewriters have long since been thrown out. For the past several years, The Celestial Tourist Speaks, as well as most everything else I write, has been composed with a word processing program. When I am working with such a piece of software that I know well, I no longer even have to think about changing things and making corrections. My fingers do the work, almost without my noticing it. All I have to think about is what I wish to say. The connection between thoughts and words is much more free and direct.

Not every amateur astronomer will wish to write about the subject, but those of you who do, or who keep a journal, logbook or diary about your hobby, should be using a computer.

Did I say "logbook"? I have two shoeboxes full of observing records of all the celestial objects I have ever toured, one 3 X 5 file card for each, indexed by NGC number or by some other catalog identification. When I started keeping these records I did not own a computer, and as a result this extensive data base is all but useless. If I want to know which globular clusters I was able partially to resolve with my 8-inch Dobson, I have to go through all 2000 cards by hand, looking for globulars, or else laboriously work down a master list of all known globulars in the Milky Way, checking each one to see whether I have observed it. If I had been able to use data-base management software instead of file cards to keep these records, it would be only a moment's work to direct the computer to answer such a question. Even if I had done no more than put the information into a "text file" - a long typed description in machine-readable form - then I could accomplish this example search by letting the computer look for the work "globular" in the file. I doubt I will ever have time or energy to type in all the contents of my file cards. But if you are contemplating keeping an index of your observations, don't repeat my error. Use a computer.

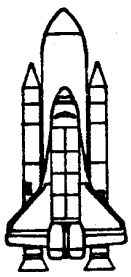
On the other hand, I may not have to copy in my file cards by hand. There are computer accessories call optical scanners that will read a printed page and - with the appropriate software- convert it to a text file. I doubt that any can yet cope with my handwriting, but that time will come.

Meanwhile, the present generation of optical scanners may contribute to amateur astronomy in another way. These gadgets can also scan a picture and convert it to a form that a computer can analyze. Now why is that a good thing?

To listen to the discussions of photographic processing that take place late at indoor star parties, you would think you were at a convocation of witches, bartenders and janitors. "I processed this film with marsh gas, cracked ice and trisodium phosphate." "Fillet of a fenny snake/In the cauldron, boil and bake." Is it any wonder we cannot agree on what color the Orion Nebula is? Chemical processing never seems to come out the same way twice, and there are desirable effects that happen infrequently or not at all. How much better if one could extract all the information on a slide or negative, then do something specific and repeatable with it. (Better still to digitize the image at the focal plane of the telescope, and leave out the photographic film entirely; but to do so requires specialized, expensive, hand-built detectors, whereas optical scanners are commercial products you can buy in a store.) I have worked professionally with computer image processing, and the extra detail that can be pulled out of a digitized image with relatively simple programs is truly amazing.

To be fair, the present generation of inexpensive optical scanners is probably not capable of refined work. These devices do not have enough resolution to capture fine detail, and most of them cannot digitize gray - they can only report a bit of image as either solid black or pure white. Notwithstanding, I suspect that there is interesting astronomical work to be done, perhaps at first with a small blown-up portion of a high-contrast black-and-white picture. There will certainly be better optical scanners in the near future, and now is the time to start figuring out what to do when they become available.

SPACE PROGRAM UPDATE
BY: BOB FINGERHUT



SHUTTLE RECOVERY PROGRAM

The new shuttle solid booster design that was tested in Aug. has now been disassembled and inspected. The hot gasses didn't get any closer to the O-ring seals than 3-inches, making the test a complete success. In Oct. a sub-scale test was conducted with a deliberate defect introduced. That test was also successful.

SPACE STATION PROGRAM

The House appropriations committee recommended the full administration request of $767 million for space station in 1988 but the Senate is expected to appropriate only 558.6 million. The difference will be worked out in a joint congressional committee. NASA wants to award hardware contracts about 15 Nov. but the House appropriations committee may block the awards unless NASA makes the following commitments: 1. Support a free-flying module. 2. Modify one orbiter for extended duration flights. 3. Manifest two spacelab flights dedicated to materials research. 4. Support additional funding for materials science research in 1988. 5. Development of automation and robotics technology on the station. Meetings were held separately with the Europeans and Canada in mid Sept. over building and operating the space station. Agreement was not reached. There are still two major areas of disagreement - military use of the station and the multinational management structure for operations. It was hoped to have agreement before awarding hardware contracts. Defense Secretary Weinberger continues to oppose any restrictions on the use of the space station for military experiments. He maintains that defense requirements must remain the primary concern of U.S. space policy.

