Saguaro Astronomy Club

Metro Phoenix, Arizona

SACNEWS

February 1999 — Issue #265

v1.25

Planetarium Programs

by Sam Herchak

76627.3322@compuserve.com

When I first started using planetarium programs on a home computer several years ago, I found them useful but at the same time, disappointing. Disappointing from an observing point of view because they just weren't accurate enough. Pluto's position was at least several arcminutes off and even with the Hubble Guide Star Catalog (HGSC) of 15 million stars/objects, you couldn't display the Trapezium in M 42 correctly. But we all know what a difference a few years make in computing. Programming and databases have improved to the point that there is no reason your computer can't show Pluto and asteroid positions to within 1 arcsecond of their actual location and make starcharts as good as the Millennium Star Atlas! Without writing a book on what's available, I'll simply tell you my favorites.

For first-time buyers, "blow $40" and get SkyChart III by Tim DeBenedictis (`www.southernstars.com`). This program has Windows/Macintosh versions and even includes stellar data from the Hipparchus, Tycho, and Hubble catalogs for that low price! It has a beautiful display, good interface, great documentation (on disk), telescope control for many popular models, and its solar system accuracy will amaze you. Lunar/asteroidal occultations, Galilean "moon" events, and artificial satellites from standard two line elements (TLE's) are accurate to within one minute of the actual times I have observed. At this point, it doesn't have as many display/filtering options as I'd like, but those are in the works.

For experienced observers, Guide by Bill Gray (`www.projectpluto.com`) is the best buy at $89 (and in my opinion, simply the best available). It is far easier to tell you what it can't do — CCD image processing is about it! Otherwise, this program does it all. Besides unprecedented accuracy (a recently observed asteroidal occultation shows up as a 0.6 arcsecond "miss" with Guide), its displays are incredible. Instead of just showing the Milky Way area or the Veil Nebula as outlines, Guide has "isophotes" that show the relative intensities and gradients of the object. Instead of just showing the position of the Galilean moons around Jupiter, Guide shows their shadows on the planet (if appropriate). Instead of just a disk representing the Moon and planets, Guide has bitmap images. Zoom in on Mars and there is Syrtis Major (if actually visible from the observing location at the specified time). It's virtual observing!

The CD-ROM is packed with databases. When you "Get info" on an object (whether it be planet, asteroid, star, or galaxy), you'll get at least half a page of information. Guide displays the data from all the included catalogs because parts of one are often more accurate than parts of another. For deep sky objects, Herschel descriptions from the NGC2000 and the SAC Databases are included. You can also import/display information from RealSky and the new 500 million star A1.0/2.0 catalogs from the US Naval Observatory. The program allows precise astrometric measurements from CCD images and will even compute orbital elements from those measured positions.

The interface is highly configurable by the user, has a tremendous amount of supporting documentation (although some is hidden in obscure places), and will run on any PC including DOS machines. Although a Mac version is not in the works (possibly Linux though), I run it just fine on my Apple PowerPC computer with Windoze95 and the application Virtual-PC. The Sky, Megastar, Starry Nights, and Voyager II are all lacking compared to Guide

Quick Calendar

SAC Meeting
Speaker: Glen Sanner
7:30 PM, Friday, January 29

SAC Deep-Sky Meeting
November and December *Fuzzy Spot* Objects
7:30 PM, Thursday, February 4

SAC Star Party
Buckeye Hills Recreation Area
Saturday, February 6

1999 Dues are Due

See Membership Services Form on the back page.

in my opinion.

I highly recommend both companies. They have been a pleasure to deal with, providing prompt service and responses to my questions or suggestions. If only Christmas weren't so far away now....

