

# SJAA EPHEMERIS

VOLUME 4 NUMBER 12 OFFICIAL PUBLICATION OF THE SAN JOSE ASTRONOMICAL ASSOCIATION December 1993



**The Eyepiece**  
by Bob Madden

First things first! Last month I ran a test to see who read the "Ephemeris" and ask the readership to respond as to their preferences of meeting location - Milpitas Library or Houge Park.

The response was overwhelming - all three of you responded; Doug Snyder, Bill Beeman and Justin Howell! I really am thankful for their answers and the time they took to drop me a note. I believe it takes commitment to our association to take the time to send a postcard. The answer? It was Houge Park! There wasn't a single person to vote for Milpitas Library. Now the second shoe! The center of membership population is located - you guessed it - at the new Fry's electronic store located at highway 17 and Hamilton Ave. - about a mile or two from Houge Park and about 15 miles from Milpitas Library.

Does someone want to do a write-up on the status and politics of the Group 70 1.8 Meter LAT? I believe they have gone underground as there is not a single posting on the Eyes on the Skies BBS in Livermore ( except mine asking what's happening ). You may also note there is a comment about the Santa Clara University's Observatory. What a sight it was to see the large dome

**Dec 4:** No activity (2d before 3rd Q)  
**Dec 11:** Star Party at Henry Coe SP or Grant Ranch (your choice). Sset 4:49pm, no moon.

**Dec 17:** Sar Party at Houge Park. Sset 4:52pm, 25% moon, Mset 9:42pm.

**Dec 18:** General Meeting at the Milpitas Library 8:00pm, preceded by the Board meeting at 6:15. The speaker will be Dr. Bruce Weaver and his subject will be: At MIRA: a new Weaver's Tale About the Warp and Woof of Star and Planet Formation.

**Dec 21:** The winter solstice happens at 20h27m09s UT

**Jan 8:** Star Party at Fremont Peak Sset 5:03, 2d NM, Mset 11:07pm

**Jan 14:** Sar Party at Houge Park. Sset 5:09pm, 10% of full, Mset 8:21pm.

**Jan 15:** Observational Astronomy Class starts for the year

**Jan 22:** General Meeting at the Milpitas Library 8:00pm, preceded by the Board meeting at 6:15. The speaker is to be announced.

**Jan 29:** No activity. Mn 2d after full

open and get a view of the 16" reactor! That is it for cheap shots.

I'm interested in fabricating an interferometer ( cost about \$500 according to Peter Ceravolo). I already have Peter's manual. If the association could raise the jingle we could use the instrument to test telescope optics. Getting this project under way would be just like Jack Zeiders did with the Solar Telescope. We have just over 250 members, who I'm sure have telescopes, and would like ( maybe not! ) to know how well their optical instrument is made. I'll hold the cash and account for it if someone wants to donate. You can give

it to me at a general meeting, Houge Park, or the US mail. Please remember to send your name on a small piece of paper with the donation. When we have enough I'll purchase the parts. Between Paul Barton and myself we'll get it put together.

Patrick Donnelly sends his articles all the way from England this and next month - att'sa way to go Pat!

## Hubble Gossip from Usenet

In article 513@agate.berkeley.edu, elwood@seacliff.cea.berkeley.edu (Elisha Polomski) writes:

I heard gossip last week [at an EUVE seminar] that the corrective optics for Hubble may be as much as 7mm off. This was going to be fixed by turning a screw to reposition the mirrors. The gossip is that the engineers did not know for sure which way to turn the screw, or how many turns it would take. Any more news on this?

The WFPC II was removed from the shuttle, and its optics tested. They were found to be properly aligned, and are not 7mm off. The device will fly as is. To the best of my knowledge, the optics will be only "coarsely" aligned by the installing astronauts. The optics will then be fine-tuned by remote control, guided by observation through the telescope. There is no reason to believe, at this time, that the WFPC II will not work as planned.

Timothy J. Thompson, Earth and Space Sciences Division, JPL.  
Assistant Administrator, Division Science Computing Network.  
Secretary, Los Angeles Astronomical Society.