EUROPEAN ARIANE RESUMES LAUNCHES

The European commercial booster, Ariane, launched two satellites on 15 Sept. It was the first flight in 15 months. The third stage ignition system was redesigned after a 30 may 1986 failure.

SOVIETS LAUNCH BIOLOGICAL SPACECRAFT

The biological spacecraft was launched on 29 Sept. It carried rats and two monkeys for study and had participation by the U.S., France, Hungary, and East

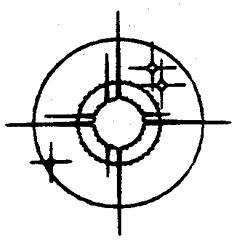
Germany.

SOVIETS TESTING JET-POWERED SPACE SHUTTLE

The Soviets are conducting runway takeoff and landing tests with a jet engine powered version of their space shuttle orbiter. The orbiter was fitted with four 20,000 lb. Lyulka engines so that it could simulate approach and landing profiles it will fly when returning from orbit. Plans are for the first flight to be unmanned but that has not been well received by the Soviet cosmonaut corps.

NEW MODULE TO BE ADDED TO THE MIR SPACE STATION

The new module will be an extravehicular activity (EVA) airlock. It is about the same size as the Kvant astrophysics module that was added earlier this year and weighs 24,250 lbs.



COMET COMMENTS
BY: DON MACHHOLZ

One new comet has been discovered and two returning comets recovered, but all remain faint. However, bright Comet Bradfield reigns in our evening sky, while Comets Borrelly, Rudenko and Wilson are still visible to us. This year we have recovered or discovered more comets (24) than any other year.

Periodic Comet Gehrels 1 (1987v): J. Scotti of Kitt Peak recovered this comet on Aug. 29, when it was a faint mag. 17. It has an orbital period of 15 years, was closest the Sun (3.0 AU) in August, and will not be getting much brighter.

Periodic Comet Helin (1987w): Eleanor Helin discovered this comet on Palomar Sky Survey II plates exposed on Aug. 24. We now know that it is a periodic comet with an orbital period of 14.2 years. It stays outside Mars' orbit, never getting closer to the sun than 2.58 AU. It was discovered at mag. 16, but it is not expected to become much brighter.

Periodic Comet West-Kohoutek-Ikemura (1987x): This comet, which reached perihelion (1.6AU) a few months ago, was recovered on Sept. 27 by J. Scotti. It was then mag. 17 and will be getting fainter from now on. It will be better placed in its next passage in 6.4 years.

EPHEMERIDES

DATE	R.A. (1950)	DEC	ELONG	MAG.	NOTES
			Comet Bradfield (1987s)		
10-22	16h 52.5m	-04° 31'	48°	6.1	This comet has been brighter than
10-27	17h 09.8m	-02° 30'	48°	5.9	predicted with several observers re-
11-01	17h 28.1m	-00° 20'	48°	5.7	porting a tail. It should be an easy
11-06	17h 47.5m	+02° 00'	50°	5.6	binocular object and possibly visible
11-11	18h 08.3m	+04° 30'	51°	5.5	to the naked eye from dark sites.
11-16	18h 30.8m	+07° 07'	53°	5.4	1987s cuts across the Summer Milky
11-21	18h 55.3m	+09° 50'	56°	5.4	Way, setting a little later each nite
11-26	19h 22.1m	+12° 38'	59°	5.5	as seen from the Northern Hemisphere.
12-01	19h 51.4m	+15° 25'	63°	5.6	This is presently our brightest comet
12-06	20h 23.2m	+18° 05'	67°	5.7	and will be in our skies thru March.
			Comet Rudenko (1987u)		
10-22	11h 39.8m	+03° 01'	33°	7.3	Comet Rudenko is now in the morning
10-27	11h 30.1m	-02° 56'	39°	7.4	sky, moving rapidly south. Northern
11-01	11h 20.6m	-09° 49'	44°	7.6	Hemisphere observers will lose it by
11-06	11h 10.7m	-17° 39'	50°	7.9	Thanksgiving. It will then continue
11-11	10h 59.6m	-26° 23'	56°	8.1	to dim as it nearly reaches the South
11-16	10h 45.8m	-35° 48'	62°	8.4	Pole. It then loops north, but it
11-21	10h 27.5m	-45° 30'	68°	8.7	will be at least mag. 13 by time it
11-26	10h 01.2m	-54° 50'	73°	9.0	pops above our S. horizon in Jan.