1998 Leonid Meteor Shower

Report from Florence Junction, AZ

by Bernie Sanden

besanden@hotmail.com

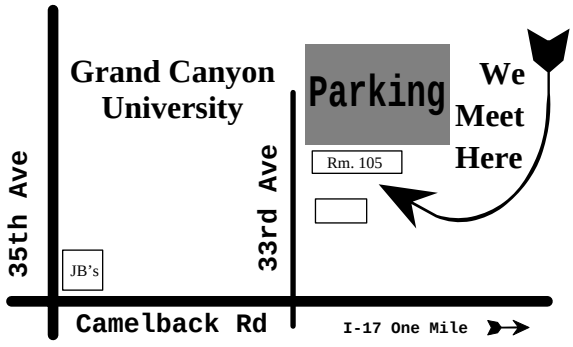
A friend I work with is such an avid meteor observer that a condition for taking the job we offered him was that he could be assured of having time off for the 1999 Leonids. That was in 1994. This year, Bob and I considered driving NW of Wickenberg to view the Leonids just in case this turned out to be THE YEAR. However, as the day approached, and the realities of having to work the next day restricting my freedom to view the shower from a distant location, I had to settle on a site nearby. I heard that Don Wrigley was planning to watch from the Florence Junction site, so after a call to Don, I and a few others met up at Don's place to gather before heading out to the site. While viewing Saturn in Don's backyard using his 6″ refractor and 10″ reflector, the show was already underway. As the radiant rose, we saw two bright meteors skimming overhead a full 120 degrees within 15 minutes of each other. Before the night was out, we had witnessed perhaps the best meteor shower we ever will...that is, unless we are fortunate enough to be at the right place at the right time to observe the 1999 Leonid "storm' should it occur. As far as this years' Leonids, the drama of the night and the blaze of scores of roman candles lighting the night sky are still etched in my memory as if it happened last night. The event was a heck of a lot of fun, as well, thanks to the group I was fortunate enough to share the unfolding events with.

Upon returning home from work the next day, I sent a quick summary out to the AZ-Observing E-mail astro newsgroup. Six weeks later, I don't think I have anything to add. It pretty much sums up my observations for the night:

Amazing how much variance there is between meteor count reports within the state. Anyhow, here's the numbers from the Florence Junction site about 30mi east of Phoenix. Limiting magnitude varied drastically across our sky due to Phoenix light pollution to the west and intermittent cirrus. Best part of sky was probably about 6.5 mag, worst about 4.5. Observers Don Wrigley, Frank Kraljic, Chris MacFarland, Tom Polakis (between 3:30 and 5:30am), and myself. Frank took the "group" count, I did an individual count:

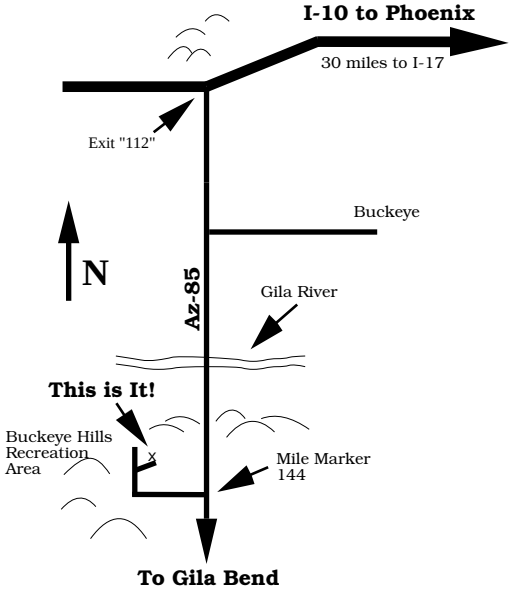
Directions to SAC Events

SAC General Meetings 7:30 PM at Grand Canyon University, Fleming Building, Room 105 — 1 mile west of Interstate 17 on Camelback Rd., north on 33rd Ave., second building on the right.



SAC Deep Sky Subgroup Meeting at John & Tom McGrath's, 11239 N. 75th St., Scottsdale, 998–4661 — Scottsdale Rd. north, Cholla St. east to 75th St., southeast corner.

SAC Star Parties at Buckeye Hills Recreation Area Interstate 10 west to Exit 112 (30 miles west of Interstate 17), then south for 10.5 miles, right at entrance to recreation area, one-half mile, on the right. No water and only pit toilets. Please arrive before sunset; allow one hour from central Phoenix.



Local Time (-7hrs UT)	Indiv.	Group
1AM – 2AM	78	88
2AM – 3AM	110	148
3AM – 4AM	114	196
4AM – 5AM	164	236
5AM – 6AM	109	—

No group count between 5 and 6am, Frank was content to sit back and watch the show. My proportionally lower count (relative to the group count) between 3 and 4am is partly due to the direction I was facing and my obsessive involvement with a Thermos full of hot chocolate.

Main impressions:

• -5 or brighter meteor every 10 minutes or so, at least 4 very bright (ground-lighting) meteors left visible trains that lasted over 5 minutes. The "best" of these occurred at about 5:45am towards NE approx magnitude -12, leaving a train that lasted over 15 minutes in the twilight sky, eventually forming an inclined ring 5 degrees long. The trains that persisted were great binocular objects, being distorted in the upper atmosphere. Big 'ol false-Veil Nebulae.

