

# SJAA EPHEMERIS

## SJAA Activities Calendar

Jim Van Nuland

### June

- 2 Pinnacles Astronomy Night.
- 3 Fremont Peak star party. Sunset 8:21 p.m., 4% moon sets 9:56 p.m.
- 9 Houge Park star party. Sunset 8:27 p.m., 61% moon sets 2:25 a.m.
- 10 Observational Astronomy class, Houge Park, 8 p.m.
- 17 General Meeting. Speaker Gary Peterson, Basaltic Flooding of Planetary Landscapes
- 23 Houge Park star party. Sunset 8:32 p.m., 59% moon rises 1:05 a.m.
- 24 Fremont Peak star party. Sunset 8:29 p.m., 49% moon rises 1:33 a.m.

### July

- 1 Fremont Peak star party Sunset 8:30 p.m., No moon.
- 7 Houge Park star party. Sunset 8:31 p.m., 46% moon sets 0:58 a.m.
- 8 Observational Astronomy class, Houge Park, 8 p.m.
- 15 General Meeting: Dr. James Kaufman on the Moon Illusion
- 21 Houge Park star party. Sunset 8:24 p.m., 73% moon rise 23:37 p.m.
- 21-22 SJAA public star parties at Yosemite National Park.
- 29 Fremont Peak star party Sunset 8:16 p.m., 1% moon rises 5:33 a.m.

Reserve space at the Yosemite star party! Call Jim Van Nuland at 408-371-1307, or visit Jim's web site [www.svpal.org/~jvn](http://www.svpal.org/~jvn)

## Comet Comments Message for the SJAA

Don Machholz

This concludes Comet Comments, which began in the September 1978 issue of this newsletter. I had actually written a short article about Comet Meier in April of that year, but in September I started writing on a monthly basis. All I wanted to do was to let other amateur astronomers know where the observable comets were in the sky. And when I knew the discovery circumstances, or the discoverer him/herself, I wanted to share that with the readers too.

Perhaps most interesting to my readers was a feature I ran for the first 15 years. It was titled "Comet Tales" and featured series on past comet hunters, present comet hunters, the telescopes these people use, Comet Halley, and then five years of everything you would ever want to know about comets and comet hunting. In the past five years, "Comet Hunting Notes" has served a similar purpose. It is often this part of Comet Comments which took the most time to prepare.

Getting back to 1978, the editors of *Ephemeris* were Ed Schell and Penny Penschmidt. The early Comet Comments were handwritten by me and then hand-delivered to Ed. In time I graduated to using a very old typewriter. By 1981 a club in Delaware wanted to receive Comet Comments and a couple of years later Gerry Rattley moved to Arizona and wanted it in his new club's newsletter too. I remember using carbon paper to write the additional copies.

Circulation grew with the interest of Halley's Comet and has steadily

grown ever since. At the end, Comet Comments was being received in the Philippines, China, India, Australia, New Zealand, South Africa, Brazil, Argentina, Chile, Italy, Norway, the Netherlands, Germany, England, and Canada. I was e-mailing it to a list of 100 individuals, snail mailing it to 15 more, and mailing it to another half-dozen through SASEs. And to think it all started with the SJAA Ephemeris.

I would like to thank the San Jose Astronomical Association for encouraging me to write Comet Comments. I also want to thank the newsletter editors and readers for making it easier to do.

Don Machholz, April 20, 2000

Many of you will want to find information about comet ephemerides. To assist you, your Ephemeris editors have compiled some web pages. And here they are...

<http://encke.jpl.nasa.gov/eph.html> will give you almost everything you'll need even if you want to compute your own ephemerides.

[http://encke.jpl.nasa.gov/whats\\_visible.html](http://encke.jpl.nasa.gov/whats_visible.html) will give you a list of comets currently visible.

[http://encke.jpl.nasa.gov/will\\_be\\_visible.html](http://encke.jpl.nasa.gov/will_be_visible.html) will give you a list of comments that will be visible in the near future.

<http://encke.jpl.nasa.gov/info.html> Other sources of information.

Now get out there and find a comet! (See inside for one of Don's comets.)

