the san jose astronomical association

SJAA

December 1981

Dec. 4 Space Telescope Tour at Lockheed. Reservations have closed; if you missed out this time, there MAY be another chance in the future. NO CAMERAS OR TAPE RECORDERS ALLOWED.

Dec. 5 SJAA General Meeting at De Anza College. Allan Meyer, staff astronomer on the Kuiper Astrophysical Observatory, will tell us what's new with the KAO. 8:00 pm. Room S-34, across from the planetarium.

Dec. 12 Indoor Star Party at the Los Gatos Red Cross. Norm Neinchel will give a demonstration of cold-camera astrophotography; see what <u>really</u> goes on inside those lightproof changing bags. Also: Steve Greenberg's slides of the second launch of Columbia. Bring any slides <u>you'd</u> like to share. 7:30 pm on.

Dec. 18 Board meeting at Steve and Patty's, 1272 Mills St., Apt. 1, Menlo Park. (Yes, finally!!) Mills is between Oak Grove and Glenwood, just east of the train tracks. 326-8614 for directions. THIS IS A CHANGE FROM THE PREVIOUS BULLETIN.

Dec. 19 No scheduled club activity.

Dec. 26 No-host star party at Fremont Peak State Park.

Jan. 2 Indoor Star Party at the Los Gatos Red Cross; 7:30 pm on. Bring those newly-received telescopes for a parking lot star party! Bring any other new astro-goodies, also.

Jan. 9 General Meeting, Room S-34 at De Anza College. Ernie Piini will discuss his tour of the USSR last summer, especially including the total solar eclipse.

Jan. 15 Board meeting at Frank Dibbell's, 710 Georgia Ave., Sunnyvale; 733-7208.

Jan. 16 Star Party at Sanborn Canyon County Park. If the weather is bad, we'll have an Indoor Star Party at the Los Gatos Red Cross instead.

Jan. 23 Star Party at Henry Coe State Park.

Jan. 30 Indoor Star Party. More details in the January Bulletin.

SAN JOSE ASTRONOMICAL ASSOCIATION
3509 Calico Avenue, San Jose, CA 95124

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Membership rates: Adult $18/yr; Junior (under 12) $12/yr; includes <u>Sky & Telescope</u>. SJAA <u>Bulletin</u> subscription for non-members: $7/yr.

Observations

GREETINGS!

Denni Frerichs, being no fool, has found TWO people to replace the one of her as Bulletin editor. (She may know something we don't.) We are, in reverse alphabetical order, Patty Winter and Steve Greenberg. Yes, you will see some changes in the Bulletin, and yes, we would like to hear your suggestions. And yes, it's going to be difficult to top the quality of the past few months' issues--they've been terrific, Denni!

The official mailing address for all Bulletin material (including address changes)is:

P.O. Box 262
Menlo Park,
Ca 94025

That is Stephen's box, and is a much better receiving place for mail than our home address.

Please have all material for the January issue in to us by December 20th. (And thank you to all our regular contributors for meeting our rather early deadline this month.)

SJAA MEMBER ROSTER: will be included in the January Bulletin. This means that NOW is the time to send us any address/phone/name corrections.

Speaking of which...Shea Pratt's address was given incorrectly last month. All membership renewals should go to her at 474 Safari Drive, San Jose 95123.

INDOOR STAR PARTY CHANGES: Jack Zeiders, Bob Fingerhut, and Frank Dibbell are reorganizing the format of the ISPs to make them more interesting and useful. Jim van Nuland reports from the November board meeting on the first batch of changes:

1) Name tags will be available at the door. Please use them, and if you are an SJAA board member or officer, indicate so.
2) The mirror-making class will run from 8pm to 9pm. You can keep going on your own as late as you like, but now you can be assured you'll have help during that time.
3) A short formal meeting will be called at 9pm. People having slides, equipment, etc. to show should mention so at this time. The group can then subdivide into front and back room activities.

We especially want to encourage you to bring slides to the ISPs: latest astrophotos, Shuttle landings, eclipses, etc.
If possible, please bring a projector; we can't guarantee there will be one there any given night.

Stay tuned for further reports on club changes after Jack Zeiders completes his survey of SJAA members.

