SJAA EPHEMERIS

SJAA Activities Calendar

Jim Van Nuland

January

1 Fremont Peak star party. Sunset 5:00 p.m., 18% moon rises 3:41 a.m.

8 Fremont Peak star party. Sunset 5:05 p.m., 5% moon sets 7:06 p.m.

14 Houge Park star party. Sunset 5:13 p.m., 55% moon sets 1:14 a.m.

15 Observational Astronomy class, Houge Park, 8 p.m. "Introduction to the Sky" *See inside for more information*

22 General Meeting at Houge Park, 8 p.m. Speaker: Michael Light, author of *Full Moon*

28 Houge Park star party. Sunset 5:27 p.m., 42% moon rises 1:36 a.m.

29 Deep-Sky night. Sunset 5:28 p.m., 33% moon rises 2:29 a.m.

February

5 Fremont Peak star party. Sunset 5:35 p.m., New moon rises 5:57 p.m.

11 Houge Park star party. Sunset 5:43 p.m., 41% moon sets 0:11 a.m.

12 Observational Astronomy class, Houge Park, 8 p.m.

19 General meeting at Houge Park, 8 p.m., Jeff Moore, Mars Polar Lander and the latest results from Galileo

25 Houge Park star party. Sunset 5:57 p.m., 60% moon rises 0:21 a.m.

26 Fremont Peak star party. Sunset 5:57 p.m., 50% moon rises 1:15 a.m.

Winter Fremont Peak star parties are "no host."

The Great Leonid Storm of 1999

Jane Houston

The 1999 Leonid MAC Mission began months before the ARIA aircraft took off from Edwards Air Force Base on Saturday, November 13th. Planning began as soon as the 1998 Mission was over and the predicted storm had not materialized over Okinawa.

My first mission was to get past the gate of NASA Ames Research Center in Mountain View and find the basement office of SETI's Dr. Peter Jenniskens. The group of amateur astronomers who made up the flux measurement team met for a practice session in October. We donned our i-goggles and practiced hollering out the magnitude and classification of meteors from last years mission videotapes. We were a dismal failure. We each took home tapes and goggles and practiced. We had the written record to compare our results against. After a few hours, I found I could see 25 percent more meteors on those tapes than the original reviewer did. I was ready for the mission! All I needed was a flight suit. Two days and nights of practice at Edwards Air Force Base in the Mojave Desert later we were ready for our adventure.

Jane in flight suit and "i-goggles" aboard the ARIA research aircraft.

First, we were briefed by the Air Force, zipped into our new flight suits, and strapped into our seats. Oxygen masks dangled overhead. Off we went on the dream trip of a lifetime. Arizona morphed into the great plains, and then to the great urban eastern coast. After refueling at McGuire AFB in New Jersey, we took off just before midnight for our first official night of meteor flux measurement. It was November 13. Seven hours later, we landed at Mildenhall AFB, near Cambridge in the U.K. On that first night of counting, our numbers averaged an equal number of Leonids and Sporadics about 10 or so each per hour, adjusted for ZHR.

Each of the 6 amateur astronomers on the flux measurement team donned i-goggles which were connected to one of six cameras. Four of the video cameras were equipped with an F/1.2-55 mm photographic objective, a Hi8 camcorder and military image intensifying electronics. Such a camera records stars up to magnitude +8 and

Continued on Page 2

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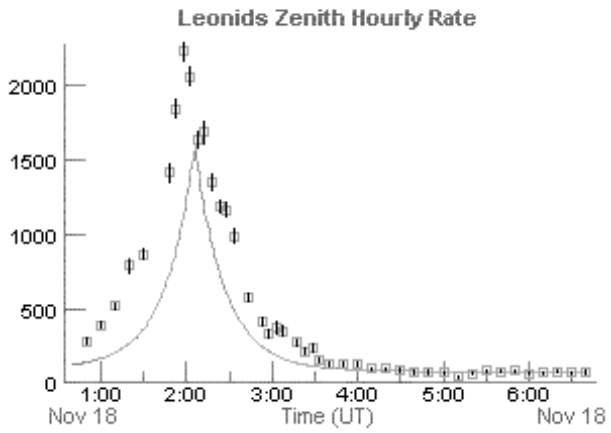
http://www.seds.org/billa/sjaa/sjaa.html



Continued from Page 1

meteors up to magnitude +7 in a 25 degrees field of view. One camera was an intensified high definition TV camera operated by the Japanese television network NHK. NHK cameras on the two aircraft provided stereoscopic views of fireballs, and sprites. The sixth was an image intensified CCD camera operated by the European Space Agency. This one camera had a smaller field of view, 12 by 20 degrees as opposed to the other 5 which gave a larger field of about 20 by 30 degrees of sky. The Japanese camera changed from a wide field to a narrow field every 20 minutes, so we were only able to measure the flux with that camera when in wide field mode.