Continued on page 2

## DOUBLE, TRIPLE, AND MULTIPLE STARS

by Patrick M. Donnelly

I have recently become interested in observing or should I say trying to observe some of the closest multiple star systems to the earth. Some are very easy to observe, because they are bright or very near other objects on the celestial sphere and easy to find. Others I have given up on seeing, unless something dramatic changes. The systems I plan to describe are all within 5 parsecs of the earth.

There are eight (8) multiple star systems within five parsecs of our solar system. These are:

Alpha Centauri	Procyon
Luyten 726-8	$\Sigma$ 2398
Sirius	Grommbridge 34
61 Cygni	Krueger 60

There are also two (2) other possible systems within the five parsec limit. These include Barnard's Star and Lalande 21185. Both of these stars have unseen companions, but it is not known what is the nature of these companions. Of the eight (8) remaining systems I have seen all of them except for Luyten 726-8 and Procyon. I haven't tried for either, but I know I do not have the equipment available for the viewing these objects, especially Procyon.

These systems can be divided into three (3) types of systems. The first type is normal Main Sequence stars with White Dwarf companions. Sirius and Procyon are in this group. The second group is those systems consisting of normal Main Sequence stars that are not red dwarfs. The only system in this group is Alpha Centauri. Also, there is now some suggestion that Proxima Centauri is not part of the Alpha Centauri system. Hence, this system would contain no red dwarfs at all. The final group consists of pairs of red dwarf stars.

These systems that are not red dwarf systems are some of the brightest stars in the sky. Sirius and Alpha Centauri rank first and third in brightness (if we omit the sun, of course) and Procyon ranks eight. All of these systems are difficult to observe. Alpha Centauri is located in the far southern skies and is

not visible from San Jose area. If you do get to go far enough south to see Alpha Centauri, it should be the first object to observe. I consider this double star to be the best in the sky. Also, right now the companion to Sirius is quite close and difficult to resolve. This companion, commonly called Pup, can best be seen with an occulting bar in the eyepiece. The companion to Procyon is visible only in very large instruments. Based upon these problems I shall skip further discussion about them.

By far the easiest Red Dwarf system to observe is 61-Cygni. This system has magnitudes 5.2 and 6.0 components separated by 25". Its period is around 650 years. 61-Cygni was both the first star to have a measured parallax and the first double star system to have its period determined. The second easiest system is  $\Sigma$ 2398 in Draco. It consists of Magnitude 8.9 and 9.7 stars separated by 15.5". The system consists of 2 almost identical red dwarfs and has a period of 346 years. Also in the same vicinity is Grommbridge 34 in Andromeda, another pair of red dwarfs. They are at magnitudes 8.1 and 10.9 with a very easy separation of 39". The period for this pair is approximately 3000 years. It should be noted that the primary is also a spectroscopic double. Thus it is a triple system.

Krueger 60 is located essentially next to Delta Cephei. It is located about 3/4 of a degree south of Delta. It consists of two M-Type red dwarfs and has a period of 45 years. The stars are magnitudes 10 and 11.5, and they have a separation of about 2.5". A third companion is located 60' (magnitude 10), but it is only an optical companion. The most difficult is Luyten 726-8. It is a system of red dwarfs of magnitudes 12.5 and 13.0, separated by 2.4". If you ever do observe this star, please let me know.

It should be noted that all of these systems worth observing are visible at this time of the year. Check out these systems with that new eyepiece that you receive for Christmas. I have found that hunting down these stars to be a frustrating adventure, but enjoyable at the same time.

## Hubble gossip continued from page 1

Member, BOD, Mount Wilson  
Observatory Association.

INTERnet/BITnet:

tjt@scn1.jpl.nasa.gov

NSI/DECnet: jplsc8::tim

SCREAMnet: YO!! TIM!!

GPSnet: 18:10:22.85 W by  
34:11:58.27 N

I heard... that the corrective optics may be as much as 7mm off...

The worry was over the Wide Field / Planetary Camera No.2 (WFPC-2), and the suspected problem would have prevented both WFPC-2 and the COSTAR-improved instruments from focusing simultaneously.