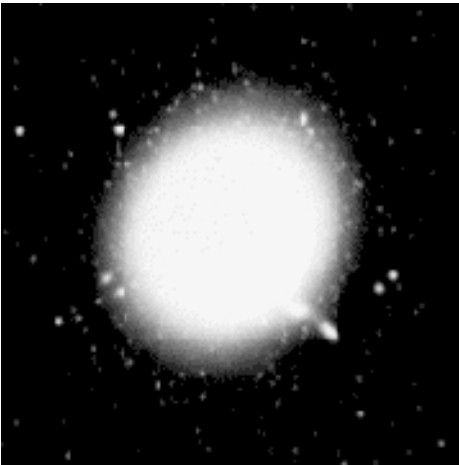
**24 Hour News and Information Hotline: (408) 559-1221**

**[www.sjaa.net](http://www.sjaa.net)**

## **The Jet**

Jay Reynolds Freeman

The famous “jet” emanating from the nucleus of M87 has long been an observing quest of mine, and a recent posting and web-site article by Jim Shields (the latter at <http://redshift.home.pipeline.com/m87jet.htm>) reminded me to keep trying. I have tried before, but the feature is small — less than half an arc-minute long and perhaps ten percent as wide — and is immersed in the high-brightness region near the nucleus of the galaxy, which means that it requires high magnification just



*M87 and its jet. Photo by Steven Williams at the Grove Creek Observatory (Australia).*

to see it, and good seeing so as not to blur it in with the rest of M87's core. Good seeing has been scarce at the sites where I observe, during the part of they year when M87 is well-placed, so the best I had ever done with Harvey, my white Celestron 14, was to log the jet “suspected.”

At least, that is the best I had done until recently. I took Harvey to Henry Coe State Park, near Morgan Hill, California, on Friday 28 April and again on Saturday 29 April, mostly for the kind of faint galaxy hunting that I don't write about for fear of boring you. Friday was chilly, windy, and dewy, and the seeing was visibly ratty even at only 98x. Yet Saturday was different, and not just because it was warmer, less breezy, and not so damp. As I

chased lumpy nothings through Hydra and Crater, I kept hearing passing observers remark how good the seeing was — sub arc-second in a Celestron 8. As I grew more and more tired, the intellectual effort of star-hopping became too much for me, so I decided to abandon my planned program and see what M87 had to offer.

Perhaps as an omen, I had unusually good luck finding it to begin with: Usually I enter the central part of the Virgo galaxy cluster by starting at rho Virginis, scanning north to M60 or M59, then working across to the west, but on this night I pointed the finder in vaguely the right direction, took a guess about which star M87 was next to, looked through the main telescope, and there it was. At 98x, there was no detail visible in the main galaxy, though

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*Perhaps as an omen, I had unusually good luck finding it to begin with.*

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its near neighbors NGC 4476, 4478, 4486A, and 4486B were all visible. So I changed to 326x — a 12 mm Brandon — for a better look. The seeing was indeed pretty good, and after a few minutes, I casually asked the few die-hards who were still awake and observing to come and tell me how the view appeared to them. I didn't tell anyone what we were looking at 'til all the results were in.

We all saw the thin ray emanating toward the northwest, and also another area of increased brightness just east of the nucleus, not as far out as the tip of the ray. I increased magnification to 489x (8 mm Brandon): The seeing was up to it, and the visibility of the features improved. To my eye, the jet was slightly detached from the nucleus — it did not go all the way in — the length (scaling against the eyepiece field diameter) was right, and the outer tip of the jet gave a hint of being slightly bent or kinked. The

view was good enough, that I would venture that the jet would have been visible in a substantially smaller telescope, perhaps in a 10-inch. Fellow observer Dave North went so far as to say that the jet was easy in Harvey at these magnifications. I am sure that my previous inability to detect it stemmed from the much worse seeing that obtained when I tried, and the observation served as a great reminder that deep-sky work with large amateur telescopes is often seeing-limited. And I don't know what the enhanced brightness at (approximately) position angle 90 degrees was — all the images of M87 that I have been able to find are either so deeply exposed they burn in the entire core, or so lightly exposed as to show the jet and little else. I don't think the whatever at 90 degrees was as bright as the jet.