TELESCOPES FOR SALE: 4" Meade 1020 Schmidt-Cassegrain spotting 'scope with Meade German equatorial mount. $400 the set. 5" RFT refractor (Jaegers coated achromat) on Meade German equatorial mount. Choice of one eyepiece. $475. Jim Molinari: (408) 255-7030 (h); (408) 727-0749 (w). Celestron 11. Brand new with special coating, wedge, tripod, dual-axis drive corrector. Celestron re-did the optics, so they are very good. Asking $3300 plus transportation costs. Paul Maxson, Saguaro Astronomy Club, 8839 North 30th Avenue, Phoenix, AZ 85021; (602) 995-5164.

Jim Pollack of NASA: "There's no evidence of life anywhere else in the solar system."

Ken Wilson: "Well, on Titan on Saturday nights there's a little bit of life."

occulting zone

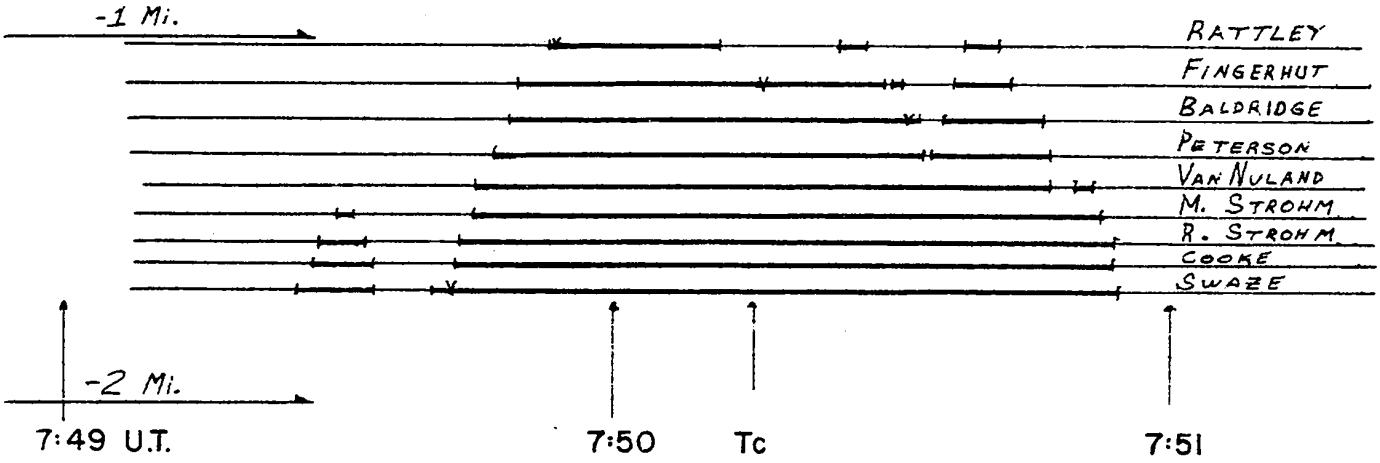
FINAL REPORT

As promised in the Occulting Zone in November, here are the results of the Oct. 19 graze at Los Banos, Calif.

Nine observers obtained 45 timings, plotted below. Due to tape trouble, Jan Smith and Jim Burrous did not obtain timings. Paul Barton and Brian White, north of everybody, did not observe due to telescope troubles.

In the diagram, each observer's position is shown as a horizontal line. The line is bold when the star was occulted. Flashes are shown as marks atop the line. The unlabeled arrow, right of 7:50, marks the mid-time.

One mile on the vertical scale corresponds to 0.53 miles of elevation on the moon. One minute of time horizontally corresponds to about 70 miles, so the vertical exaggeration is about 87 to 1.



At the left is seen a secondary peak, separated by a large valley. The main peak then rises sharply, with a tiny bump caught by Swaze as a blink.

The peak starts to level off at Rattley's level, as shown by the flurry at the beginning. The broad shallow valley is barely caught by Fingerhut's flash at mid-time. After the intermediate peak comes a deep narrow valley, extending below Peterson. After the final peak the shoulder drops sharply, interrupted by a small feature at Van Nuland's level.

The predicted profile fitted only loosely; none of the details seen here appear on the prediction. It appears that the moon passed about 0.3 mi. north of the expected position.