A review team headed by Apollo astronaut Tom Stafford determined that no problem existed. NASA Administrator Daniel Goldin ordered a second review, this one led by HST Project Manager John Rothenberg, and it confirmed the Stafford team's results.

For reference, the WFPC-2 instrument is equipped with its own built-in corrective optics. The other HST instruments will have incoming light corrected by the COSTAR unit.

Shuttle Mission STS-61 is scheduled for launch on 1 December.

-Brian

## Election Nominations

Elections are coming in February. The nominating committee, Jack Zeiders and/or Jim Vanuland, will accept nominations now. The nominee must be acceptable to the nomination. You may call either Jim or Jack at the telephone numbers listed on the Marquee. Those people up for re-election are:

Gene Cisneros

Bob Madden

Bob Brauer

Jack Peterson

Nominations will be announced during the January general Meeting and elections will be conducted at the February Meeting.

## General Meeting Report

by Jim Van Nuland

Jack Petersen discussed the possible move to Houge Park, advantages to each site. He asked for a show of hands from those present: 6 for the Library; 11 for Houge Park. [JVN: Gulp! This is from people who have come to the library!]

Public "thank you" to Paul Barton for the exemplary job he is doing with the club Telescope Library: maintaining, teaching each borrower to use the scope, promoting the use of the scopes. THANK YOU!

**Speaker:** Dr. Aaron Barnes, PhD.  
Physics, U. of Chicago, 1966  
Theoretical Studies branch, NASA

### Topic: The Heliosphere and other things

The heliosphere is defined as the transition between the Sun and whatever surrounds the Solar system: interstellar space. Distance unknown, but perhaps 100 AU or much further in some directions.

Sun: 333,000 Earth masses; 110 Earth radii (0.25 the mean density). We know lots about the interior of the Sun, but little about the surface. Quote from Schwartzchild: This is because we can see the surface!

Solar seismology has allowed us to map the interior to some extent. From the drawing, the core is about .2 of Sun's radius. Energy is produced in the core, carried by diffusion, taking about 10,000 years (!) to get to the surface. Near the top (was it .9 of the the radius?), convection suddenly sets in, transferring heat in days instead of thousands of years. Then at the top 100 km (the photosphere) it becomes transparent. The photosphere displays tops of cells of convection about 1000 km across, called granulation.

The next layer up is the chromosphere, a reddish layer 2000 km thick. Its structure is on a much larger scale than the photosphere, spicules 10,000 km high, temp up to 25000 Kelvins, and organized by the magnetic field rather than by convection.

Lastly comes the Corona, showing streamers along the Sun's equator during solar[sunspot] minimum, but with streamers all around at solar maximum. This is seen in the beautiful photos taken during eclipses. The streamers tend to map out the magnetic field. The corona is even hotter, perhaps 2 million Kelvins. This refers to the thermal speed of the particles, not to the thermodynamic mass temperature; an ordinary thermometer would not register much heat at all.

Solar flares are related to something called a Mass Ejection, but it is not clear which causes the other; thinking has reversed recently. But perhaps there is an underlying mechanism that causes both of them.

Dr. Barnes showed a number of photos of the corona, taken from Skylab with the Apollo Telescope mount. One of these, widely published, shows Comet Kohoutek at the top, and an odd dark circle at the lower left: the the Moon, about to eclipse the Sun! [JVN: I'd wondered for years what that was.]

Sunspots: strong magnetic fields; loop from spot to spot, but with chaotic structure. Open field lines escape from the Sun, carrying material to make up the Solar Wind and latter blows out in generally spherical manner. At Earth, the velocity is about 400 km/second, and is 80% hydrogen, 20% helium, with traces of other stuff. In it, the speed of sound is about 50 km/sec, but this is not an ordinary speed, rather the speed at which a shock wave travels.

The earth's magnetosphere excludes (keeps out) the solar magnetic field, also excludes most particles, so we are fairly safe on Earth and in low orbit. However, astronauts in Lunar orbit could be affected / injured by severe solar storms!

