

MAY 1984

# EPHEMERIS

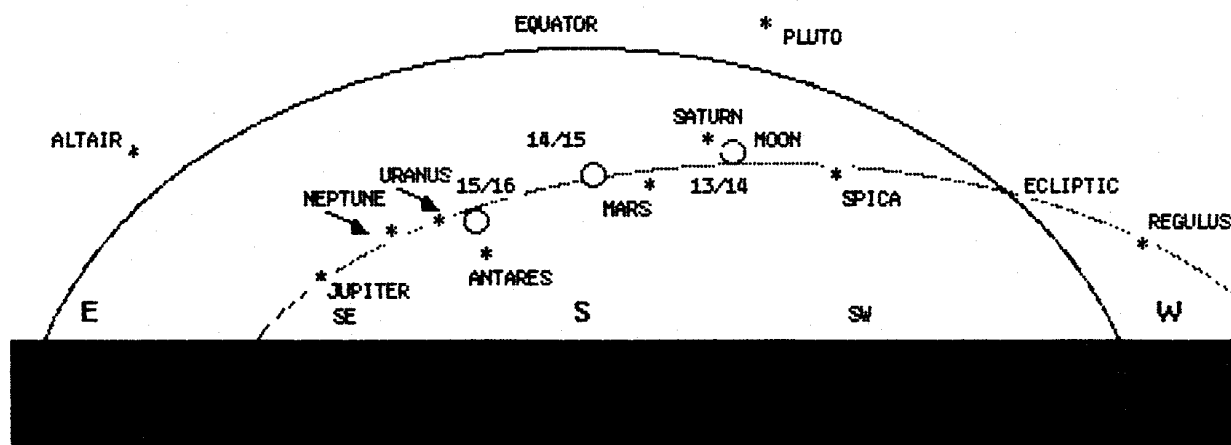
SJAA

MAY 14/16, MIDNIGHT LOCAL TIME, SATURN AND MARS AT MIDNIGHT ARE RIGHT OF THE MERIDIAN-- THEY HAVE HAD THEIR OPPOSITIONS, AND ARE IN THE EVENING SKY. THE MOON HAS PASSED SATURN DURING THE PREVIOUS NIGHT AND MARS DURING THE PREVIOUS DAY. NOW IT IS FULL, AND YOU MAY BE ABLE TO SEE ITS SOUTHERN EDGE SLIGHTLY DARKENED IN THE PALE ECLIPSE. MERCURY IS UNDERGROUND BEHIND YOUR BACK. FROM APRIL THROUGH MAY, SATURN-MARS-EARTH-MERCURY STAY IN A ROUGH LINE, THOUGH THE LINE POINTS FIRST LEFT THEN RIGHT OF THE SUN.



\* ARCTURUS

VEGA

\*



# MAY SJAA CALENDAR OF EVENTS

50 APRIL MONDAY	8 TUESDAY	9 WEDNESDAY	10 THURSDAY	11 FRIDAY	12 SATURDAY	13 SUNDAY
	NEW MOON 3:45 UT  PHI BOOTID & ALPHA SCORPIID METEORS		SATURN AT OPPOSITION	ETA AQUARIID METEORS	LOS GATOS RED CROSS MEETING 7:30 PM	
7	6 MOON 1st QUARTER	9	10	11 MARS AT OPPOSITION	12 MOON AT PERIGEE -- GENERAL MEETING U.OF SANTA CLARA JOEL SCUTY OF LOCKHEED	13 SUN ENTERS TAURUS
14 MOON PASSES 30' S. OF SATURN 8 UT  MOON PASSES 2° N. OF MARS 19 UT	15  FULL MOON 4:28 UT	16 MOON PASSES .6° S. OF URANUS 11 UT	17 MOON PASSES 3° S. OF NEPTUNE 20 UT	18 MOON PASSES 3° S. OF JUPITER 17 UT  OMICRON CETID METEORS	19 MARS NEAREST EARTH(.5315AU) 17.6" visual  INDOOR STAR PARTY & BOARD MEETING LOS GATOS RED CROSS	20
21 MOON PASSES 1.0°S. OF MERCURY	22  MOON 3rd QUARTER	23 NEW MOON -- ANNULAR ECLIPSE	24 MOON AT APOGEE	25	26 STAR PARTY FREMONT PEAK (see map) --  RIVERSIDE CONVENTION	27 <div style="border: 1px solid black; padding: 5px;">JUNE 2: GRANTS RANCH JUNE 9: BOARD ELECTIONS &amp; JACK MARLING AT UNIVERSITY OF SANTA CLARA</div>

### \$36 MILLION REQUEST TO PAY FOR UC TELESCOPE

A whopping \$36 million gift to the University of California from the widow of a luxury automobile importer will be used to build the world's most powerful telescope, the administration said.