PRELIMINARY REPORT -- NOVEMBER 15

The Nov. 15 graze at Greenfield was a partial success. Though the expedition was officially cancelled, Gerry Rattley and Bill Cooke insisted on going to see the rain. They were joined by Phil Hermsmeyer and Brad Carlson, who drove up from San Luis Obispo. Against all "expert" weather forecasts, the sky was partly clear and they obtained several timings despite passing clouds during the observing run. Low clouds closed in only 15 minutes after last contact.

Preliminary reports indicate a northward shift of perhaps half a mile.

Jim Van Nuland, (408) 371-1307
3509 Calico Ave., San Jose 95124

BEING SAFE FROM THE LUNATICS WHILE OBSERVING

(I wish to spend some time discussing personal safety while observing the heavens, as this subject seems to be of concern to some SJAA members. This is not a full treatment of the subject, but rather a few points that I've picked up from some 800 observing sessions in the Santa Cruz Mountains over the past five years. This month's column discusses strange people.)

I am often asked: "Is it really safe to be up in the Santa Cruz Mountains, or on Loma Prieta at night?" These questions and the concern they reflect are valid, as the Santa Cruz Mountains have a reputation similar to the Black Hills of South Dakota. It's not so much that a lot of crime takes place up there, but it has become an "unofficial graveyard" for victims of crimes taking place in the valley.

In all the time I've spent there, I have felt threatened only once. I was observing with a fellow astronomer who was photographing the sky. We were set up along the dirt road, and along comes a car with its bright lights on. My friend began yelling at these guys to turn off their lights — Mistake # 1. They didn't respond. (They wanted to see what he was doing.) So, he yelled louder, and used a few vulgarities to get his point across — Mistake # 2. This angered them, so they pulled up alongside us and asked him if he wanted to fight. (There were about four of them.) At that point he started apologizing (as intently as he had been yelling at them) and they withdrew their offer to fight. All of that could have been avoided if my friend had asked them politely in the first place, rather than demanding.

Setting up on a dirt road, as I do, I don't run into too many people. About 20% of the weekday mornings (midnight to twilight) no one will pass by on that road. However, on weekend evenings there is a bit more traffic. Some 25% of the people stop to say "hello", and ask me if I'm "looking at the stars, or something". I reply that I am, and take it from there. Sometimes, people are waiting to be invited to look through the scope. Other times they'll ask to look through it. Since I'm comet hunting, I'll just show them the field of view that I presently have, and then point out a few constellations, the Milky Way (many people can't see this from their homes) and any planets or other objects of interest. Most people will say "thank you", and then leave. Some will stay and talk for a while. I've seen some SJAA members really go to town and give them a full-fledged celestial tour. This is good, too, if you both have the time. I have found that most people prefer to look at star clusters, the moon, and the planets — they have trouble seeing most galaxies and nebulas through the telescope.

Keep in mind that most people are apprehensive when they drive around a corner, and see you there with telescope and assorted equipment. They don't know (a) if you're the property owner who'll chase them off, (b) if there are more than one of you, or (c) if <u>you</u> are armed and dangerous. (I know of some amateur astronomers who keep a firearm in their car or on their person. Remember, there are advantages and disadvantages to this course of action. At the worst one would not want to be overpowered and shot with one's own gun! On the other hand there might come a time when it could be "needed". But, I have yet to see such a time, at least in my situation.)

Let me summarize all of this into a few key points.

(1) Remember that you have the upper hand, in most cases. You know the area better, and others will have some apprehension about <u>you</u>. (2) Pick an observing site where you are not completely isolated. <u>Some</u> traffic, or at least the potential that a car may come by at any minute, can prevent someone from bothering you. (3) Wear a heavy jacket with pockets, or some type of heavy clothes. This will prevent people from seeing immediately that you are unarmed, or a "95-lb. weakling". (Keeping one hand in a pocket will also help.) (4) Be outwardly friendly when people approach you. Initiate conversation. (A lot of people driving up to the mountains are lonely.) (5) Know the location of the nearest phone and police or sheriff's department. (6) Observe in groups. (7) Let a responsible person know where and for how long you plan to be observing, and stick to

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COMET COMMENTS 10-20-81
(Updated 11-14-81)

(Comet Comments was not in the last bulletin because it never made it through the mail to editor Denni. She tried calling me to get the column over the phone, but I was never home. So, I have updated the article, and here it is.)