• Spurts and lulls, sometimes saw a dozen in a couple minutes followed by only a few in the next few. Many simultaneous meteors. My favorite in this regard were three that shot out near the Sickle of Leo in different directions, all within about 2 seconds, clearly identifying the radiant. The spurts really got the group whooping. We were all a bunch of adrenaline junkies by dawn.

• Unlike other Leonid showers I've seen, in which green was the color I most often recalled, most of these appeared yellow and orange (could it be due to the fact that I have historically observed the Leonids above 5000 ft elevation?).

• Lots of background meteors (not reflected in the above counts). Most appeared to radiate from Pleiades/Hyades area, so we assumed they were Taurids. We counted 12 per hour between 1am and 3am.

• Meteors screaming down the length of the zodiacal light cone was something I've never seen before. Something very aesthetic about it.

• Although the count rose as the radiant did, the number of long, slow meteors decreased. It was a trade-off - either proportionally more of the "knock-your-socks-off" kind, or a lot of frenzied activity mostly involving short and quick ones. In fact, two of the best meteors we saw were observed from Don Wrigley's backyard in Apache Junction around 11:00 PM, which seemed to skim for over 120 degrees of the sky, nearly overhead.

• Saw two distinct glints in the sky between clouds on the drive back to Phoenix, about 20 minutes before sunrise. Hated to think so much was still going on and we were missing it. All and all the best meteor shower I've ever observed, but can only imagine how the "storm" might look. Be prepared, 33 years will be here before you know it...

Dues are Due

It's time to renew your SAC membership for the upcoming year. Dues are still $28 ($42 for the whole family) for the year. **See the Membership Services Form on the backpage of this newsletter.**

Magazine renewals have changed slightly. While *Sky & Telescope* is still $27, *Astronomy* has gone up to $29.

In other news, the 1999 R.A.S.C. Observer's Handbooks have arrived! They will be available at the Christmas party in December and on into 1999 until they run out. They are $12 a copy.

Orders will be taken for the 1999 Astronomy WALL Calendar at the club discount price of $10.00. (We need 10 minimum.)

We will also take orders for 1999 Year In Space DESK calendars at the club discount price of $10.00. It's 172 pages, See at http://www.YearInSpace.com (We need 10 minimum.)

Fuzzy Spot

by Ken Reeves

Lepus **January 1999**

Lepus is a small constellation just under the feet of Orion. The Rabbit or Hare is hard to distinguish, I see it as a lopsided and smaller version of Hercules with Alpha, Beta, Mu, and Epsilon making the keystone. Also, don't confuse this with Lupus, the Wolf near Scorpius. Since the names are so similar, I am always getting the two mixed up.

The Rabbit contains the nice globular cluster M 79 which is quite removed from the other Messier clusters, but other than this, there are not a lot of deep-sky objects. You'll mostly be looking at faint galaxies. Some of my observations were taken in the 20″ scope, but don't worry, I made sure that these objects were listed in Luginbuhl and Skiff's book (*Observing Handbook and Catalogue of Deep-Sky Objects*, unfortunately out of print), so they should be accessible to most scopes.

NGC 1904 (05h24.5 −24°33′) The first object is M 79, a remote globular cluster and not to be skipped over! At 100X in the 10″ scope, it is very bright, pretty large, with a bright middle. The straggler stars spread out pretty far, and the center is very condensed. By cranking the power up to 170X, the middle is still unresolved, but there are many stars spread over the central haze. At 240X a lot of the stars pop out using averted vision and the central haze is definitely granular.

IC-418 (05h27.5 −12°42′) I have yet to observe this planetary nebula. According to Skiff, "This planetary is clearly visible in 6 cm, appearing as an undistinguished mag. 9 star: longer focal lengths are required to show its nebular character.... With 30 cm the central star is prominent, especially at high power. Here the nebula shows a slight elongation N-S."

NGC 1954 (05h32.8 −14°04′) This is the brightest galaxy in a group of 4. According to Skiff, "e.g. 1954 is the brightest of this small group of galaxies. It is faintly visible in 15cm, which shows a small patch elongated roughly E-W with two mag. 12.5 stars involved on the NW side." The other 3 galaxies are listed as IC 2132, NGC 1957, and A0530-14. IC 2132 is visible in 15 cm, the other two are only visible in 30cm.