There were two other cameras aboard the ARIA aircraft, but my team did not use them for our measurements. One of them measured atmospheric wave structure and airglow emission using (among other things) magnesium and sodium filters in visible and near infrared wavelengths. Another was a fiber coupled slit spectrograph - measuring high and low resolution UV. This camera also had a Celestron "First Scope 80" for an objective.

Our first task each evening was to map out the field of view in our goggles. There was some overlap on some of the cameras. It was easy if Orion or Ursa Major was partially visible in the field of view through the goggles. Less easy if three stars in Eridanus were our clues to the field. Once we figured our limiting magnitude by memorizing the star fields in our goggles we were set to observe meteors and record their magnitudes.

Each night yielded highlights. The first night out over the Atlantic we observed meteors streaking through the Aurora Borealis, and saw Sprites, upward lightening strikes, thought to be induced by meteors.

The second night from England to Israel we observed and recorded 15 - 20 Leonids per hour, after making comets at a local elementary school on Lakenheath RAF Base.

The third night from Israel to the Azores we observed the peak of the Leonid Storm of 1999. This equated to a ZHR of 2300 Leonids per hour. I personally observed 2700 Leonids on storm night alone. The group of six of us combined for 15,000 Leonids that night. These counts were subsequently adjusted for ZHR and only the results from similar cameras were used for final results. 453 Leonids at 1:45 UT. 1030 Leonids at 1:50 UT. 1114 Leonids at 1:55 UT. 1017 Leonids at 2:00 UT. 766 Leonids at 2:05 UT. 525 Leonids at 2:10 UT (power outage). 711 Leonids at 2:15 UT. 682 Leonids at 2:20 UT. 577 Leonids at 2:30 UT. Down to 34 Leonids at 4:55.

The fourth night from the Azores to Florida, we observed all night long just to collect the data. We were exhausted and most of us slept some of this night. Sprites and Elves were captured by the airglow measuring camera this night!

The final flight took us from Florida back to Edwards Air Force Base. We all looked out the optical glassed windows in the bright daylight and saw the remnant of an earlier cosmic collision — Arizona's Meteor Crater! What a fitting end to our trip!

My complete scrapbook, complete with more detailed write-ups and many photos, press coverage and research results, as they are submitted can be found at: http://morris.sanjose.psn.net/~mojo/jhmac/index.html

I can't wait for 2002, the next potential year for an airborne trip. I hope I get to go again! Heck I won't even need a flight suit!

A truckload of Leonid research assistants. Left to right, Dr. Richard Rairden from Lockheed Martin, SJAA members Mike Koop and Jane Houston, and Dr. Kristina Smith

Mercury Transit Report

Akkana Peck

After a week of weather forecasts predicting cloudy or party cloudy skies for the Mercury transit, this morning dawned mostly clear here in San Jose, CA.

Articles written before the transit had predicted that it might be a difficult event to see, requiring high magnification, good optics, and steady seeing. We weren't sure what to expect.

Hoping to gain some elevation (for better seeing) and some distance eastward, away from the cold front the satellite photos showed coming our way, we headed for Henry Coe State Park, armed with a 4.5" Newtonian, a C-5, and an 80mm f/7 refractor, all fitted with JMB (Orion) solar filters.

Sunspot viewing before the start of the transit was fabulous, with one huge group (easily visible to the naked-filtered-eye) looking like an island arc, perhaps like Hawaii will look after another few million years drifting over its hot spot in the Pacific. The seeing was not very steady (not surprising for daytime on a day between two weather fronts) but was good enough to show a nice low-power view of the sunspots. We took the C-5 up to 85x and the 4.5" up to 60x to watch for the beginning of the transit.