No new comets have been discovered these past two months, but we do have a mysterious observation of a possible comet, and a recent report of a comet striking the sun.

Possible Comet Stattmayer. On Sept. 6, the Smithsonian Astrophysical Observatory received word from Peter Stattmayer of W. Germany that he had discovered a comet of magnitude 13 superimposed on M 33. Two days later, the SAO received two photos from him showing the comet on Sept. 6. It had a short tail and was moving north-north east. It was at first thought that Dr. Edgar Everhart had conducted a visual search on Sept. 7 and found nothing, but apparently poor weather prevented the search. However, on Sept. 12, C. Y. Shao of Harvard took a photo of this area, and although it showed stars to magnitude 14 (it was in strong moonlight), there was no comet visible. It has yet to be confirmed, and at this late time probably won't be.

So, what could this object have been? It could have been a photographic flaw of some sort. Or, it could have been a comet that flared and then faded. It could possibly be a hoax of some sort, but the SAO is not likely to press such a charge.

Probable Sun-grazing Comet. It was recently announced that in Aug. 1979, the satellite P78-1 observed a comet near the sun. The head was "somewhat brighter than Venus", and a bright tail was also visible. It was followed closely for about two hours as it neared the sun. Soon only the tail was visible, then nothing. There have been no reports of any other observations of this comet.

Dr. Brian Marsden of the SAO suggests that this comet had a retrograde orbit, and might have belonged to the Kreutz Sungrazing Family of comets. This family contains about 8 to 12 known comets. All have about the same orbit, and sweep very close to the sun before going back into space. Their orbital periods range from 512 to a few thousand years. This comet never did have a chance to return into space. If it had been a member of the Kreutz family, its approach would have been from behind the sun (as seen from earth) and that's why it wasn't observed visually.

This is the first instance of a comet being discovered by a satellite. Additionally, this is the first known case of a comet hitting the sun, although there is some possibility that comets in 1887 and 1945 did the same thing. Probably the only thing left was a puff of steam. Perhaps it should be nicknamed "Icarus".

Great Comets. The Great Comet of 1882 was discovered by many people at the same time on Sept. 1, 1882. This comet swept very close to the sun on Sept. 17. At mag. -4 and 30 degrees from the sun in the predawn sky at discovery, it whipped around the sun and back into the predawn sky again.

This comet is a member of the Kreutz Sungrazing Family, and one of the first comets to be well-photographed. It is also one of the two comets (the other being Halley's) ever to be "seen" transiting the sun. On Sept. 17, 1882, it was observed up to the very edge of the sun's disk. It then disappeared, only to re-appear on the other side of the sun. (Comets are such "nothings"!) It later broke into four parts. The main part is due back in the year 2641.

Near Volcano, California, on a hill known as "Daffodil Hill", sits a California State Historical Marker. It marks the site of the first astronomical observatory in California, and further states that "in 1882 a comet was discovered from here". Now, as the saying goes, you know the rest of the story.

Don Macholz
(408) 448-7077

Editor's Note.

The delay in reporting the collision of Aug. 31, 1979, was due to the fact that satellite P78-1 was performing a classified mission. It was not until late August, 1981 that the photos showing the event were declassified. The December issue of Discover magazine has published two of them.

--S.G.

SPACE PROGRAM UPDATES
by Bob Fingerhut

Hot gases surrounding Saturn detected by Voyager:

A region surrounding Saturn containing plasma at temperatures of from 600 million to 1 billion degrees Fahrenheit--the hottest gases ever observed in the solar system--has been discovered in Voyager 2 data. The density of the gas is about 30 particles per cubic foot.

Deputy Director named for Space Telescope:

Dr. John M. Teem, an astronomer at Kitt Peak National Observatory since 1970, has been appointed Deputy Director of the Space Telescope Science Institute in Baltimore.

NASA resignation:

Dr. Anthony J. Calio, Associate Administrator for NASA's Office of Space and Terrestrial Applications, is expected to resign shortly to become Deputy Administrator for the National Oceanic and Atmospheric Administration. Calio served as Acting Deputy NASA Administrator earlier this year during the interim administration of Dr. Alan M. Lovelace.