I rather regretted not having a list of deep-sky targets that might reveal special detail in good seeing tucked away somewhere, but I did think of a few other things to try. M13 was wonderful at 489x — resolved all the way across the core. “You always wondered what was on the other side,” said one observer, speaking of our seeming ability to see clear through the globular. A bit to my surprise, the three dark lanes of the “propeller” were easily visible; I am used to thinking of them as best seen in smaller telescopes, but this particular combination of aperture and magnification seemed to be just right for viewing them. Perhaps M13 should be called the Mercedes cluster, for the lanes indeed resemble the Mercedes star.

M57 was next on my list, and it too was a lovely view. At 489x, the central star kept popping in and out — it was not as good a view as I have had of the central star with Harvey, on previous occasions, later in the summer with even better seeing, but it was certainly there. So were several

*Continued on next page*

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## The Jet

*Continued from previous page*

other stars, blinking in and out at the limit of vision, both within the glowing portion of the ring itself and in the darker “hole in the doughnut”. Perhaps doughnut is not quite the right word; one observer said that although M57 resembled a Cheerio with smaller aperture and magnification, the view through Harvey looked like a peach cut in half. I could see patches of faint nebulosity even in the “hole”, and the entire ring presented an irregularly curdled or mottled appearance, with lots of structure large enough to be easily resolved, but low enough in contrast to be only on the edge of visibility.

Another observer directed my attention to a possible color variation in the nebulosity; to him, the outer periphery of the ring appeared ruddy, whereas most of the body of the ring was green. On inspection, I think I agreed, though the difference was very subtle.

I took a look at a few double stars, to get a more conventional idea of what the seeing was like. Nu Scorpii was well resolved into four stars, with large amounts of dark space between the two components of each of its pairs. The airy discs of the stars were visible, but the diffraction rings were washed out into a blur of light around the central discs. There was no hint of linear distortions, such as might have deceived us into thinking we had detected the M87 jet when we actually had not. Nu Scorpii was lower in the sky than any of the other objects I have mentioned; seeing may have been better higher up. Antares, lower still, was a relatively easy split, even though its bright primary was trailed into a short, blocky spectrum by atmospheric dispersion.

I didn't get to sleep 'til almost dawn. It had been quite a night.

## Meteors

### June — Not a Major Meteor Month

Jane Houston Jones

On any given night, assuming it is clear, an observer can expect to see about 7 meteors. These sporadic meteors are a measure of the everyday cometary debris entering our atmosphere. And it holds up all over the world. 7 meteors are to be seen everywhere on earth, every night. I sort of like that feeling that we astronomers are connected to each other by what we do and what we see. Each night, while I'm out observing, my astro-friends on other continents are doing the same thing. And we all get lucky every night. We all see a little speck from the birth of the solar system light up our night.

Watching sporadics on any night can make up for the fact that there aren't any major showers this month. Two minor showers of interest will generate maybe as many meteors as the sporadics.

The Arietids peak on June 7th (May 22 through July 2). Short wave radios can pick up the brief signal of radio stations being reflected off the ionized trails of meteors. Like the way the ionosphere reflects most radio waves. At 30 degrees west of the sun

(appearing from Aries the Ram) and rising an hour before dawn means I wouldn't plan a meteor party or anything. If you happen to be on the equator about this time, I'd definitely give it a look.

The June Bootids peak on June 27th (June 26 - July 2). The ZHR goes from 0 to 100, leaning toward the 0. This shower has only been active three times this century. But a surprisingly strong shower appeared in 1998, leading the IMO to put the shower back on its “Working List of Visual Meteor Showers” It's worth a look though, as the Bootids are slow moving, rambling through the sky. Lazy and slow, a dramatic change of meteor pace from the fast Persids we'll all be seeing in August. Bootes is well placed all night long, and the radiant is in northern Bootes. The date, a mere four days past new moon at the expected peak means that we'll have dark skies, too! Jane says definitely take a look for this one! And drop the editors a line if you have any meteoric experiences; we'd love to post some observations in the newsletter!