Other planets have magnetic fields, more or less, but they differ considerably. Mercury: small field, excludes solar wind. Venus: no magnetic field. Its ionosphere excludes the solar wind. Mars — unknown mag field, but thought to be small if any. Jupiter — whopping field! If Jupiter's mag field were visible, it would (from Earth) appear larger than our Moon!

Saturn — somewhat similar. Uranus: funny field, bizarre as Uranus is on its side, but its mag field is sharply out of the orbital plane! Neptune — upright planet, but mag field is sideways.

Eventually, the pressure of the Solar Wind drops to less than whatever is in the interstellar medium; this interface is called the heliopause. We have 4 spacecraft traveling outward from the Sun, reporting on conditions out there, and they will eventually reach the heliopause. Estimates are from 40 to 100 AU, probably with a long tail in the direction from which the Sun is moving locally.

Unanswered questions: How does the chromosphere and corona get so hot? JVN: how hot at Earth? Dr.B: oh, a million degrees.... JVN: gulp!

Meeting ended at 9:28, with considerable discussion afterward. Thank you very much, Dr. Barnes, for a very interesting lecture!

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### e-Mail Address

by Bob Madden

The Board is made of members who have access to Internet, FidoNet and usenet and there is a movement to obtain as many e-mail addresses as possible to make them available to other users in the association. Board members use the net to send and receive messages about meeting minutes and other projects of interest. An active member is Jim Van Nuland, whose postings I view regularly. In fact the posting on lunar eclipse is Jim's that I grabbed one evening. Please take time, if you have access to the Internet/usenet, to call Jim Van Nuland at 371-1307 and give him your e-mail address. By the way, for those who don't have access to the internet, but do have access to bulletin boards, and haven't thought about signing up with PORTAL, give it a try. The charge is \$19.95 flat per month, additional charges apply for additional memory storage over 1 meg. I must admit the start-up costs should have How to Use Internet books included (about 25 to 30 dollars each). The time connected is unlimited. There is a bold new world of information waiting to be tapped out there.

## How many colors can we see by William M. Cornette

Rafy Marootians  
(rafy@cairo.anu.edu.au) wrote:  
: This is not a FAQ but how many colors  
can our eyes see?  
: Maybe that should be "how many colors  
can our eyes distinguish"?  
: And how is such a measurement done?

The information I am aware of is used in specifications. For example, if you wish to specify delivery of an article at a given color (specified, for example as x-y coordinates on the CIE Chromaticity Diagram), how far away from x-y can you tolerate (or distinguish). The usual criteria is a set of ellipses whose major and minor axes and orientation are a function of x and y. In fact, some people transform the CIE diagram to another coordinate system to get circles. For example, MacAdam (1942) defined a set of ellipses that are fairly large in x-y for green and fairly small in x-y for red and blue. Also, the orientation of the major axis appears to be oriented generally toward the center of the x-y diagram (i.e., where the color is white). These results were based on human studies and the results differ slightly from observer to observer (not too surprising).

Guth, Massof, and Benz Schawel (1980) defined a transformation to ATD-Color Space where the ellipses are circles that vary in size with distance from the A-axis (i.e., small circles near the axis, larger ones away from the axis). There is also a CIE ( $u^*$ ,  $v^*$ ) diagram that is also used by some observers. Stiles also defined a method using a three-dimension chromaticity diagram. Vos and Walraven developed a model that included luminance level as a factor (the ellipses tend to get smaller at high luminance). I assume this is related to rod/cone activity. Wyszecki and Felder (1971) have shown that ellipses are an over-simplification of the problem, and the proper shape is a somewhat irregularly shaped object.

Wyszecki and Felder (1971) have also shown some of the variability from observer to observer and for a single observer from test to test.

It is also known that for a small object the apparent color (or the ability of an observer to distinguish color) degrades as the sample gets smaller (or further away). For example:

First, Blues and Grays become indistinguishable; Then, Yellows and Grays Merge, Browns and Crimson Merge, and Blues and Greens Merge; Then, Blue-Greens and Grays Merge; Then, Reds and Grays Merge; Then, Normal Vision is devoid of all color.