Periodic Comet Borrelly (1987p)

10-22	03h 34.8m	-38° 14'	125°	10.4	This comet is running fainter than
10-27	03h 30.2m	-37° 30'	126°	10.2	expected and the magnitude estimates
11-01	03h 24.2m	-36° 19'	128°	10.0	reflect this. It will be closest the
11-06	03h 17.2m	-34° 35'	129°	9.9	earth on Dec. 8 (0.48 AU) so it will
11-11	03h 09.3m	-32° 15'	131°	9.7	appear large and diffuse. It's mov-
11-16	03h 01.1m	-29° 14'	132°	9.5	ing northward from the galaxy-ridden
11-21	02h 52.8m	-25° 29'	133°	9.4	area into rather a barren part of the
11-26	02h 44.9m	-21° 01'	134°	9.3	sky. Comet 1987p will be up nearly
12-01	02h 37.8m	-15° 53'	134°	9.2	all night long, reaching its highest
12-06	02h 31.8m	-10° 15'	134°	9.2	point shortly before midnight.

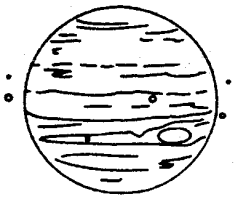
SEEKING COMETS

Do comets come to the inner solar system evenly from all directions, or are there "families" or "groups" of comets?

First, there have been "pairs" of comets, usually caused by a comet splitting. This seems to happen to about 2-4% of all comets, the result being a major component which survives and a minor part that fades away. Often the major part is brighter than the parent comet, this is believed to be due to fresh material being exposed to the sun after breakup.

Secondly, many periodic comets belong to the "Jupiter Family" These travel in a direct orbit, have an inclination of about 8 degrees, and complete one revolution in less than 20 years. There are over 100 comets in this family (three are mentioned in the first half of this article) and they get this way from close passages with Jupiter. Most of the periodic comets now being discovered belong in this family.

Finally, as for other groups, none are apparent except for the Kreutz Sungrazings, which we'll discuss next month.



GREAT RED SPOT
BY: JIM VAN NULAND

Discovery of Jupiter's Great Red Spot is credited to Giovanni Domenico Cassini in 1665, through there are drawings with possible indications as early as 1635. It gained general attention in 1878, when some observers considered it a new find! Simon Newcomb, writing in 1902, stated that the Spot appeared about 1878 and faded gradually, and that after 1892 it was faint or absent. He makes no mention of earlier sightings.

There are other red and white spots that appear for a few months at a time, but only the Great Spot remains. Its motion in both longitude and latitude is somewhat erratic, making 3-year predictions impractical, and that's why you don't see an ephemeris for it in the astronomical almanacs. I continue tracking during Jupiter season, adjusting the Spot equation as needed to follow the changing motion of the Spot.

The predictions are corrected for the changing aspect, phase, and light-time. At the given times, the Spot will be facing directly toward Earth, and thus will appear central on the apparent disk of the planet. Observations may be made for about an hour before and after that time. The times are given in local time, and include transits for which the planet is at least 1 hour up, with the Sun at least 3 degrees down. A random amount from 0 to 10 minutes has been subtracted, to prevent anticipation when timing a transit. It is useful to know that the Spot moves its own length in about 30-40 minutes.