## The Shallow Sky

### We Survived

Akkana Peck

Well, we survived the Millennial Great Planet Alignment and came out without a scratch. The downside of this is that now most of the planets, being more or less in line with the sun, are still visible only at dawn or dusk, making for not a great season for planet watchers.

Mercury makes an evening appearance this month, starting at about half phase and fading to a slim and difficult-to-spot crescent as it moves back toward the sun later in the month.

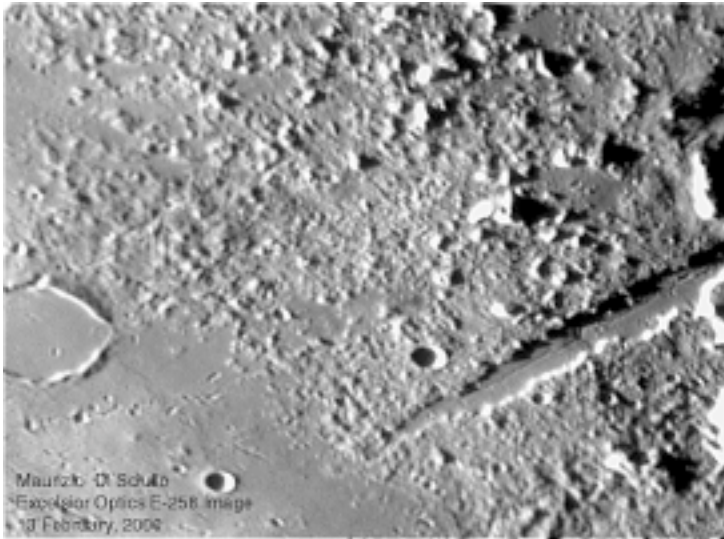
Jupiter and Saturn are only a few degrees apart in the predawn sky. Their low altitude makes them unimpressive targets for telescopic observations, but they should be a pretty naked-eye sight for earlybirds.

Uranus and Neptune are visible in the late evening sky, in Capricornus; faint Pluto, in Ophiuchus, rises earlier and is very well placed for ambitious observers this month. Try humming Christine Lavin's “Planet X”, a song about the discovery of Pluto, for inspiration as you hunt down this faint point of light.

## Platolets and Capillaries

Dave North

There are two classic really tough lunar tests of seeing and optics. If you hang around with moonies long enough, you'll start to hear discussion of them (and maybe already have): the craterlets in Plato and the rille in the Alpine Valley. Of course, there are others. And of course, I'll mention a few of them. But right now, we're going to deal with these two 'classics.' First,



*Maurizio Di Sciullo, Excelsior Optics E-258 image, 13 February 2000*

the craterlets in Plato. They're small, but can be resolved not only as dark marks, but five (at least) can be resolved with detail enough to see their rims in just the right light. I have seen claims of up to 11 craterlets resolved, and my own very best run is only seven. Sometimes you'll look at the floor of this crater with even the finest telescope and see no craters at all. That tells you a little something about the seeing (it's bad). Other times you'll score four (or more) with fairly modest aperture. A few years back they were under such odd, cooperative light that I'm fairly sure the five majors would have shown easily in an 80mm scope. So if you see that many, or more, it really doesn't necessarily mean you have 1/20 wave optics — the light

angle is also critical, but not predictable. Sometimes they show well with very low light (though this condition usually hides at least one of the craters in shadow). Sometimes they show best as light marks at high illumination. And just about anything in between. So there's no easy way to predict when it's best to look, nor is it clear that this particular test establishes anything

about optics or observational skill, though it does serve as a positive indicator of seeing on most nights (if you can see any of them, it's probably not too bad). But hidden in this morass of nitpickiness is a true challenge: two of the larger craterlets are right next to each other, separated (as far as I can tell) by about their own diameters. Usually, folks will think they are just one crater (the largest). I'm not going to point out which one it is — though it's easy enough to see on a good chart — but if you can "split the double" ... then you have indeed done something of note.

The rille in the Alpine Valley? Very hard. I have never seen the whole thing at one time outside of an image by Maurizio DiSciullo or Thierry Legault (or Lick photos or...) I have talked to a few folks who have had the opportunity to glean this prize from their eyepiece "in toto," but there have not been very many. What this means is, The Rille is a very hard target. For those who have tried without success: it's really there!