The huge sum from the Marion O. Hoffman Trust is by far the largest private gift in the university's 116-year history, according to Judith Woodard, vice president for university relations.

The next largest gift was a \$19 million grant to the Los Angeles campus in 1981.

In gratitude for the gift the university will name the observatory where the telescope will be housed the Maximilian E. and Marion O. Hoffman Observatory. Estimated completion date is 1990.

The computerized, 400-inch-wide telescope will be located on Mauna Kea, a 14,000-foot peak on the island of Hawaii. The gift will cover more than one-third of the \$100 million cost of building the innovative device, a segmented mirror telescope that is designed to see further into space than any telescope before it.

In the planning stages since 1978, the telescope was always intended to be privately supported, according to campus spokesman Ray Colvig. The idea was modeled on the fund-raising effort to build the Lick Observatory near San Jose. The largest donor to that project was real estate developer James Lick.

The UC telescope is a joint project involving astronomers from four UC campuses: Berkeley, Los Angeles, San Diego, and Santa Cruz.

Hoffman learned of the project through a newspaper article, Colvig said.

Hoffman, a widow since 1981, died in December before she could write the gift into her will, but her trustees carried out her wish to assist the UC system with the project.

The amount of \$36 million is the estimated value of her California and New Jersey properties, works of art and cash from the Hoffman Trust.

Hoffman's husband left a fortune built on sales of luxury European cars to Americans.

It was her husband's love of precision mechanical devices that led Hoffman to make the gift in his memory, Woodard said.

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With a story like that, don't YOU want to make a donation to the SJAA Observatory Pledge?

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Speaking of money; our Auction netted a profit of \$400, \$300 of which will go into the observatory fund. On behalf of the SJAA board of directors I extend a big THANK YOU to all the participants and helpers that were there to make it a success.

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Our May 12th general meeting at the University of Santa Clara will feature Joel Suty, a Div. Manager at Lockheed Missiles and Space Company in the Missile Systems Division. His presentation "SPACE SHUTTLE....BETWEEN FLIGHTS" covers the time frame between launches, the recovery operations and subsequent processing of the Shuttle components in preparation for its next adventure.

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On May 30th there will be an annular eclipse of the sun, but we will only see about 30% of the eclipse. The eclipse will be centered over the southeastern portion of the United States head down thru Georgia toward Mexico.

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Yes, we still do have club telescopes available for loan. If interested call any of the following members:

Chris Pratt (408) 629-2994 has the 14" Dobsonian

George Deiwart(408) 257-6658 has the 6" Newtonian

We hope they do!

Tom Stavolone(415) 251-3808 has the 12" Dobsonian

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After our big earthquake on Tuesday, I checked to see if there was any damage done to any of the telescopes at Lick Observatory. According to one of the technicians, no damage was sustained by any of the "eyes" on the mountain although it took almost allnight to realign them, the biggest error being about 3 degrees in RA.

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## Calico Observatory

3509 Calico Ave.

San Jose, Cal. 95124

(408) 371-1307

1984 April 22

### Great Red Spot

For May, Jupiter is still an after-midnight object, but note that the list is getting longer! More opportunities to see the Spot, and it's gotten much easier to see. I'd like a report of observations, especially if a smaller instrument was used. Note the aperture, magnification, and conditions. I've not confirmed the motion of the Spot lately, so I suggest getting out half an hour before the given times to make sure.

da	mo	d	h	m	da	mo	d	h	m
W	5	2	2	33 am	Sa	5	19	1	30 am
F	5	4	4	09 am	M	5	21	3	09 am
M	5	7	1	36 am	Th	5	24	0	44 am
W	5	9	3	20 am	Sa	5	26	2	16 am
Sa	5	12	0	50 am	M	5	28	3	51 am
M	5	14	2	21 am	Th	5	31	1	26 am
W	5	16	4	01 am	Sa	6	02	3	03 am

Clear Skies, Jim Van Nuland

During May, deep sky enthusiasts have the best opportunity to observe the central regions of our local supercluster-located in the direction of the Virgo-Coma Berenices border. The density of galaxies in this vicinity of the sky is so high that random pointing of your scope will often produce a low-power field containing one or more objects and identification of faint finds can pose problems. Starhopping is also more of a challenge here due to the scarcity of bright field stars and I often find galaxy-hopping simpler.