To see Jupiter's Great Red Spot, good seeing and about 100-200 power are needed. Begin half an hour before the given time. Try an apodizing screen if you have one; you might also experiment with colored filters, perhaps yellow, blue or green. A neutral-density filter will help, too. In the past, the Spot has been seen well with a 60mm refractor, and with present conditions I was able to discern it with a 76mm at about 165x. Focus carefully, then look eastward along the south edge of the southern equatorial belt, seeking a dent where the belt narrows to perhaps 2/3 of its width. Now, watch continuously for those moments when the air is especially stable, and the Spot will pop out at you! Let me know of your results, especially if you are using an instrument smaller than 8 inches, or if you do some experimentation with observing aids.

I was able to recover the Great Red Spot on July 26, for Marquette, Michigan, 181 days since I'd last timed the Spot. Although the sky was clear, seeing varied from only fair with moments of good; the latter revealed a slightly yellowish Spot, pushed about a third of its width into the southern edge of the South equatorial Belt. The south Temperate zone is still white, and the Spot shows well against it during moments of best seeing. This is similar to last year, maybe a little better, so, as before, excellent seeing will be needed. (Editor: The Red Spot was easy at 100x in a 55mm fluorite refractor.)

At the most recent observations, the Great Red Spot seemed larger than usual. Jupiter was at its largest (49.7" in mid-October) and in addition, the Spot has grown, as evidenced by its taking longer than usual to pass the central meridian of the planet -- 40 minutes, rather than 30.

At the tabular times, the Spot faces directly toward Earth, and thus appears central on the apparent disk of the planet. Observations may be made for about an hour before and after that time.

Try various magnifications, starting perhaps with 150. Can you see the Spot at lower powers? Higher? Try various filters. Let me know of your results, especially if you are using an instrument smaller than 8-inches, or if you do some experimentation with observing aids. Clear Skies!

Great Red Spot on Meridian PST

da	mo	d	h	m		da	mo	d	h	m		da	mo	d	h	m	
Sa	10	31	11	16	pm	Su	11	15	0	57	am	F	11	27	8	40	pm
Su	11	1	7	8	pm	Su	11	15	8	44	pm	Su	11	29	10	14	pm
Tu	11	3	0	57	am	Tu	11	17	2	32	am	M	11	30	6	6	pm
Tu	11	3	8	47	pm	Tu	11	17	10	18	pm	Tu	12	1	11	55	pm
Th	11	5	2	40	am	W	11	18	6	10	pm	W	12	2	7	49	pm
Th	11	5	10	26	pm	Th	11	19	11	59	pm	F	12	4	1	32	am
F	11	6	6	19	pm	F	11	20	7	53	pm	F	12	4	9	27	pm
Su	11	8	0	9	am	Su	11	22	1	37	am	Sa	12	5	5	14	pm
Su	11	8	8	1	pm	Su	11	22	9	28	pm	Su	12	6	11	1	pm
Tu	11	10	1	50	am	M	11	23	5	20	pm	M	12	7	6	53	pm
Tu	11	10	9	37	pm	Tu	11	24	11	10	pm	W	12	9	0	36	am
Th	11	12	11	15	pm	W	11	25	7	4	pm	W	12	9	8	35	pm
F	11	13	7	1	pm	F	11	27	0	41	am	F	12	11	10	11	pm

COMPUTER CONTROLLED TELESCOPE REVISITED
A PRODUCT EVALUATION BY JOHN GLEASON

Last year I had the opportunity to test a prototype version of Celestron's Computer Controlled Telescope (CCT). Many SJAA members can probably remember reading about it in the November '86 Ephemeris. After spending an entire evening with this revolutionary telescope accessory, I wrote an extensive evaluation covering the operation of the equipment. Now a year later, I own a Celestron 11 version called the COMPUSTAR.

For those of you who are unfamiliar with the computer controlled telescope, here is what the Compustar is all about. The entire concept is an electro-mechanical mating of a microprocessor and high speed stepping motors to the Right Ascension and Declination axis' of the Celestron fork mounted telescopes. Programmed into the microprocessor are three built-in catalogues containing more than 8000 astronomical objects. 7800 non-stellar astronomical objects, all Messier catalog objects, and 100 double and multiple stars. All of this information is displayed in the form of numeric digits and various backlit messages from a small, plastic 7"X9"X2" enclosure that contains two rows of keypads corresponding to various levels of commands for each key.