But don't expect to see it on your first try, or your second, or maybe even your twentieth. Just remember, Don Machholtz went for thousands of hours before bagging his first comet — your own wait won't be as long (I don't think). Parts of it are much easier than others, and before too long you should catch a glimpse of a stretch here or there. Most likely, they'll be fleeting hints the first time — though you may luck out and get a steady view. You never know! What can you expect to see? A thin wiggly line. That's it.

So, why do people do these things? Beats me. Why climb Everest? In my own case, I just glance because it's there. Sometimes you see it,

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***So why do people do these things? Beats me. Why climb Everest? In my own case, I just glance because it's there.***

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usually you don't. It's an old habit, formed when I first started tracking it down. Took me quite a while — all I had in those days was a 4.5-inch reflector (which I still have and use). Are there other "classics?" Well, maybe. The crater Linne itself (not the halo) is sometimes seen as a hard shot. Several other rilles also qualify, and perhaps the catena in Rimae Hyginus qualifies (though they are really quite easy in any kind of good light and seeing). But for some reason, there are folks out there who will count the craters in Clavius (a monster that really, you must see). This one I don't get at all ... if you get decent seeing, you'll run out of fingers and toes and noses and eyes and have to start making hash marks on the back of your hand or something.... ..but heck, if you get over a hundred, that's probably a pretty good night.

# 1999 Leonid MAC Campaign, Some Scientific Results

Jane Houston Jones

In late April, the International Leonid Multi Instrument Aircraft Campaign (Leonid-MAC) Workshop was held in Tel Aviv, Israel. NASA, the U.S. Air Force, and the Israel Space Agency sponsored the event. Most of the researchers who conducted airborne experiments on the Leonid Multi-instrument Aircraft Campaign last November attended the workshop. Many other researchers with projects conducted during land based campaigns also presented their results.

The Leonid meteor shower offered unprecedented opportunities to address outstanding issues in the areas of Planetary Astronomy, Suborbital Magnetospheric, Ionospheric, Thermospheric, and Mesospheric (MITM), and Astrobiology. The Leonid meteor shower also presented opportunities to study the dynamics of the upper atmosphere, and issues that relate to the satellite impact hazard of meteor storms.

Some highlights from the Leonid MAC Workshop:

## **Astrobiology:**

Leonid storm lightcurves different from 1998 return (I. Murray et al., Regina University)

CN is absent in near-UV (R. Rairden et al., Lockheed Martin)

Unusual meteor shapes at high 135-200 km altitude (P. Spurny et al., Ondrejov Observatory)

New meteor models from rarefied flow around a meteoroid. Direct Simulation Monte Carlo techniques explain meteor temperatures (I. Boyd et al., Michigan University)

First measurement of temperature decay in air plasma of bright bolide (J. Borovicka et al., Ondrejov Observatory)

Unusual beading in meteor train emission (M. Taylor et al. Utah State Univ.)

First mid-IR spectra of persistent trains show warm air emissions (R. Russell, G. Rosano et al., The Aerospace Corp.)

Shower affects airglow chemistry (J. Kristl et al., AFRL)

## **Impact hazard:**

Acute impact probability about 2.5 percent during 1999 Leonid storm (H. Yano, ISAS)

Near-real time reporting a success (M. Treu, USAF/XOR)

Storm profile Lorentz curve: offers possibility for empirical measurements of traillet cross section perpendicular to Earth's orbit and dust density fall off away from comet position (P. Jenniskens, SETI Inst.)

Good prospects for further meteor storms in 2001 and 2002 (D. Asher, Armaugh Observatory)

## **Environment:**

First elves observed over Europe are also first confirmation of EMP pulse theory (M. Taylor, L. Gardner, et al., Utah State University)

Numerous unusual short duration VLF emissions in 1-20 kHz range consistent with meteoric origin (C. Price, Tel Aviv University)

Brief flashes against lunar disk consistent with impacts on the Moon (L. Bellott et al., Univ. of Tenerife)

## **Techniques:**

Airborne observations up to 7 times more effective in counting meteors than ground-based efforts from Calar Alto (D. Koschny, ESTEC)

NASA is presently in a phase of information gathering to gear up for the next (and final) generation missions in the Leonid MAC effort for the years 2000-2002.