NGC 1964 (05h32.8 −14°04′) This galaxy was observed in the 10″ scope as pretty small, fairly faint, containing a very much brighter middle, and there is either a star involved or perhaps it is a stellar nucleus, and there is another bright star or stellaring seen in the galaxy. The galaxy is elongated NNE/SSW. To the W of the galaxy is an isosceles triangle of stars. These nearby stars do interfere with the viewing.

NGC 2017 (05h39.4 −17°51′) This open cluster is probably better classified as a multiple star. It is very bright, pretty small, extremely poor, but the few stars are condensed. There are 2 levels of stars, with a total of 6 stars counted.

NGC 2179 (06h08.0 −21°44′) This galaxy was observed in the 20″ at 160X. I saw it as little faint, somewhat small, very elongated 3:1 N/S with a star on either end. These stars may enhance the elongated appearance. I felt the stars were what made this observation interesting.

NGC 2196 (06h12.2 −21°47′) The last galaxy was also observed in the 20″ at 160X. Seen as somewhat bright and pretty small, it contained a much brighter middle, but no nucleus. The object is round with some sort of mottling going on, possibly a spiral structure. Using averted vision on this object helped a lot. There is a star to W which may just be involved, and several other stars nearby form a nice string.

Herschel 400 Objects 1964 SAC's 110 Best of the NGC Objects none

Herschel 400 Objects
1964

Comet Comments

by Don Machholz

(530) 346–8963 CC245.TXT December 8, 1998
http://members.aol.com/cometcom/index.html
DonM353259@aol.com

21P/Giacobini-Zinner

Date	RA-2000-Dec		Elong	Sky	Mag
01–07	00h38.0m	−23°33′	74°	E	10.4
01–12	01h00.5m	−22°58′	75°	E	10.7
01–17	01h21.8m	−22°11′	75°	E	11.0
01–22	01h41.8m	−21°16′	76°	E	11.2
01–27	02h00.8m	−20°13′	76°	E	11.5
02–01	02h18.8m	−19°06′	76°	E	11.8
02–06	02h35.8m	−17°56′	76°	E	12.1

With a moderate-sized telescope, you could view a half-dozen comets on most nights during the next few months. As predicted here last month, **Comet Linear (1998 U5)** outburst by nearly three magnitudes. It, and **Comet Linear (1998 M5)**, both pass north of the

sun and from the evening to the morning sky. **Periodic Comet Giacobini-Zinner** fades in the evening sky while Comet Williams fades in the morning sky. **Comet Jager** and **Periodic Comet Harrington-Abell** remain within fifteen degrees of each other as they pass through opposition on favorable visits through our part of the solar system.

C/1998 W1 (Spahr): Found on Nov. 16 by Timothy Spahr using a 16-inch Schmidt as part of the Catalina Sky Survey, this faint comet will be closest to the sun next month at 1.7 AU and orbits the sun every 6.7 years.

C/1998 W2 (Hergenrother): The same Catalina equipment was used to find this comet on Nov. 21. It remains faint.

C/1998 W3 (LINEAR): The LINEAR program found this faint comet on Nov. 25. It has a retrograde orbit and will be closest to the sun in Feb. 1999 at a distant 4.9 AU.

C/1939 TN (Vaisala-Oterma): A strange case of an object being discovered in 1939 which was treated as an asteroid but long suspected of being a comet. Recent observations show it is diffuse with a short tail; it is now classified as a comet. It orbits the sun every 9.5 years with a perihelion distance of 3.4 AU.

COMET HUNTING NOTES: Father Leo Boethin of the Philippines passed away on Sept. 15. He was the discoverer of Periodic Comet Boethin (85P/) on Jan. 4, 1975. It orbits the sun every eleven years.

C/1998 P1 (Williams)

Date	RA-2000-Dec		Elong	Sky	Mag
01–07	12h34.7m	−00°30′	98°	M	9.3
01–12	12h21.2m	+03°34′	108°	M	9.3
01–17	12h04.7m	+08°13′	118°	M	9.3
01–22	11h44.9m	+13°22′	130°	M	9.4
01–27	11h21.7m	+18°49′	141°	M	9.4
02–01	10h55.4m	+24°13′	151°	M	9.6
02–06	10h26.8m	+29°08′	159°	M	9.7

C/1998 M5 (LINEAR)