ESA concern:

The European Space Agency is concerned about reports that NASA's Deep Space (tracking) Network may be closed down as a result of new budget cuts. ESA has been planning to use the network to pick up data from its International Solar Polar Mission (ISPM) spacecraft, and as a back-up system for obtaining data from the Giotto mission to Halley's Comet in 1986. Cancellation of the Deep Space Network would thus further strain relations between NASA and ESA, which have already been impaired by NASA's decision to drop the U.S. ISPM spacecraft.

Indian spacecraft to be launched by U.S.S.R.:

The Indian Space Research Organization has shipped an earth resources satellite to Moscow for transfer to a Soviet launch site. Launch of India's Bhaskar 2 by the Soviet Union was scheduled for the third week of November. The imaging spacecraft has a planned lifetime of one year.

Soviet space station:

The Salyut 6 space station to which the Cosmos 1267 spacecraft has been docked since June 19 continues to provide engineering data on the adding of modules to Salyut stations to increase their size and operational capability. Salyut began its fifth year in orbit September 29. The Salyut 6/Cosmos 1267 configuration has been flying in a 362 x 382 km orbit inclined 51.6 degrees.
The Soviet Union is reevaluating plans not to reuse the Salyut 6 space station for manned flights. The head of cosmonaut training, Vladimir Shatalov, has said the joint Soviet-French mission in 1982 may use the station, but has not excluded the possibility of a visit to Salyut 7 instead.

Space-based ion thrust unit scheduled for testing:

A Mercury Ion Thruster built by Hughes Space and Communications group for NASA is scheduled for launch in May 1983 on the Air Force Space Test Program's P80-1 spacecraft, testbed for the Teal Ruby sensor. The thruster, known as the Ion Auxiliary Propulsion System, is a station-keeping device with an 8-centimeter diameter beam that generates 1.12 millipounds of thrust.

THE CELESTIAL TOURIST SPEAKS

Since the October 24th star party was covered in the last bulletin, and no one set up any telescopes at the Los Gatos Red Cross on Hallowe'en, I have no star party reports for this column.

My Celestron 14 has been in operation for a year now. I have set it up on 28 nights, and have looked at over 1200 objects with it. I am well pleased, with a few qualifications.

First, as those of you who have seen it know, the instrument has been modified. I use a low, stubby pier for a seated observing position, and to reduce vibration. I have replaced the horizontal plate of the "wedge" with a slab of 1 1/2-inch thick aluminum plate, for further vibration reduction. I also made a 20-inch long dewcap from 16-mil aluminum sheet. I repainted the telescope white and silver, as an additional measure against dew formation on the optics and exterior surfaces, and to keep the instrument from getting overheated when I set it up before sunset. I extended the counterbalance rods out past the back end of the tube, so that I could balance the weight of the dewcap. And, I soon replaced the cam-type declination locking mechanism with a wingnut, when the soft aluminum cam wore away from its original shape. All of these modifications work, and the telescope is much more useful with them than without.

Second, the original set of optics was lousy. It took me some six months to find this out, because the seeing last winter and spring was also lousy. Star-testing in tranquil June skies showed a classic case of pure astigmatism, with a circle of least confusion well over an arc-second in diameter, which no amount of collimation or of rotation of eye, eyepiece, and diagonal would eliminate. Back to the factory it went, accompanied by a stern letter, in which I mentioned that I had read the place in the catalog where Celestron advertises "diffraction-limited optics". I also said enough to indicate that I knew perfectly well what "diffraction limited" meant.

Celestron tore into the telescope and started rotating this, shimming that, and checking the alignment of the other. (Notwithstanding what it says in all the owners' manuals, there is more to collimating a Schmidt-Cassegrainian than adjusting the tilt of the secondary.) The problem did not go away. So, the factory installed new optics, which are very good, indeed.

I was very happy with Celestron's warranty service: no one tried to tell me that the problem wasn't real; no one tried to convince me to live with it; and, the instrument was fixed to my satisfaction at no charge.

My best guess as to the cause of the astigmatism is that the primary mirror blank had a flaw or internal strain that did not show up when the optics were matched and figured using a testing jig, but which allowed the mirror to start to "fold" along the weakest diameter, when any force was applied to it. The primary mirror is mounted on a bushing that passes through its central perforation. A retaining nut fastens to the end of this bushing, and bears against the mirror (with gaskets and goop in between). Tightening down the nut might have caused the mirror to "fold". But, that's only a guess.