First contact was predicted to be at 21:11:38 UT (1:11 local time); it was perhaps a minute earlier than that that we first thought we saw a small "bite" out of the sun's northeastern limb. The "bite" was very sharp and obvious, even in the 80f7, running at about 20x. Evidently the reports of the difficulty of observing a Mercury transit had been much exaggerated.

Second contact was expected at 21:23:08. We expected the "black drop" effect — that for a little while after second contact, the disk of Mercury would appear to stretch out a bit before appearing to be cleanly inside the sun's disk. What I saw was a bit different: from 21:21 to 21:23, the view seemed to oscillate (with the seeing fluctuations) between the "black drop" and actually showing some solar disk outside the disk of Mercury. This makes me suspect that the "black drop" effect is the result of seeing fluctuations, and might be less pronounced somewhere with very steady seeing.

Starting at 21:23, we could see clean separation between the outer edge of Mercury's silhouette and the sun's disk. It was visible in the 80f7 at low power as well; neither magnification nor aperture appeared to make much difference in how well we were able to view any part of this event. I hope no one was scared off of trying to watch the transit because of all the gloom-and-doom predictions of the horse-power it would require!

The 35 minutes or so between second and third contact were uneventful except for one stray cloud blocking our view for a few seconds, and a nice view in the 80mm of a jet airliner passing across the sun's disk just south of Mercury. At 21:56 (thinking it was 21:58, but we'd forgotten to synchronize our watches and it turned out we were both just over two minutes fast) we geared up for third contact (predicted for 21:58:47) ... and waited ... and waited ... and two minutes later, at 21:58:45, the "oscillating between black drop and showing separation" effect finally began to happen, and continued for a bit over half a minute (not as long as it had on second contact) before finally turning into "a bite out of the sun's limb". So the prediction very accurately described the third contact time, even though at the time we thought we had gotten a "free" two extra minutes of transit ...

I increased magnification on the C-5 to 170 to try to get as clear a view as possible of the last seconds before fourth contact. The "bite" finally became indisinguishable at 2:09:18 (a minute earlier than predicted, perhaps with steadier seeing we could have had a minute more of visibility). Again, though, neither magnification nor aperture seemed to matter; a few seconds before it disappeared in the 4.5" and 5", it was also still visible in the 80mm.

We didn't see any hint of Mercury silhouetted against the sun's corona with our white-light filters.

SJAA members gather at Houge Park to observe the Mercury solar transit, December 15, 1999. Photo by SJAA member David Simons.

Mooning

David North

Eclipse!

Not only that, high in the sky, at a good time, with clear air! If the weather holds, this will be about as good as you can hope for.

The first hints of duskiness will appear at around 6pm, when the moon is low and darkness has barely set in.

Just a little after 7pm, the inkiest part of the earth's shadow should start to creep across the Moon.

At that point, it will be about 20 degrees elevation — not bad.

Over most of the next hour, the shadow will travel across the Moon until it's completely eclipsed a little before eight.

By then, it will be 30 degrees up in the east, and getting out of the thicker atmosphere: colors will be more accurate.

Keep some coffee and maybe popcorn handy, because this will be a long one — about 90 minutes!

Near the end, it will be almost 50 degrees elevation, which is pretty darn good.

And when it gets all the way out of the umbra almost an hour later, elevation will approach 60 degrees.

Another half hour for the penumbra to drift off, and the show's over, but the moon is now near 65 degrees up.

But all this timeline stuff is hardly necessary: the simple approach is to set up around sunset and watch what happens. You can't miss it!

So, what will you need?

Not much. In fact, the less the better.

First, you'll want to see the color. There's no telling what shades will show up, but whatever it is (yellowish, reddish, greenish or even toward the blue) it's spectacular.

However, the best way to see it is usually binoculars. A mount is nice (tripod and bracket, or more elaborate if you can).

The more you can concentrate the light, the better. This means low mag and big aperture — it's one of those rare times when 7x50s might be better than 10x50.

You won't have much use for high mag in any event. The shadow traveling across the moon won't give a sharp terminator like we usually see, so details will be fleeting at best.

In fact, near an eclipse is when one of my silly platitudes fails: There's Always A Terminator. Not when the Sun is directly behind you!

A medium telescopic view might be a plus, just for the fun of it, but don't expect too much — and make sure you have your binos (or Short Tubes or anything like that) primed and ready.