Fortunately, some of the celestial showpieces in Coma Berenices can be found near faint naked-eye stars. For example, locate magnitude 5.6 Comae and 45' southeast is the impressive face-on Sc galaxy M99. My C8 reveals a fairly bright circular glow (4.5' x 4.0') with a bright central condensation at 100x. On March 24th I observed this magnitude 10.4 galaxy from Digger Pines in my Odyssey I and immediately noticed spiral structure. One spiral arm is attached at the southeast edge of the nuclear region and then winds nearly 180° along the west side and ends northwest of the nucleus. Later in the evening I observed with a 17.5" and also noted a second fainter and much shorter arm attached at the opposite side of the nucleus.

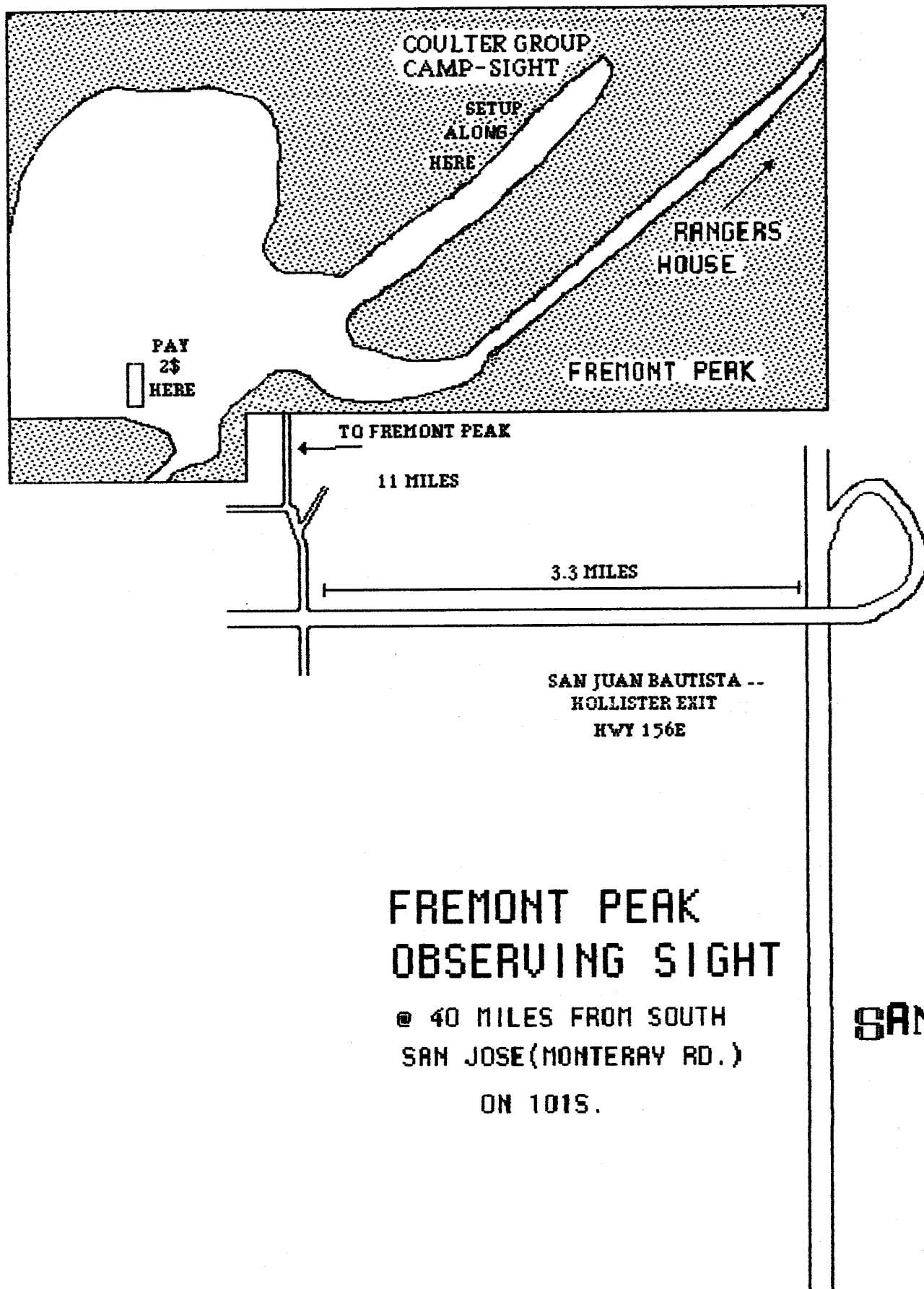
Further north in Coma is the naked-eye coma star cluster spread over a 5° region. Though the brightest stars are magnitude 5 and visible without aid, the best view of this beautiful grouping is in binoculars. At the southeast edge of the cluster is 5th magnitude 17 Comae and just 1.7° east is NGC 4565- one of the best examples of an edge-on spiral to be found in the sky. With dimensions 15' x 2', the C8 shows a bright, narrow streak of light extending over half a 100x field. In the 13.1" Odyssey at Digger Pines in March, a dark absorption lane was visible splitting the central bulge into two sections. The brightest portion of the nucleus was much more conspicuous, though, south of the dust lane and to view the portion of the galaxy north of the lane required a careful look.