For the CIE Chromaticity Diagram, distinguishable color tends to shrink to a band (nearly horizontal).

Describing all this without graphics is difficult. I could fax you a few of the diagrams I mention above, or you could check on a good book on Chromaticity.

William M. Cornette  
wmc@photon.com

### 100-inch HOOKER Telescope

In article  
<CG8CIJ.JL6@caracara.cdev.com>  
randall.s.knox@cdev.com  
(Knox) writes:

> I understand that the 100in Hooker  
telescope at Mt Wilson is being  
refurbished and prepared for  
operations again.

> Does anyone know what the status  
of this project is? When will the  
telescope be back in operation?

> Thanks in advance.

> rsknox

Yes, they're putting an amazing adaptive optics system on it right now. It will have .05" FWHM resolution (more than twice as good as Hubble, at 1/10<sup>th</sup> of the cost). They hope to have it up and running by next August. I have a preprint here by C. Shelton and S. Baliunas entitled "Second Generation Adaptive Optics: Plans for the Mount Wilson 100-inch Telescope," which describes in detail the plans, but unfortunately, I'm not sure where they're publishing it.

Not only will the Hooker have the best resolution of any optical telescope in the solar system, it will be cheap too, take only one person to run it, and not require rerouting all the aircraft in the vicinity like some other adaptive

optics systems do.

Jim Horne  
jhh@waldzell.physics.yale.edu

### NASA INFORMATION via internet

I have noticed that many people have been inquiring about lists of spacecraft and related information. NASA now has a free on-line service that may suit your needs. Here are some excerpts from the NSSDC Master Catalog and NASA Master Directory.

### NSSDC MASTER CATALOG

NMC (NSSDC Master Catalog) is a free online information system providing information about past, present, and future NASA and non-NASA spaceflight missions and about the investigations flown or scheduled to fly on those missions. NMC also provides detailed information about those data sets primarily archived at the National Space Science Data Center (NSSDC). In addition, NMC describes publications, people, and non-spaceflight data.

NMC describes approximately 15,000 objects including spacecraft, experiments, and data sets. It is accessible through the NSSDC Online Data and Information Service (NODIS) which also provides access to the NASA Master Directory (NMD). NMC compliments the NMD by being more comprehensive and detailed relative to spacecraft and their experiments, and by providing more information about NSSDC-held data.

### NASA MASTER DIRECTORY

The NASA Master Directory (NMD) is a free, on-line multidisciplinary database of information about Earth and space science data holdings of potential interest to the scientific research community.

The NMD contains high level descriptions about these data centers, as well as scientific campaigns and

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## Meeting Location

by Bob Madden

What I'll try to do here is give you an up-date of the on going saga of determining where our meeting location(s) should be. I believe since we moved to the Milpitas Library the Board Members feel there has been a reduction in attendance at the general meetings. There has off and on been discussions at the board meetings about where is best to hold our meetings. When we lost the capability of meeting at the Los Gatos Red Cross building Paul Mancuso suggested that we move to the Library. Several other places were also discussed with some reservations about how long we could stay once we had decided to move the meetings there. As a result the Milpitas Library was selected. Also this location, as I remember, was selected under the urgency of little time to decide.

In the interim we relocated there and have several disquieting rules happen to us. One is we aren't allowed to hold more than one meeting there a month, which is the reason we relocated the observation astronomy class to Houge park. Second the cost per meeting is \$10 and no food is allowed in side (not a big deal). We are finding it increasingly difficult to obtain the key to the library. In fact one meeting had to be cancelled due to not being able to obtain the key. There just seems to be an inconvenience in getting the key. Houge Park doesn't appear to have the difficulties associated with the library. Besides Houge Park costs us only \$25/year for all of our activities; star parties, classes, auction and general meetings.