I'm going to experiment with a larger scope, just to see what happens, but in the past the 12.5-inch hasn't been all that great. We'll see.

Just a little after 7pm, the inkiest part of the earth's shadow should start to creep across the Moon.

You might pay particular attention to the leading and trailing edges of the umbra. There, it's often possible to see odd colors due to the effect of our atmosphere on the diffuse light at the edge. All manner of strangeness has been reported in the past.

Another fun pastime is checking out stars being occulted; they're pretty easy when the moon isn't so bright.

And another favorite pastime is wandering through your favorite dark sky objects during the full Moon! Even I have fallen prey to this obtuse indulgence...

What location is best? Well, if you want to see dark sky sights, you'll need a dark sky location. But for the eclipse itself, nothing could be easier.

You won't need seeing, and darkness will only be marginally useful. Basically, anyplace where you don't have bright lights in your eyes should be fine.

Darkness might help a little with color vision, but you can get most of the same advantage just by covering your head with a black cloth, or otherwise blocking the local light.

After the show's over, you might take a crack at some ray tracing (use a moon filter) if you want to keep going; this will be a high moon.

In general, this is the beginning of Evening Moon Season.

During the days just before full moon, elevations will be very high.

That means good seeing, particularly when the terminator is crossing the area of Mare Humorum or Schroter's Valley, two of the most spectacular areas on the moon.

Be there or be square!

One final note: when I was mulling over the question of who I know that might know most (or all, or even a heck of a lot) of the named features on the moon, I somehow forgot the obvious:

Our own Robert Garfinkle!

Most people think of him as a dark sky guy (the observer's classic book Star Hopping, of course) but he's been working on a book about lunar observation for about 100 years now. No book yet, but he does know just about every name there is...

So, in the Moon Scholarship department, things aren't quite as grim as I suspected...

Observational Astronomy Class for 2000

Doug Davis

January class — **Introduction to the Sky**: A general overview of amateur astronomy, understanding the celestial sphere and coordinate systems, basic understanding of constellations, star-hopping and finding one's way around the sky, and naked eye sky phenomena.

January 15, 2000, 8 p.m., Houge Park

Astronomy Educator Position Available

Astronomy Educator for Family Astronomy & Other Programs

The Astronomical Society of the Pacific (ASP) has a full-time position available for a creative, energetic astronomy educator, with interest and experience in K-12 education, the role of families in learning, and the development of hands-on astronomy activities. Applicants should have excellent oral and written communications skills, good background in basic and observational astronomy, and at least two years experience in astronomy education programs that reach out to K-12 students, teachers, or families.

The position will be split between an NSF-sponsored education and outreach program aimed at families called Family ASTRO and the other educational programs of the ASP. The successful candidate will be a senior staff member at the Society, should be a team player, and can have a significant role in setting future directions and creating new ASP programs in education and outreach.

Job responsibilities will include researching family science programs around the country, helping to create and test a series of new family astronomy kits, designing training protocols for family astronomy, and then being one of the leaders of the resulting workshops. Other duties involve helping to write and produce educational materials in astronomy (to be distributed through the ASP catalog), researching and writing grant proposals for educational projects and materials, and working with the media and the public to answer questions about astronomical events, news items, and ideas.

You may write or call (415-337-1100 x 100) for a more complete job description and background information. The tentative start date is March 1, 2000, but this is somewhat flexible.

To apply, please send a resume, up to three non-technical writing samples, and a cover letter explaining your qualifications for and interest in the position. Include the names of, and contact information for, three professional references who are familiar with your work in education and outreach.

Send application packages to:
Educator Screening Committee
Astronomical Society of the Pacific
390 Ashton Ave.
San Francisco, CA 94112

Upcoming School Star Parties

January
11 Meadows Elementary
19 Bernal Elementary
26 Backup for Bernal Elementary
February
2 Backup for Bernal Elementary
10 Working on this one. hold the date.
March
8 Haman Elementary

The Shallow Sky

Akkana Peck

We begin the "oughts" on a high note for planet watchers, as Jupiter and Saturn ride high in the January sky, visible all night, just fifteen degrees apart from each other and moving closer.