The "Black-eye" Galaxy, M64, can also be easily located by moving 1° northeast of magnitude 5.35 Comae. Incidentally, 35 Comae is a triple consisting of a tight and difficult 1" pair and a mag 9 buddy at a comfortable 29". At magnitude 8.6 and dimensions 7.5' x 3.5', M64 is the brightest object in the region and is an impressive object in the C8 with a sharply brighter core evident in the Odyssey, appearing as a curved dark patch just northeast and adjacent to the bright nuclear region.

For a change of pace, the magnitude 8 globular cluster M53 can be found 1° northeast of magnitude 4.5 Comae in the southeast section of the constellation. In the C8, M53 appears very grainy, mottled and on the verge of resolution into stars, but only one star is clearly seen on the northeast edge of the cluster. Has anyone resolved M53 more fully in an 8" scope? On the other hand, observing in May of 1982 at Fremont Peak with the Odyssey, the outer halo beyond the central 2' core was resolved in to a number of faint stars around magnitude 14 at 168x.

While you are in the area, move 1° southeast to an unusual globular, NGC 5053. This magnitude 11 cluster has a very low surface brightness and is noticeably lacking the strong central condensation found in most globulars. At Fremont Peak 3 years ago, my notes taken using the C8, record 5053 as faint, not resolved, smooth surface brightness, and appearing larger than its listed 4' diameter.

STEVE GOTTLIEB (415) 524-4678



## SPACE PROGRAM UPDATE

by

BOB FINGERHUT

SOLAR MAX SATELLITE REPAIR A SUCCESS -The astronauts of the shuttle Challenger retrieved the Solar Maximum satellite, in space since 1980, repaired it and returned it to orbit. It will now be able to observe Halley's Comet in 1986 when it is close to the Sun and should be able to make solar observations thru 1990. The shuttle was launched April 6th from the Kennedy Space Center and landed April 13th at Edwards Air Force Base in Calif. While in space the Challenger also deployed the Long Duration Exposure Facility, LDEF, which contains 57 experiments. LDEF is scheduled to be retrieved and returned to earth in Feb. 1985.