In the October board meeting I must admit I voted to stay at the library, but following that Jack Zeiders reminded me that I had promised to determine where the center of membership was located. Something I had failed to finish for about three months. That did it! I determined, using information provided by Jack Petersen, the center of membership location is located at Highway 17 and Hamilton Ave. in San Jose; or about where Fry's Electronic store is located. This was very interesting! I also asked, in the Ephemeris, for an informal vote as to

where you would prefer we hold the general meetings. Armed with this information I would be ready to report to the board in November and reopen the discussion about meeting location again (and vote properly). The results were not as responsive as I would have wished, but during the November meeting a show of hands was asked for on the preference of meeting site. The results of that was in favor of Houge Park. Now we are getting closer. There still remained a concern over how stable Houge would be as we feel that it should be a long range (4 or 5 years) agreement. This is now being investigated.

Our goal is to have resolution soon, perhaps by or in time for the March meeting. In any event the Observational Astronomy classes and star parties will remain at Houge Park

## NASA INFO

Continued from page 4

projects, sources (spacecraft, platforms), and sensors (instruments).

The NMD also provides automatic connections, called LINKS, to many of the data centers or data system holding the data sets. These connections are available from a simple command which may be activated from several places in the directory.

## ACCESS PROCEDURES

Using NSI/DECnet:

Set Host NSSDCA

Username: NODIS

Type in your name or guest

Select option 1 (window) or 2 (text) interface

Select Multi-Disciplinary Option

Select (2) Master Catalog

or (1) Master Directory

Using Internet:

Telnet 128.183.36.23

Username: NODIS

Type in your name or guest

Select option 1 (window) or 2 (text) interface

Select Multi-Disciplinary Option

Select (2) Master Catalog

or (1) Master Directory

Via Direct Dial:

Set modem to 8 bits, no parity, 1 stop bit

For 300, 1200, or 2400 baud, dial 301-286-9000

For 9600 baud, dial 301-286-4000 or FTS 888-4000

Prompt: Enter Number, you enter "NSSDCA"

Prompt: Call Complete, you enter <CR>

Username: NODIS

Type in your name or guest

Select option 1 (window) or 2 (text) interface

Select Multi-Disciplinary Option

Select (2) Master Catalog

or (1) Master Directory

## WHERE TO GET HELP

NMD:

Contact Ms. Pat Ross by:

NSI/DECnet: NCF::PATROSS

Internet:

patross@nssdca.gsfc.nasa.gov

Phone: 301-441-4210

NMC:

Contact the Master Directory User Support Office (MDUSO) by:

NSI/DECnet: NCF::MDUSO

Internet:

MDUSO@nssdca.gsfc.nasa.gov

Phone: 301-441-4299

## MOON Eclipse

In article

Jim.Van.Nuland@f106.n143.z1.fidonet.org writes:

I> JT->Does anyone know the exact time for the lunar eclipse that will occur

U.T. of Start of partial phase: 4 40.4

totality 6 02.2

middle 6 26.1

end totality 6 50.1

end umbra 8 11.9

How to calculate — I cheated; lifted figures from the Astronomical Almanac, 1993. Thank you, USNO.

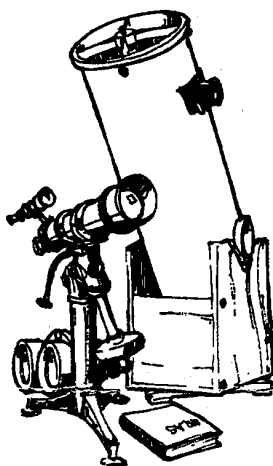
X SLMR 2.1a X He's got to go up on the mountain to get focused!

— Maximus/2 2.01wb

### 1993 SJAA Calendar

General Meeting		Houge Park Star Party	Observational Astronomy Class
Dec	18	17	none
Jan	22	14	15
Feb	26	18	19
Mar	26	18	19
Apr	23	15	16
May	May be the 14th ?	17	21
June	25	17	18
July	23	15	16