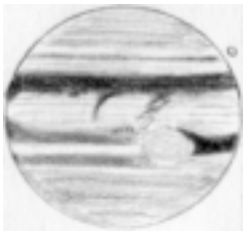
Jupiter's southern equatorial band (SEB) has been odd this year; The portion of the band following the Great Red Spot (GRS) is unusually light, almost invisible in small telescopes.

Jupiter and Saturn ride high in the January sky.

Larger telescopes and steady air will show that this almost invisible band is actually filled with white ovals, and the area north of it filled with turbulent swirls and eddies. Dark festoons stream down from the NEB into this zone of turbulence — a lovely sight!

As always, the dance of Jupiter's moons and their shadows across the face of the planet is fun to watch. Jupiter is passing through eastern quadrature (on the 17th), so the distances between each moon and the shadow it casts will be at a maximum.

Saturn shows a ring tilt of nineteen degrees: not as much as the middle of last year, nor as great as we'll see later in 2000 (24.3 degrees in early September), but still very generous compared to most years' views. The previously elusive gap in the outer "A" ring is easier than it has been in the past, and all three rings as well as the planet's face show subtle shadings.



Jupiter sketch by the Author

Saturn reaches eastern quadrature on January January 31st, which means that the shadow of the planet on the rings (which gives the planet an especially "three-dimensional" look) will be most prominent then.

Mars continues to hang low in the southwest at sunset.

The innermost planet, Mercury, and the outermost three, Uranus, Neptune, and Pluto, are all too close to the sun (from our vantage point, that is!) to be observable this month.

The earth reaches perihelion, the closest approach to the sun this year, on January 3rd around 9pm PST.

Venus is in the morning sky, rising a few hours before sunrise.

Comet Comments for January 2000

Don Machholz

Periodic Comet Machholz 2 is fainter than expected, but might still be glimpsed in our evening sky. It will return every 5.2 years but will not be well-placed until the year 2015.

The Catalina Sky Survey found a faint comet on Nov. 5. It is now pulling away from the sun. Meanwhile, old data from the SOHO satellite was used to find a comet that appeared in May 1997.

Comet Hunting Notes: As we head into the new year the visual comet hunter faces competition from programs designed to find comets and asteroids that may hit us. Is there any need for the visual comet hunter? The consensus seems to be that amateurs will still find comets but at a much reduced rate. Searching for over 1,000 hours may become commonplace. Areas near the sun, especially in the morning sky, should yield the greatest number of visual discoveries.

Don Machholz (530) 346-8963
DonM353259@aol.com.

Ephemeris

141P/Machholz 2

Date(00UT)	R.A. (2000)	Dec	El	Sky	Mag
12-08	20h19.5m	-11d29'	50d	E	11
12-13	20h42.5m	-11d41'	50d	E	11
12-18	21h08.2m	-12d04'	50d	E	11
12-23	21h37.7m	-12d38'	52d	E	11
12-28	22h12.2m	-13d21'	55d	E	11
01-02	22h53.4m	-14d07'	59d	E	11
01-07	23h42.1m	-14d41'	65d	E	11
01-12	00h37.6m	-14d41'	72d	E	12
01-17	01h36.0m	-13d52'	81d	E	12
01-22	02h32.0m	-12d15'	90d	E	12
01-27	03h21.3m	-10d11'	98d	E	12
02-01	04h02.5m	-08d11'	103d	E	13
02-06	04h36.3m	-06d00'	108d	E	13
02-11	05h03.9m	-04d12'	110d	E	13

Elements

Object:	P/Machholz 2
Peri. Date:	1999 12 09.2752
Peri. Dist (AU):	0.748905 AU
Arg/Peri (2000):	149.2991 deg.
Asc. Node (2000):	246.1434 deg.
Incl (2000):	012.8116 deg.
Eccen:	0.751075
Orbital Period:	5.22 years
Ref:	MPC 35815
Epoch:	1999 12 08
Absol. Mag/"n":	??/??