MORE SATELLITES ARE CANDIDATES FOR REPAIR/RECOVERY -The Landsat 4 Earth Resources spacecraft may be retrieved or repaired in orbit in April 1986. The flight into polar orbit by the shuttle orbiter Discovery would be the second launch from Vandenberg AFB, Calif. The repairs would include replacement of failed solar arrays due to the use of the wrong potting material on its wires, replacement of its thermic mapper direct ground link, and its prime command and data-handling computer. It would also have to be refueled so that it could return to the 380 n.mile altitude where it operates. The Landsat 5 which was launched March 1st to replace Landsat 4 is working and returning Thematic Mapper images. Another candidate for retrieval is the Indonesian Palapa B-2 spacecraft whose PAM upper stage put it in the wrong orbit after launch on shuttle Mission 10 in Feb. 1984. The recovery mission is being considered for October of this year and is pending completion of negotiations between Indonesia and its insurance companies regarding the costs of recovery, refurbishment, and relaunch of the satellite. The Westar 6 which suffered the same type of PAM failure on the same shuttle flight could also be retrieved on the same rescue flight, though Western Union has not yet considered a recovery proposal. Western Union has a backup satellite, Westar 6S, which is scheduled for launch in Sept. 1985, as Westar 7. They have asked the F.C.C. for authority to use it to replace Westar 6 at 91 W.Longitude.

PAM FAILURES UNDER INVESTIGATION -The PAM upper stage motors that failed on shuttle Mission 10, sending two communication satellites into the wrong orbits, is being investigated. The quantity of volatile gas content in the Star 48 motors carbon/carbon nozzles is one suspect. Carbon phenolic material is better understood than carbon/carbon but a switchover would delay the launch of some PAM payloads by 9 months until early 1985.

PAM PROBLEM CAUSES LAUNCH DELAYS -The Galaxy-C communication satellite was to be launched on May 24 on a Delta booster with a PAM-D upper stage. It has now been delayed at least until July 19.

The Air Force has delayed the launch of the ninth NAVSTAR global positioning satellite due to the PAM problem. It was scheduled for an April launch on an Atlas-E with a PAM upper stage.

The next shuttle flight, 41-D, which was scheduled for June 4 also is scheduled to launch 2 communication satellites with PAM-D upper stages. The Telesat may be removed and its launch delayed 9-12 months.

NEXT SHUTTLE FLIGHT THE FIRST FOR NEW ORBITER DISCOVERY -The next shuttle flight, 41-D, was scheduled for June 4 but will probably be delayed 4-6 days due to the landing of the last flight in Calif., instead of in Fla. as planned, due to fog. It is planned that it should carry two communication satellites, Telesat-I and Syncom IV-1, the large Format Camera, and a space technology payload called OAST-1.

## SPACE UPDATE(cont'd)

NASA AND ARIANE NEAR TERM LAUNCH SCHEDULE -NASA plans to launch a satellite on May 17th. It is the Comsat Intelsat VA-A communications satellite. It will be launched on an Atlas-Centaur booster from Florida. An Ariane 1 flight is scheduled for May with the Spacenet-1 communication satellite as the payload. The first launch of an Ariane 3 booster is scheduled for July carrying the ECS-2 and Telecom-1A satellites.

SALYUT-7 RECEIVES VISITORS -Three cosmonauts including one from India visited the Salyut-7 space station from April 2nd to April 10th. The crewmembers were Indian cosmonaut Rakesh Sharma, and Soviet cosmonauts Yuri Malyshev and Gennady Strekalov.

SHUTTLE TO CARRY FOREIGN ASTRONAUTS -A French astronaut will fly on the space shuttle in March 1985 to conduct tests on the human body's ability to adapt to weightlessness. The primary crewman for the shuttle mission will be Patrick Baudry. Jean-Loup Chretien who visited the Soviet Salyut-7 in 1982 will be the backup.

President Reagan will agree to the launch of an astronaut from the People's Republic of China on the shuttle as part of technological agreements with China. It will be announced by President Reagan during his visit to China April 26th to May 2nd.

## THE MOSTLY CLOUDY MESSIER MARATHON

04-11-84

The weekend set aside for the 1984 Messier Marathon was clouded out. Fri. night, Mar. 30 was cloudy; on Sat. night my wife Laura, Darwin Poulos and I went to Loma Prieta and met Tom Ahl who was finishing a long book while he waited for clear skies. The clear skies never came, and the drizzle turned to sleet so we headed home. Later in the night the sky cleared up a bit but the Marathon requires a full night of clear skies. On days before and after this weekend the skies were clear, so those who wished to could have searched out 109 of the 110 Messier Objects during these times.

On the evening of Mar. 19 I observed 109 of Messier's galaxies, clusters and nebulae from Loma Prieta, this is despite the moon being three days Past Full. Sixty-six of them were seen before moonrise (9:22 PM). I then went home for a few hours sleep, then back to the mountain for the remaining objects in the moonlight.