Please read your *Ephemeris* each month for changes



### SJAA Loaner Status

by Paul Barton

No.	Name	User	Due Date
1	4-1/2" Newt/P Mount	available	
2	6" Dobson	Jim Marquis	11/28/93
3	4" Quantum	Chung-Lin Lee	1/6/94
6	C-8 Celestron	Stan Stanley	11/7/93
7	12-1/2" Dobson	available	
8	14" Dobson	Lee Courtney	1/5/94
9	C-11	Paul Barton	*****
14	6" Newt/P mount	Craig Mohrman	11/28/93
15	8" Dobson	John Schoenenberger	1/6/94
18	8" Newt/P Mount	John Da Silva	1/9/94
19	6" Newt/P Mount	Jim Ricks	12/26/93
20	4-1/4" Dobson	Tom Rice	Special Loan

Solar telescope. Available only to experienced members for special occasions such as day time public star parties, etc. Call.

(on waiting list)

C8 John Schoenenberger

C8 Jim Ricks

If you want to borrow a telescope call Paul Barton (number is on the credit Marquee) and get your name on a general list (any telescope) or on a specific telescope list.

### ASTRO ADS

**ASTRO ADS** are free to all noncommercial advertisers wishing to sell astronomically related products or services. Please send your ad directly to the Editor: Bob Madden

1616 Inglis Lane

San Jose, Ca. 95118-2825

**NO LATER THAN THE 12th OF EACH MONTH!** Your Astro Ad will run approximately 3-months.

**Criterion 6" Newtonian**, f/7, motor drive, 6X30 Finder, 2 lens: 9mm and 18mm. Excellent condition - \$500. Call Sal Orlando (408) 292-1300 9/93

**Owner of 17.5"** telescope will share telescope in exchange for transportation to a dark sky site. Can stay over night. (408) 296-0487 1324 Blackfield Dr. Santa Clara. Ask for Mr Thompson 10/93

**Celestron C-11**, Many accessories \$1750. Mike Ryan (408) 241-4508 11/93

**6" Rich-Field** telescope - Colter optics, chopper-yellow (cool!) rack and pinion focusing w/eye piece - \$80. **Edmund Sci** Med to heavy duty GEM - short wooden legs for reflector - \$75. **Edmund Sci** light duty GEM - long legs for refractor - \$50. **Edmund Sci** w/aluminum setting circles \$75. **Pentax ME Super** 35mm SLR camera - 50mm f/2.0 lens - through the lens metering - perfect astro-camera. MINT! \$150 call Ben Blake

(408) 379-5276 leave message if answering machine 11/93

**Parsec 12 GEM** mfg by Epoch Inst - Kevin Medlock. Never used - \$2500 firm. One of the best. **Everex 2400 baud Modem** external, will work with a PC or Mac. \$25 Call Bob Madden (408) 264-4488 12/93

**C-6 Tube Assy** - \$200, **German Equatorial pier Mount** - Heavy duty - \$500, **14-inch Mirror** - Cassegrain, Hole in center, chip on edge - Best Offer. Call Ted Blanchard - (408) 265-5683 12/93



# CELESTIAL CALENDAR

December 1993

LunarPhases	Date	Rise	Tran	Set
LQ	17:28hr	06-12	-----	0557 1211
NM	01:27hr	13-12	0726 1228	1733
FQ	14:26hr	20-12	1143 1805	-----
FM	15:06hr	28-12	1708	----- 0659

## Nearer Planets

Mercury	07-12	0556 1058	1600
1.29 AU	17-12	0633 1123	1621
Mag -1.6	27-12	0708 1151	1634

Venus	07-12	0621 1118	1616
1.67 AU	17-12	0642 1133	1623
Mag -4.0	27-12	0701 1148	1635

Mars	07-12	0735 1221	1707
2.44 AU	17-12	0730 1215	1659
Mag 1.30	27-12	0724 1208	1653

Jupiter	07-12	0351 0916	1441
1.03 AU	17-12	0321 0844	1407
Mag -1.8	27-12	0250 0811	1333

Saturn	07-12	1134 1652	2209
10.0 AU	17-12	1057 1615	2134
Mag 1.10	27-12	1020 1539	2059

SOL	Star	Type	G2	V	Mag	-	26.72
RA	DEC						
16:58	-22:40	07-12	0707	1159	1651		
17:41	-23:22	17-12	0715	1204	1653		
18:26	-23:18	27-12	0720	1209	1658		