The planned one-plane and low-cost 2000 Leonid MAC mission is a technology testbed for new astrobiology experiments for the final two missions in 2001 and 2002 when a storm is expected. Unaffected by scattered Moonlight, this mission will collect fundamental data on dust distribution perpendicular to Earth's orbit and along the dust trail away from the comet. The mission banks on the fact that both the 1866 and 1932 traillets are best observed from the eastern USA in consecutive nights.

More detail, in the form of extracts of each workshop speaker's topic can be read on the Leonid MAC Workshop 2000 website. <http://leonid.arc.nasa.gov/workshops/>



*Jim Van Nuland (left) and Mark Taylor manage the desk at the 2000 SJAA Auction and Swap Meet.*



## Comet P/1994 P1 (Machholz 2) (1994o)



*This is an image of Comet P/Machholz 2 obtained by Jim Scotti with the 36 inch Spacewatch telescope on Kitt Peak in Arizona on 1994 September 9 UT. The image is about 23.3 arcminutes on a side with north at right and east at top. This comet was observed as a fragmented comet with at least 6 fragments observed after its discovery. This image shows fragment "A", the brightest of the nuclei and fragment "B" just to the right and above fragment A. The other fragments are off the frame to the north-northeast. The morphology of this comet changed rapidly in the days around this image. Visible here is a narrow ion tail extending off the image and a nearly symmetric coma embedded in a sharply bounded tail structure. Also visible very faintly is a faint debris structure spread through the nuclei. The tail structure changed drastically in the days following this image with the ion tail dissipating and the tail weakening.*

### Wanted to Trade

I have a very late model Astro Physics Traveler EDF in new condition with all standard accessories. Wanted to trade (with cash added) for an Astro Physics 155 EDF or Takahashi 6" in excellent condition. David Simons 408-943-4386, ysimons@yahoo.com

### For Sale

Unassembled AstroSystems Telekit manufactured for a 14.5" f/5 mirror. The kit is in perfect condition and ready to finish and assemble, no optics included. Ready for pick-up in Campbell. \$1,000. Morris Jones (415) 453-2885 or (408) 836-4300, mojo@whiteoaks.com.

## Celestial Calendar

June 2000

Richard Stanton

Lunar Phases:	Date	Rise	Trans	Set
NM	07:14 PDT	02	06:12	13:28 20:51
FQ	20:29 PDT	08	12:37	19:19 01:19
FM	14:27 PDT	16	20:27	00:41 05:45
LQ	18:00 PDT	24	01:05	06:56 12:54

Nearer Planets:	R. A.	Dec.
Mercury, 0.69 A.U., Mag. 0.4		
07 07:28 14:52 22:15	06:48.1	+24:34
17 07:26 14:43 21:59	07:20.7	+21:52
27 06:58 14:04 21:09	07:22.2	+19:14

Venus, 1.73 A.U., Mag. -3.9		
07 05:46 13:03 20:20	04:59.1	+22:39
17 05:51 13:16 20:42	05:52.4	+23:46
27 06:05 13:31 20:56	06:44.9	+23:44

Mars, 2.58 A.U., Mag. +1.6		
07 06:15 13:36 20:58	05:33.4	+24:00
17 05:59 13:26 20:53	06:02.9	+24:13
27 05:50 13:16 20:42	06:31.5	+24:05

Jupiter, 5.85 A.U., Mag. -2.1		
07 04:35 11:34 18:34	03:31.4	+18:12
17 03:58 11:03 18:08	03:40.6	+18:44
27 03:26 10:33 17:40	03:49.4	+19:12

Saturn, 9.99 A.U., Mag. +0.9		
07 04:36 11:31 18:26	03:28.4	+16:50
17 03:57 10:56 17:55	03:33.3	+17:07
27 03:21 10:21 17:21	03:37.8	+17:21