For the remainder of the year, two more Possible Messier Marathons exist. During the last part of July, when there's a New Moon, roughly 95 of the 110 Messier Objects are visible, with the Scorpio-Sagittarius region well-placed. Then, in late Oct. about 105 of the Objects will be visible. As for next March, the New Moon is Mar. 21, this places the weekend of Mar. 15-17 as the best time for the 1985 Messier Marathon, when 109 of the objects can be seen.

Don Machholz (408) 448-7077

(1535 characters/spaces)



One comet has been discovered recently, but it is too faint to be readily visible to us. Meanwhile, Comet Crommelin has faded in the west and Comet Hartley-IRAS has faded in the northern sky. We'll check up on Comet Halley as it continues to approach our inner Solar System. In our Past Discoveries department we'll examine the two earth-grazing comets which swept by us last year at this time.

Periodic Comet Russell 4: Kenneth Russell of the Siding Spring Observatory in New South Wales discovered this comet on Plates taken by M. Hawkins on Mar. 2, a few degrees N. of the star Spica, at mag. 13. Upon determination of the orbit we know that it's orbital period is 6.4 years and the that comet stays mainly among the asteroid belt. I viewed it at about mag. 12.5 in early April, it is not expected to get much brighter, as it's now pulling away from both the Earth and Sun.

Halley's Comet on May 15, 1984: RA:06hr 01.3m; Dec:+13°35.7'. Dis. from Sun: 7.21 AU. Dis from Earth: 7.98 AU. Mag.: 20.6. (Last month the RA was 05hr 54.6m, not 44.6m as I reported)

## PAST DISCOVERIES

Comet IRAS-Araki-Alcock (1983e): You might remember this comet, it Passed very close to Earth (3 million miles) last year on May 11. It's discovery was announced only a week earlier so there was very little time to notify the Public and Prepare to observe it. A good question, which we have been asking of every comet in this series, is: "Could it have been discovered earlier?".

Let's first look at the discovery circumstances. The satellite IRAS first detected the comet on April 25.85 when it was roughly between the stars Deneb and Vega. The ground crew did not recognize it as a comet, then word was not transmitted properly, so it wasn't until George Alcock of England discovered it on the evening of Tues., May 3 that the comet became known to the SAO. Alcock was using 15x80 binoculars from inside his house, looking through a closed window. It was then learned that Genichi Araki of Japan found it seven hours before Alcock. This was IRAS' and Araki's first comet discovery, and the fifth for Alcock.

On May 3, the comet was at RA:18h 57m, Dec:+52.2°, 92" from the Sun, in the morning sky, mag. 6.2 and 12' dia. The moon was waning, 65% full, and rising around 1 AM. There had been moonless sky in the evening while the comet was above the horizon (for those of us in mid-Northern latitudes) for the past four nights, during that time most comet hunters were searching the western sky and therefore the comet was to their backs. Also, some Periodic comets were vying for attention in the evening sky too.

Two weeks before, Prior to Full Moon, the comet should have been at mag. 9.0 and at 19hr 08m, +47.3°. And two weeks before that the comet was in almost exactly the same position but at mag. 10.4. It would not have been expected to be discovered in late March, when it was mag. 11.4, but it seems as though it would have been an easy object in April for any comet hunter searching the morning sky. Why wasn't it found?

I swept the area on Apr. 7 when the comet should have been mag. 10.3 and 3' dia., but although I saw some faint clusters, I did not see the

comet. Reasons it was missed includes some of these Possibilities: it was seen against a rich area of the Milky Way, this tends to mask comets. Secondly it was high in the morning sky, most comet hunters don't even cover this space in their sweeps. And third, there is the chance the comet brightened rapidly before discovery. We do know that it surged by one magnitude on May 12, this could be an indication of unstability. Whatever the reasons, this most Publicized comet managed to keep itself hidden until it was almost upon us.

What if the comet's ascending node had differed by 90, 180 or 270 degrees and it approached the Sun from these different directions? In each of those three instances the comet would not have gotten brighter than mag. 10.2 or closer than 1.2 AU from Earth and Probably would have never been discovered.