Astronomical Twilight	Dawn	Dusk
JD 2,449,328.5	07-12 0536	- 1823
,338.5	17-12 0542	- 1826
,348.5	27-12 0547	- 1831

## Sidereal Time

Transit Right	07-12 0000	PST=0456
Ascension at	17-12 0000	PST=0536
Local Midnight	27-12 0000	PST=0615

Darkest	Saturday Night	Nov 11
Sunset	1652	
Twilight End	1824	
Moon Set	1535	
Moon rise next morning	0626	

## TIMES AND DATES ARE PACIFIC STANDARD

Times are Local Civil

for Houge Park

Derivation of these values are from  
*Astronomy with Your Personal  
Computer*

by Peter Duffet-Smith

*MacEphem*

by Elwood Charles Downey

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## Comet Comments

by Don Machholtz

Four comets are now visible in our skies, two more were recovered.

Periodic Comet Urata-Nijimas (1993q): Recovered by Jim Scotti of Kitt Peak, this comet will remain faint. The orbital period is 6.6 years.

Periodic Comet Spitaler (1993r): Jim Scotti at first thought that this was a discovery of a new comet. However upon his suggestion, this is now proven to be periodic Comet Spitaler, lost since discovery in 1980. Its 7.1 year orbit has brought it to perihelion 13 times since then. It is expected to remain faint.

## EPHEMERIDES

DATE (00UT) R.A. (2000) DEC. ELONG SKY MAG

### COMET MUELLER (1993a)

11-29	20h31.8m	+46°30'	89°	E	8.8
12-04	20h41.5m	+41°54'	85°	E	8.8
12-09	20h50.2m	+37°39'	81°	E	8.9
12-14	20h58.3m	+33°46'	76°	E	8.9
12-19	21h05.7m	+30°15'	72°	E	9.0
12-24	21h12.8m	+27°04'	67°	E	9.0
12-29	21h19.5m	+24°13'	63°	E	9.1
01-03	21h25.9m	+21°40'	58°	E	9.2
01-08	21h32.0m	+19°23'	53°	E	9.2

### COMET MUELLER (1993p)

11-29	22h54.4m	+10°49'	101°	E	10.8
12-04	22h52.4m	+07°41'	95°	E	10.7
12-09	22h51.3m	+04°45'	89°	E	10.6
12-14	22h51.0m	+02°01'	83°	E	10.5
12-19	22h51.6m	-00°30'	77°	E	10.5
12-24	22h52.8m	-02°50'	71°	E	10.4
12-29	22h54.7m	-05°00'	66°	E	10.2
01-03	22h57.1m	-07°02'	60°	E	10.1
01-08	23h00.1m	-08°55'	55°	E	10.0

### PERIODIC COMET ENCKE

11-29	22h40.4m	+07°29'	97°	E	10.9
12-04	22h36.3m	+06°36'	91°	E	10.8
12-09	22h33.3m	+05°51'	85°	E	10.6
12-14	22h31.3m	+05°12'	80°	E	10.4
12-19	22h30.2m	+04°38'	74°	E	10.2
12-24	22h29.6m	+04°08'	69°	E	9.9
12-29	22h29.5m	+03°40'	64°	E	9.6
01-03	22h29.4m	+03°12'	59°	E	9.3
01-08	22h29.0m	+02°38'	53°	E	8.9

### PERIODIC COMET SCHWASSMANN-WACHMANN 2

11-29	08h34.3m	+16°28'	120°	M	11.6
12-04	08h37.5m	+16°22'	124°	M	11.5
12-09	08h40.1m	+16°20'	129°	M	11.4
12-14	08h41.8m	+16°21'	134°	M	11.4
12-19	08h42.8m	+16°26'	138°	M	11.3
12-24	08h43.0m	+16°35'	144°	M	11.2
12-29	08h42.4m	+16°48'	149°	M	11.1
01-03	08h41.1m	+17°05'	154°	M	11.1
01-08	08h39.1m	+17°26'	160°	M	11.0

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