I have done some interesting observing lately. The Fornax cluster of galaxies, which I mentioned last month, was a fascinating region with the C-14. Don't miss it. Also, there are some other interesting objects in this area. A chain of galaxies begins about a degree and a half southeast of tau-five Eridani, and extends to the northeast for about two degrees. The galaxies are NGC 1395, 1415, 1426, and 1439, ranging in brightness from magnitude 11.3 to 12.9. All four are shown on the Skalnate Pleso, but only the brightest, NGC 1395, appears on Norton's. Another quartet is centered about a degree and a half east-southeast of 20 Eridani. These are NGC 1400, 1407, 1440, and 1452, with brightnesses ranging from magnitudes 11.4 to 13.0. All are on the Skalnate, but only the brightest, NGC 1407, is on Norton's (plotted as Herschel object 107^{I}).

There is an object in Fornax that both the Skalnate Pleso and Norton's missed. This is the large, bright planetary nebula NGC 1360, at (epoch 1950) 3h 31.0m, s26°00'. It is six by

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Celestial Tourist

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four and a half arc minutes in angular size, and bright enough to show up easily in my 11x80 binocular. This planetary is Messier quality, and well worth a look.

There are a lot of spectacular double stars in Orion. We all know about the Trapezium, theta-one Orionis. But, beta, eta, lambda, iota, sigma, and zeta Orionis all appear on the Mullaney-McCall list, "The Finest Deep-Sky Objects". Beta Orionis (Rigel) is a particularly challenging object, since the companion is seven magnitudes fainter than the primary, and only 10 arc seconds away. My eight inch Dobson shows all these stars well at 245x.

Jay Freeman

LETTERS TO THE EDITORS

I have two comments related to George Scotten's letter last month. First, a typographical error appeared twice in the printed version of my reply. The quantity $1221,145 should have read $122,145 both times, as correctly given in George's letter. Second, Scotten's comments about trailers for hauling Dobsons prompted me to recheck a few trailer-supply sources, and I found that in the last year or so, Sears has added several light trailer frames to its catalogue line. These might well be suitable for Dobson transporting, with or without a custom box added on.

Jay Freeman

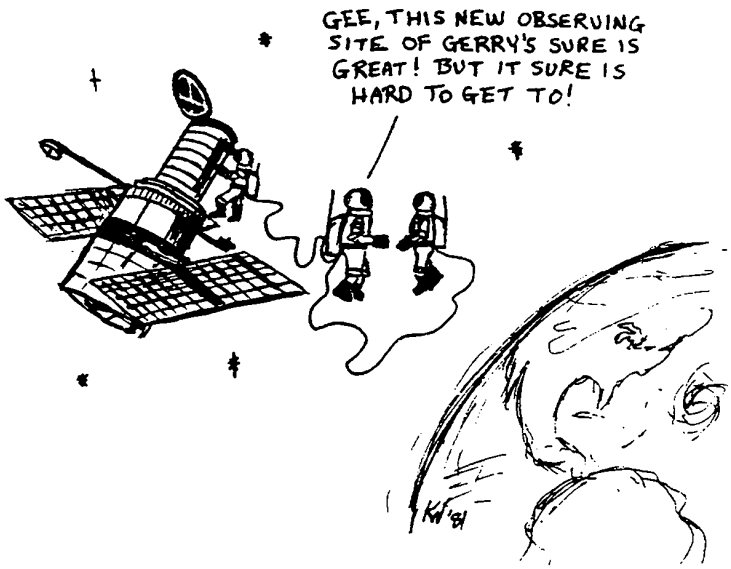
In the debate between George Scotten and Jay Freeman, I think Jay may still have the better of it.

George says that if Jay would have put the $7000 out for 30 years at 10% interest (compounded), he would end up with $122,145.82. At recent rates of inflation, at the end of 30 years, that sum may be the equivalent of $7000 today.

So, Jay may have a $100,000 telescope at the end of 30 years (allowing $22,145 for depreciation), and he will have had a lot of fun in the meantime.

As for that $.85, it probably won't take a postcard across town.

Dick Barrett



--Ken Wilson

Many thanks to Martin Hasha of Lockheed for his talk on the Space Telescope at the November General Meeting.