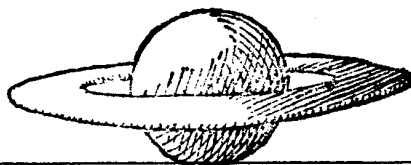
Comet Sugano-Saigusa-Fujikawa (1983e): While the world was watching the previously-listed comet, this one was discovered; four weeks later it passed to within 6 million miles of Earth. All three searchers found it within 50 minutes, it was Sugano's first, Saigusa's second and Fujikawa's fifth discovery. At that time, Mon. morning, May 8, the comet was at RA:01hr 34m, Dec:+39.7°, 28 degrees from the Sun, low in the morning sky, mag. 7.0, and 2' dia. with a short tail. It was in the predawn sky, climbing away from the Sun. The moon was about 25% Full (a crescent), rising about the same time as the comet.

The morning sky had a brighter moon each Preceding day, on May 6 the comet was 26° from the Sun and mag. 7, a difficult object. Each Preceding morning it was even closer to the Sun and slightly fainter--a very difficult object. A factor Perhaps hastening the discovery is that the Predicted track of the Comet Swift-Tuttle (responsible for the Perseid meteors) lies only 6 degrees from the location of this comet, and comet hunters usually sweep for Comet Swift-Tuttle.

In April the comet was much fainter in the evening sky and near the Sun. It then Passed north of the Sun, brightening rapidly. Thus it seems as though May 8 was the first real opportunity for the discovery of this comet.

If the ascending node had changed by 90, or 270 degrees, the comet would have been an easy object in the evening sky, if it had changed by 180°, it would have been discoverable in the morning sky.

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## MAKING AN OBSERVATION SITE OUT OF A "NOWHERE"

### A "Road Map" for the Commuting Astronomer

by Don Machholz

04-10-84

Most amateur astronomers come to the conclusion sooner or later--observing from the backyard just isn't what it used to be, that the days of wheeling the telescope out the garage and onto the patio for a night of first-class astronomy do not exist anymore. I first realized this when I began using a mostly-homemade 10.0" reflector to replace a 4.25" reflector. To my great disappointment the larger instrument did not improve things much. It was then that I decided to become a commuting astronomer, driving to a remote place from which to observe.

Or, maybe you're going on vacation, you take along the telescope, and now, on the road and in unfamiliar lands, you wish to scan the skies. Or, perhaps you're tired of going to the same old place and you need a new observing site.

In each of the above cases you need to find an observation location, a place to set up your telescope for some good, down-to-earth observing. How do you find an observing site? That's what I'll like to discuss here.

Let me back-track and suggest that your backyard may not be as bad as you think it is. Try it under various weather conditions (like after a cold front has cleared the air) and at different times of the night. Usually neighbors (such as shopping center parking lots and store fronts) turn out their lights when they close and you might find your morning skies darker than your evening skies. Try a light pollution filter, greater magnification and/or a longer focal ratio telescope to increase contrast. Don't give up entirely on the backyard, for such observations are better than none at all!

I can imagine three reasons why the average backyard may not be good enough for observing--the needs of a steady atmosphere, low horizons and dark skies. Let's take one at a time.

**STEADY "SEEING":** It's difficult to observe from under a sea of air. For some purposes calm currents overhead is of prime importance. Horizontal currents are difficult to minimize, but vertical drafts can usually be avoided. The idea then is to find a site with a uniform terrain, best perhaps is a small island, or a mountain peak surrounded by vegetation. A mountain peak also may be above the inversion layer, at this location the vertical air currents are minimized, the seeing is steady. And possibly the worst place for steady seeing is in a neighborhood surrounded by un-insulated houses spewing heat on a cold night.

**LOW HORIZONS:** On occasion an astronomer needs a low horizon--these are noticeably lacking in the city. This need arises when one seeks to observe bright comets near the Sun, a Messier Marathon, the inner planets, a thin crescent moon, or objects barely rising above the southern horizon. Deserts, plains, ridges, and mountain tops are great for this, provided a lot of trees (or buildings) don't interfere. For observing objects rising or setting pick a ridge

running N-S, for the southern horizon select an E-W ridge. Since many mountain Peaks are inaccessible, you might find the mountainous regions bothersome since there's bound to be other mountain Peaks higher than what you are.