Dr. Ken Croswell signs a copy of his book The Magnificent Universe *for SJAA member Terry Kahl at the November general meeting.*

Celestial Calendar
January 2000

Richard Stanton

Lunar Phases:

		Date	Rise	Trans	Set
NM	10:14 PST	06	07:15	12:17	17:20
FQ	05:34 PST	14	12:07	18:36	00:09
FM	20:40 PST	20	17:08	00:29	06:49
LQ	23:53 PST	27	00:39	05:36	11:25

Nearer Planets:

Dt	Rise	Trans	Set	R. A.	Dec.
Mercury ... 1.41 A.U., Mag -1.8					
07	07:11	11:53	16:35	18:48.7	-24:29
17	07:35	12:24	17:14	19:59.3	-22:42
27	07:50	12:55	18:02	21:09.8	-18:23
Venus ... 1.23 A.U., Mag. -4.3					
07	04:33	09:32	14:31	16:28.9	-19:53
17	04:52	09:44	14:37	17:20.5	-21:38
27	05:08	09:58	14:48	18:13.3	-22:23
Mars ... 1.93 A.U., Mag. +0.8					
07	09:54	15:22	20:50	22:19.3	-11:31
17	09:34	15:11	20:49	22:48.3	-08:32
27	09:13	15:00	20:48	23:16.8	-05:26
Jupiter ... 4.87 A.U., Mag. -2.4					
07	12:06	18:37	01:11	01:36.6	+08:44
17	11:28	18:00	00:35	01:39.3	+09:03
27	10:52	17:25	00:01	01:43.3	+09:29
Saturn ... 8.89 A.U., Mag. +0.7					
07	12:51	19:34	02:22	02:34.8	+12:37
17	12:12	18:55	01:43	02:34.7	+12:40
27	11:33	18:16	01:04	02:35.4	+12:47

SOL Star Type G2V Intelligent Life in System ?

Hours of Darkness

	Date	Rise	Trans	Set	R.A.	Dec.
11:13	07	07:23	12:14	17:05	19:10.8	-22:26
11:03	17	07:21	12:18	17:15	19:54.1	-20:51
10:50	27	07:15	12:20	17:26	20:36.3	-18:36

Astronomical Twilight:

		Begin	End
JD 2,451,550	07	05:50	18:38
560	17	05:49	18:46
570	27	05:45	18:56

Sidereal Time:

Transit Right Ascension at Local Midnight

07 00:00 = 06:57
17 00:00 = 07:36
27 00:00 = 08:16

Darkest Saturday Night: 08-Jan-2000
Sunset 17:06
Twilight End 18:38
Moon Set 19:07
Dawn Begin 05:50
Hours Dark 11:12

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Campbell, CA 95011-0566

SJAA Loaner Scope Status

All scopes are available to any SJAA member; contact Mike Koop by email (koopm@best.com) 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
1	4.5" Newt/ P Mount	Darryl Lambert
3	4" Quantum S/C	Manoj Khambete
7	12.5" Dobson	Jeff Crilly
8	14" Dobson	Darryl Lambert
19	6" Newt/P Mount	Dean Sala
23	6" Newt/P Mount	Glenn Yamasaki
24	60mm Refractor	Michael D. Turner
26	11" Dobson	Dean Sala
30	7" f/9 Newt/Pipe Mount	Mike Koop
32	6" f/6 Dobson	Jim Bartolini

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
6	8" Celestron S/C	David Artiaga	11/30/99
15	8" Dobson	Tim Roberts	12/3/99
16	Solar Scope	Michael D. Turner	2/20/99
28	13" Dobson	Bruce Horton	2/14/00
29	C8, Astrophotography	Steve Sergeant	1/23/00

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	?
9	C-11 Compustar	Paul Barton	Indefinite
18	8" Newt/ P Mount	Dave North	Repair
21	10" Dobson	Ralph Seguin	12/4/99
27	13" Dobson	Mike Rupe	3/5/99
31	8" f/8 Dobson	Lee Barford	1/23/00

Waiting List

15	8" Dobson	Gary Stawn
29	C8, Astrophotography	Douglas Hendricks
6	8" Celestron S/C	Richard Burks
	A Scope	Rob Dewis

Notes:

Thank you to Bill Sweeney for the donation of an Orion Plossl Eyepiece, Jim Bartolini for the final tweaks on the Signature Scope #32, built at The Tech.

Submit

Members are encouraged to submit articles for publication in the SJAA Ephemeris. Send articles to the editors via e-mail to ephemeris@whiteoaks.com.

To subscribe to or unsubscribe from the SJAA Mailing List send email to
sjaa-request@seds.org
with a blank subject line followed by a single text line that says "subscribe" or "unsubscribe"

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