Observing Safety

(continued from page 4)

that schedule. Arrange to call them as soon as you return. If you change plans inform them, so that they won't be needlessly worried. Arrange an emergency action plan, leaving the phone numbers in (5) to be called.

These suggestions will not guarantee safety, but at least they'll limit the chances that it'll be your fault if something happens.

Next month I'll discuss wildlife, some of those wonderful animals we meet while observing the stars.

Don Macholz
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Editor's note.

As a licensed amateur radio operator (N6BIS), active on the 2-meter band, I know the frequencies and locations of a number of "repeaters" in the Santa Cruz Mountains. These devices give a small belt-mounted handi-talkie radio, such as the one I carry, a range that can put me in immediate contact with radio amateurs throughout the Bay Area. Two-way radios are invaluable in emergencies and, worn on the belt with short "rubber duckie" antennas, they look suspiciously like police radios.

--PW

IMPRESSIONS OF THE STS-2 LAUNCH

My first glimpse of the space shuttle Columbia (since its April 14th landing at Edwards Air Force Base) came from a distance of about 9 1/2 miles, as I drove along the Merritt Island Causeway. Even though the morning was stormy, and Columbia was cocooned in its gantry, the glistening white nose of its fuel tank was easily visible. I was impressed by the apparent mass and size of the rocket, and decided to take the first available press tour, to view it as closely as possible.

From 1/4 or 1/2 mile away, Columbia looked liked a beautifully constructed child's toy that had been pinned (like a butterfly) onto the side of a model made by a berserk boilermaker. My early morning impression of its great mass and solidity had completely vanished.

By mid-afternoon I had chosen and staked out my photographic site well in front of the press grandstands, next to the aptly named Mosquito (slap) Lagoon, and about 3.4 miles from the launch pad.

There was too much human activity around this site for me to get much sleep the night before the scheduled launch, but I tried. And, of course, I was very disappointed when the launch was finally cancelled at T-31 seconds.

However, in some respects, the week-long delay worked to my advantage. At the end of that time, only about 1/3 to 1/2 of the reporters and photographers returned to KSC. I think a lot of vacationers and amateurs got shaken out by the cancellation, giving the remainder more room to maneuver in. Indeed, I was even able to document some of the launch preparation cycle that occurred while I was busy chasing my clothes around.

Furthermore, the more I looked at Columbia and its rocket boosters, the bigger and more massive it became again, until I was finally able to believe that it weighed 2.5 million pounds; and that it really never was going to lift from the ground and go straight up in the air. I found myself unable to comprehend the forces necessary to perform such a task. So, when liftoff time came on the morning of Nov. 12, and I was looking at the launch through my 1000mm Meade telephoto, I was stunned as a brilliant pillar of yellow flame and white billowing smoke effortlessly and noiselessly supported, and then lifted, this incredibly massive machine into the air, and in two minutes thrust it over 70 miles up and out over the Atlantic, to become a tiny speck in my viewfinder. My most vivid visual impression, until I saw the solid boosters separate from Columbia, was that, paradoxically, as the rocket got smaller in the viewfinder, the flame got larger. It seemed that, like a cornucopia, my field of view always remained full. However, the spell was broken when the rocket passed behind a large cumulus cloud. The f/10 lens could not detect the booster rockets' yellow glare, so I lost my magnified view. At this point, I looked up and saw for the first time the true immensity of the smoke trail.

I should also point out that the first 17 seconds of Columbia's flight seemed to occur in a strangely surreal silence, since the shock wave and sound from the booster rockets were still traversing the space between us. Before the sound hit me, the rocket existed visually but not aurally. However, I could hear the more "everyday" sounds of people yelling, and the click/whirring of hundreds of cameras (including my own) taking thousands of photos. After the sound arrived, it grew to a crescendo that vibrated my body, shook the ground, and drowned out every other noise. Then, it slowly diminished, and finally it was gone with Columbia. Then, even with hundreds of the people around me cheering, it was quiet again. The whole process had an incredible air of unreality about it that did not go away until I watched the Columbia reappear in the sky over Edwards AFB on Nov. 16th.

Everytime I think about the events of these days, I get an incredible thrill. I witnesssed...I was actually <u>there</u>...when the first manned spaceship returned to outer space, and landed again on earth. For me, there won't be another historical moment as unique, until the first manned expedition goes out to another planet, and returns.

Steve Greenberg