**DARK SKIES:** Everyone wants dark skies—even SOLAR astronomers want only the target object to light up the heavens. Assuming the tricks mentioned above didn't quite do the job, and removing the lights from your region doesn't go over good with the neighbors, it's time to hit the road. Jack; in search of the dark, black skies you saw in the Planetarium the last time you were there. This almost always means getting out of town, or at least away from the light sources which congregate on your backyard. With small cities only a few miles might darken skies sufficiently, while with a large city, or, worse yet, a group of cities, you may have to go many mega-miles to escape light pollution. And in which direction do you go? Well, it's good to keep the lights to your back, so to see the southern skies, head south. In fact, a good all-around site would be south of a city since objects in the northern sky climb fairly high but southern objects generally don't. Therefore, one can afford to lose some of the northern sky.

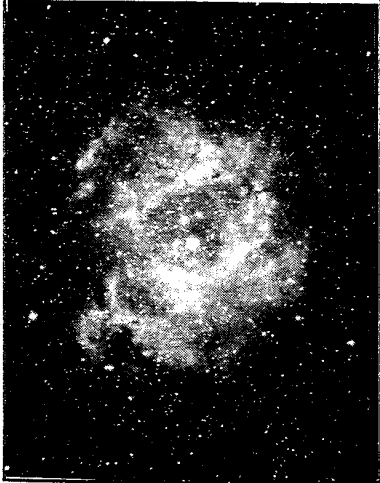
There are not just different wavelengths of light pollution, but the effects also vary too. A large city a short distance away (a few miles) lights up the atmosphere, this reduces contrast and limiting magnitude. On the other hand, a small bright source a short distance away (a streetlight at 50 yards) casts a light on the telescope and on the (very) local environment, this ruins the dark adaptation of the observer, but has little effect on the atmosphere unless it is quite thick with dust and/or humidity. In the first situation it would be advantageous to set up on a high mountain when the air is clear, the second situation would benefit group observing (everyone trips on the telescope less when it's dark), checking your moon map, or some photography.

Next month we'll get out our maps to locate the observing sites best suited for our purposes, and then we'll travel there to see what we've gotten ourselves into. Who knows, you may yet be taking your telescope to the county dump!

(5761 character/spaces)

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MODEL, ONE ONLY!! FULL WARRANTY!!  
LIST: \$1,595.00 **sale \$999**

**CELESTRON 30x80**  
Deep Sky Binoculars. Demo model only  
with minor cosmetic defects.  
LIST: \$400.00 **sale \$169**

**CELESTRON C-1000E**  
4" F/10 REFRACTOR, WITH MOTOR DRIVE.  
DEAD, LIKE NEW -- ONE ONLY!! PICK-UP  
AT SHOWROOM ONLY.  
LIST: \$2,125.00 **sale \$999**

**CELESTRON 6**  
NEW, ONE ONLY. FULL WARRANTY TOO!  
LIST: \$699.00 **sale \$499**

**CELESTRON C-50**  
SOLID BRASS SPOTTING SCOPE -- NEW!  
LIST: \$395.00 **sale \$175**

**MEADE 87D**  
3.1" F/12.5 SPOTTING SCOPE  
LIST: \$396.00 **sale \$239**

**CELESTRON 90**  
500mm F/5.6 TELEPHOTO -- NEW!  
LIST: \$480.00 **sale \$225**

\* THIS OFFER GOOD FOR ON-HAND STOCK ONLY

## MEMBERSHIP

Please send renewal form, remittance, and if you want to renew  
S&T, their white notice card, to: Bob Fingerhut, Treasurer, SJAA,  
340 Rio Verde Pl. #4, Milpitas, Ca. 95035. (408) 263-4455. Thanks!

SJAA MEMBERSHIP APPLICATION/RENEWAL

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_ CITY \_\_\_\_\_  
PHONE \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_  
AREA OF INTEREST \_\_\_\_\_  
MEMBERSHIP/S&T ☐ \$21.00 JUNIOR (UNDER 12) ☐ \$15.00  
MEMBERSHIP ONLY ☐ \$8.00

MAY '84

SJAA

# EPHEMERIS



SJAA EPHEMERIS  
3509 CALICO AVE.  
SAN JOSE, CA. 95124

BULK RATE  
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