SOL Star Type	G2V	Intelligent Life in System ?
Hours of Darkness		
05:28 07 05:49 13:07 20:26 05:03.7		+22:48
05:20 17 05:43 13:09 20:34 05:45.2		+23:24
05:22 27 05:46 13:11 20:36 06:25.8		+23:18

Astronomical Twilight:	Begin	End
JD 2,451,702 07	04:20	21:49
712 17	03:51	22:29
722 27	03:52	22:30

### Sidereal Time:

Transit Right Ascension at Local Midnight	
07 00:00 = 15:56	
17 00:00 = 16:35	
27 00:00 = 17:15	

### Darkest Saturday Night: 03-Jun-2000

Sunset	20:27
Twilight End	22:19
Moon Rise	07:15
Dawn Begin	03:53
Hours Dark	05:34

### Officers and Board of Directors

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## SJAA Loaner Scope Status

All scopes are available to any SJAA member; contact Mike Koop by email (loaner@sjaa.net) or by phone at work (408) 473-6315 or home (408) 446-0310 (Leave Message).

### Available Scopes

These are scopes that are available for immediate loan, stored at other SJAA members homes. If you are interested in borrowing one of these scopes, please contact Mike Koop for a scope pick up at any of the listed SJAA events.

# Scope	Description	Stored by
7	12.5" Dobson	Jeff Crilly
19	6" Newt/P Mount	Dean Sala
24	60mm Refractor	Michael D. Turner
30	7" f/9 Newt/Pipe Mount	Mike Koop
31	8" f/8 Dobson	Lee Barford
	Star Spectroscope	Mike Koop

### Scope Loans

These are scopes that have been recently loaned out. If you are interested in borrowing one of these scopes, you will be placed on the waiting list till the scope becomes available after the due date.

# Scope	Description	Borrower	Due Date
1	4.5" Newt/ P Mount	Tim Roberts	8/12/00
6	8" Celestron S/C	Al Kestler	6/24/00
8	14" Dobson	Gary Strawn	6/29/00
15	8" Dobson	Mike Rupe	7/28/00
23	6" Newt/P Mount	Raghu Srinivasan	8/12/00
28	13" Dobson	Paul Lawrence	8/26/00
32	6" f/7 Dobson	Gordon A. McClellan	8/12/00

### Extended Scope Loans

These are scopes that have had their loan period extended. If you are interested in borrowing one of these scopes, we will contact the current borrower and try to work out a reasonable transfer time for both parties.

# Scope	Description	Borrower	Due Date
2	6" f/9 Dob	John Paul De Silva	?
3	4" Quantum S/C	Mike Koop	Repair
9	C-11 Compustar	Paul Barton	Indefinite
16	Solar Scope	Michael D. Turner	5/20/00
18	8" Newt/ P Mount	Paul Barton	Storage
21	10" Dobson	Ralph Seguin	Repair
26	11" Dobson	John Templeton	7/14/00
27	13" Dobson	Steve Sergeant	8/12/00
29	C8, Astrophotography	Doug Hendricks	6/3/00

### Waiting List

The wait list is empty. Reserve a scope today!

### Notes:

Thanks to Kevin Medlock for the donation of three Anti-Vibration Pad Sets, and to Ran Talbott for the donation of two eyepieces!

### Publication Statement

**SJAA Ephemeris**, newsletter of the San Jose Astronomical Association, is published monthly, 12 times a year, January through December.

San Jose Astronomical Association,  
P.O. Box 28243  
San Jose, CA 95159-8243

### Submit

Members are encouraged to submit articles for publication in the SJAA Ephemeris. Send articles to the editors via e-mail to [ephemeris@sjaa.net](mailto:ephemeris@sjaa.net).

To subscribe to or unsubscribe from the SJAA Mailing List send email to [sjaa-request@sjaa.net](mailto:sjaa-request@sjaa.net) with a blank subject line followed by a single text line that says "subscribe" or "unsubscribe"

## San Jose Astronomical Association Membership Form

New \_\_\_ Renewal \_\_\_

Membership - \$15

Junior (younger than 18 years old) - \$6

Sky and Telescope - add \$30 to membership

(Sky & Tel will not accept multiyear subscriptions)

Make checks payable to "SJAA"

Bring this form to any SJAA Meeting  
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