More than just a digital setting circle showing RA and DEC; object information is displayed in the form of object type, object magnitude, and object size. There is even an object quality rating from unknown (?) to SUPERB! The quality of these observations were determined originally with a Celestron 14 at dark sky sites around the world. There are even more functions too numerous to list here covering everything from telescope speed and direction, to objects within

a 15 arc-minute field of view.

In operation you simply enter the NGC or M number of the object desired, and the telescope will slew automatically via the stepping motor. Average slewing time is around 10-seconds depending of course upon the position of the object in the sky in relation to the original position of the telescope.

The entire Compustar package consists of the display module, a power supply, and the motors and worm gears to drive the mounting. The entire package less the telescope will cost you around $2500. It cannot be connected to other types of mountings.

In my last evaluation I mentioned a few design flaws that were a real nuisance during the CCT's operation. First was an extremely noisy muffin fan that was used to cool off components in the power supply box. The power supply is a separate unit containing all of the stepper motor driver components and connects directly to the microprocessor via RS-232 cable. The production version, I am happy to say, is very quiet with the fan barely noticeable during operation. The power supply puts out a fair amount of heat so you are advised to keep the fan exhaust away from the telescope if you are attempting high resolution planetary observing. The Compustar still guzzles power to the tune of 10 Amps/Hr. Still, this is far better than the 18 Amps/Hr that I had originally reported. While an AC converter would provide you with unlimited power in a permanent observatory, for the remote observing session, DC power will still be at a premium. Fortunately I happened upon a 105 Amp/Hr deep cycle battery at the Price Club for a paltry $46. Compare that to Sears at over $90. Such a deal! This battery will get me through several 5 hour observing sessions before recharge becomes a necessity. This has proved to be more than enough power for weekend and star party use, as you are capable of looking at so many objects in such a short period of time. After 4 hours and 400 objects, you are exhausted!

Another problem was with the tiny keypad display numbers. Users always found themselves straining to read the 3mm illuminated digits. Numbers that you needed to use continually when entering data into the computer. This was solved by a 3-times enlargement and a little photo-lithography by Tom Parker to the original keyboard overlay. I am still not certain if this new overlay will be used in future units, let's hope so because it certainly solved the eyestrain problem.

Brightness of the entire display remains a source of distraction during an evenings observation. The observer either has to cover up the entire unit, or you will need to make an additional filter to dim the display. I have experienced a loss of night vision every time I have used the telescope at a dark sky site.

One major problem remains that I only touched upon in the original evaluation. At 1000X I had reported seeing a "pulse" in the RA drive motor. Not only is this pulse visible with powers as low as 100X, it is also audible as a change of pitch in the RA drive motor every second. This obviously has something to do with the micro-stepping that the RA motor must perform in order to maintain an accurate sidereal drive rate. The 1-second pulse is coarse enough to be a real concern for those amateurs interested in anything other than prime focus photography. Projection photography with eyepieces is out of the question due to the enlargement of the pulsating image. The length of exposure required in these application will cause the image to be slightly blurred. It's more than just a little annoying when observing the planets under high magnification too. I know that this pulse existed before I purchased the CCT. The severity of the pulse convinced me to convert a Celestron 11, and to save the Celestron 14 for serious deep sky observing, lunar and planetary work. This is a major drawback that I am sure most, if not all potential buyers are unaware of. At this time there is no known fix to the problem, other than trying to replace the existing RA stepper motor with one specifically designed to handle the high rate of micro-stepping.

Finally, other than changing the gauge and length of the DC power cord, no other modifications have been made to the original unit. The cord was changed because I was continually getting a low battery indication from the computer display.

Does the Compustar meet my expectation? Is it a viable piece of equipment for today's amateur astronomer? And what about the C.A.T.?

To answer the first question, I can only say that it is very easy to get spoiled using the Compustar. On a full Moon night from my townhouse in the city, I observed more deep sky objects in 1 hour than I had in the previous 3 months. This is not to say that I could not have found them manually but I doubt if I would have even attempted a search for planetary nebulae brighter

than 12th magnitude under a full Moon at anytime or anywhere. The computer made it all too easy.

After spending 15 minutes performing the polar alignment program, I began entering NGC's of various and sundry objects that I knew were hidden in the sky glow overhead. I was actually quite surprised as to how accurately the telescope found each object over and over again. The telescope had never been this accurate using the setting circles manually! So as far as hunting down and finding objects, the telescope performed flawlessly. The best part was programming the computer to look for only planetary nebulae that were rated very good to superb, and higher than 40 degrees above the horizon. A pause of 20 seconds was set and the slew key was pressed. With a beep, the telescope moved from object to object, pausing for for a 20 second observation each time.

The second question; is a computer controlled telescope a viable piece of equipment? For some amateur astronomers, it will certainly change the way they observe the stars forever. For others it will simply be just another example of the computer age creeping into the very subtle and personal art of hunting down deep sky objects yourself. Observers like Gerry Rattley, Earl Watts, and John Hile all possess unique abilities of tracking down illusive deep sky objects with a certain personal satisfaction and accuracy that goes well beyond the whirring and buzzing of an electro-mechanical device.

The Compustar will certainly overwhelm the beginning amateur astronomer, who really needs to learn the basics of observing, taking time to uncover the secret pleasures and hidden treasures of the night sky. Just as the planetarium has not replaced the night sky, the computer controlled telescope will not replace the dedicated deep sky observer. The Compustar is simply a tool. A third hand for those who wish to seriously discover the sky with a limited time to do it in.

The Compustar will also be especially attractive to the astronomy educator with a large class in observational astronomy. Finally, for many of us who own a Compustar, including myself, the unit remains only an amusement for the entertainment of neighbors and friends. It is not going to help me do astrophotography any better, and as I have already indicated, there are photographic limitations due to the stepper drive.

Since the introduction of the Compustar, another computer related accessory has appeared on the market. The C.A.T., standing for Computer Aided Telescope is an add-on accessory that is virtually identical to the Compustar. Little wonder since the C.A.T. was designed by Mike Simmons, the originator of the Celestron CCT. The only difference is that the C.A.T. operates without the electric motors.

The C.A.T. interfaces to most fork mounted telescopes using a set of pulleys and belts, connected to a pair of optical encoders. I have not thought of the C.A.T. as a competitor of the Compustar, but more as an alternative. The C.A.T. display is modified to provide the user with an illuminated "cross" pointing guide, that allows you to manually acquire an object when the illuminated LED's converge at the cross intersection.

There is one big advantage that the C.A.T. has over all Compustar telescopes. The C.A.T. can be switched from one fork mounted telescope to the next by simply changing the set of pulleys and belts for a particular fork mounting. The Compustar electronics are changeable between scopes, but the extensive mechanical modifications are not. Once modified to accept the DC stepper motors and worm gears, your telescope will be slave to the modification for as long as you own it.

You would think that without the electric motors and power supply the C.A.T. would be inexpensive. Not often right, but wrong again! Effective December 1st the C.A.T. price will be $1995! Add that to your $1700 8-inch Schmidt Cass! By comparison, the most recent dealer price from Orion Telescope Center puts the Celestron Compustar 8 at $3333. Add tripod and wedge to the Compustar, and you'll find that both systems are nearly equal in total price. For a few dollars more, you could own a 5-inch fluorite refractor of exceptional optical quality, and hope that there will be cheaper computer systems in the future. (Watch for something new coming from Japan.)

To conclude, the Compustar has exceeded my own high expectations. It works! But as I said earlier, it remains only an amusement. I have been very careful not to let it replace the deep sky observing skills that I have so painstakingly learned in my lifetime. For those who have the "I wants" and are ready to purchase a Compustar or a C.A.T., I offer the same simple advice.

SJAA MEETING AND STAR PARTY LOCATIONS

GENERAL MEETINGS

Once a month the SJAA holds a General Meeting at the Los Gatos Red Cross building in Los Gatos California. Speakers are invited to give talks on a wide range of astronomical topics which have included equipment and slide presentations. This is also the location for the SJAA's famous "Indoor Star Parties", informal sessions where members gather to share their astronomical interests. Whatever your interest, astrophotography, deep sky observation, telescope making, or just arm chair observing, you'll find a friendly atmosphere at all of our meetings.

The Red Cross building is located at 18011 Los Gatos - Saratoga Rd. From Hwy. 17 take the Hwy. 9 (Saratoga) exit and continue West up the Los Gatos - Saratoga Road for about 1.5 miles. Turn right at Rose Ave. Then turn right immediately into the parking lot of the Post Office and Red Cross building. Doors open at 7:45 PM, with General Meetings usually beginning at 8 PM.

INDOOR STAR PARTIES

Each month there are several Saturday evenings set aside for informal gatherings of amateur astronomers to share their common interest in astronomy, to "talk shop", or to simply enjoy the company of friends. Members are encouraged to bring in telescopes and accessories to share with the group. Typically there will be several telescopes operating in the parking lot or there will be a slide show of recent astrophotography and star party events in progress in the meeting hall. The SJAA also holds its Board Meetings during this time as well as an Introductory Astronomy workshop that is conducted once a month.

FIELD EXPEDITIONS

On the Saturdays closest to the New Moon, The SJAA will conduct a "Star Party" for astronomical observation at a designated location. Several times a year these star parties are held close to San Jose while others are held as far away as Yosemite National Park. Watch the EPHEMERIS for directions to these locations.

FREMONT PEAK STATE PARK

The most popular of locations for bay area amateur astronomers is Fremont Peak State Park. Located 70 miles south near the town of San Juan Bautista, Fremont Peak rises nearly 3000 ft. above the valley. For two decades amateurs have gathered at the "Peak" during New Moon weekends for serious deep sky observing and astrophotography. Fremont Peak is now the home of the Fremont Peak Observatory Association's 30-inch telescope that is open to the public on selected weekends. To get to Fremont Peak from San Jose, take Hwy. 101 South towards Salinas. Then take Hwy. 156 East (San Juan Bautista exit) for two miles to a yellow flashing light. Turn right and go about 1/4 mile to where the road reaches a "Y". Stay left for about 25 yards and then go right. (Watch closely for the Fremont Peak sign). Follow the canyon road for about 11 miles up and into the park. The SJAA sets up in the Coulter Camp area. It's visible on your right as you first drive into the main area of the park. Expect to find a lot of astronomical activity here every clear New Moon weekend. Arrive early if you are setting up equipment. 50 to 100 telescopes are not uncommon at Fremont Peak during the summer months.

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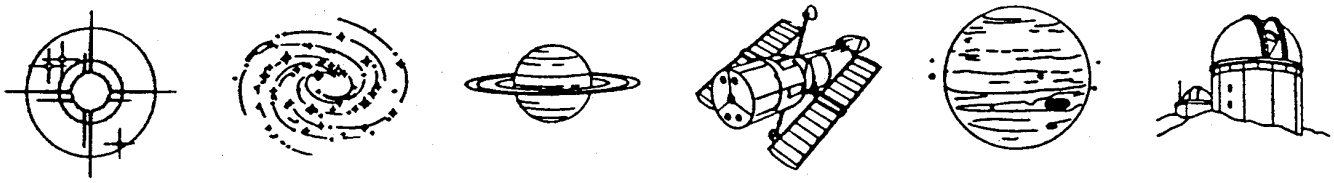

SAN JOSE ASTRONOMICAL ASSOCIATION MEMBERSHIP APPLICATION

MEMBERSHIP ONLY: $ 10 MEMBERSHIP/S&T: $ 24.00 JUNIOR (UNDER 18): $ 17.00

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San Jose Astronomical Association
1840 Yosemite Dr.
Milpitas, CA. 95035

[Phone: (408) 262-1457]

Please check type of membership and if new or renewal.

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Junior (Under 18)____

New____ Renewal____

Questionnaire (optional)

What are your astronomical interests (e.g. astrophotography, deep-sky observation, telescope making, etc.)? _____

_____

_____

_____

Do you own a telescope? _____ If so, what kind?

_____

Is there any specific area of astronomy that you feel qualified to help others with? _____

_____

_____

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