Date	RA-2000-Dec		Elong	Sky	Mag
01–07	18h59.9m	+43°03′	65°	M	9.3
01–12	19h02.9m	+44°45′	67°	M	9.3
01–17	19h06.2m	+46°41′	68°	M	9.2
01–22	19h09.6m	+48°53′	70°	M	9.2
01–27	19h13.1m	+51°21′	72°	M	9.1
02–01	19h16.9m	+54°07′	75°	M	9.1
02–06	19h20.7m	+57°12′	77°	M	9.0

C/1998 U5 (LINEAR)

Date	RA-2000-Dec		Elong	Sky	Mag
01–07	21h09.7m	+16°33′	48°	M	10.1
01–12	21h08.7m	+15°46′	44°	M	10.3
01–17	21h08.1m	+15°07′	40°	M	10.5
01–22	21h07.6m	+14°37′	37°	M	10.7
01–27	21h07.3m	+14°14′	34°	M	10.9
02–01	21h07.1m	+13°57′	31°	M	11.1
02–06	21h06.9m	+13°44′	30°	E	11.2

C/1998 U3 (Jager)

Date	RA-2000-Dec		Elong	Sky	Mag
01–07	06h33.4m	+36°46′	164°	E	10.5
01–12	06h29.3m	+35°44′	160°	E	10.5
01–17	06h25.7m	+34°38′	156°	E	10.5
01–22	06h22.8m	+33°28′	152°	E	10.5
01–27	06h20.6m	+32°17′	147°	E	10.5
02–01	06h19.3m	+31°05′	142°	E	10.5
02–06	06h19.0m	+29°53′	137°	E	10.5

52P/Harrington-Abell

Date	RA-2000-Dec		Elong	Sky	Mag
01–07	07h15.3m	+40°20′	162°	M	10.6
01–12	07h12.0m	+39°46′	162°	E	10.5
01–17	07h09.0m	+39°03′	159°	E	10.5
01–22	07h06.4m	+38°13′	156°	E	10.5
01–27	07h04.6m	+37°16′	153°	E	10.6
02–01	07h03.7m	+36°13′	149°	E	10.6
02–06	07h03.8m	+35°07′	145°	E	10.7

Orbital Elements

Object:	Giacobini-Zinner	Williams	LINEAR (M5)	LINEAR (U5)	Jager	Harrington-Abell
Peri Date:	1998 11 21.32107	1998 10 17.838	1999 01 24.5733	1998 12 21.8912	1999 03 07.7714	1999 01 27.8772
Peri Dist:	1.0337095 AU	1.14674 AU	1.742213 AU	1.235763 AU	2.152631 AU	1.755993 AU
Arg/Peri (2000)	172.54569°	294.473°	101.2873°	051.2248°	179.4942°	138.8996°
Asc Node (2000)	195.39930°	156.379°	333.3766°	066.6346°	303.8178°	337.2882°
Incl (2000):	031.85856°	145.730°	082.2285°	131.7425°	019.0944°	010.2186°
Eccentricity:	0.7064344	1.0	1.0	0.983362	0.652672	0.542909
Orbital Period:	6.61 years	Long Period?	Long Period?	Long Period	15.4 years	7.53 years
Reference:	NK 629	MPEC 32410	MPC 32410	MPEC 1998-W45	MPC 32866	MPC 32595
Epoch:	1998 11 21	1998 10 17	1999 01 22	1998 01 22	1999 03 08	1999 01 22
Absol Mag/"n":	9.0/6.0	6.5/4.0	5.5/4.0	8.0/4.0	6.5/4.0	8.6/4.0

Chris Schur's Astrophoto

February: M 6 Region

M 6 region — centered in front of a dark nebula, M 6 is surrounded by rich milkyway on the left, and to the right and giant Sharpless nebulosities on the right. The photo was taken with an $8''$ $f/1.5$ Schmidt camera on two 4-minute exposures sandwiched on Kodak Pro 400 PPF film.

Also see Chris Schur's Astrophotography web page at: `pulsar.la.asu.edu/~chris`

Bits and Pieces

Minutes from the December Party

Thank you Steve Dodder and Rosie Cruz (and dogs & cats) for hosting our SAC Christmas Party on December 5th. About 30 of us made the trek out to the Maricopa backwoods to celebrate, eat, chat, eat, and star gaze and eat and eat. We basked in the nearly full moonlight and looked at Jupiter, Saturn, and the Andromeda Galaxy from Steve's observatory. He has a wonderful setup and a dark yard along with all the comforts of home. He offered an invitation to stop by anytime. If you have plans to build a backyard observatory, this one is definitely worth checking out.

—*Jennifer Keller, SAC Secretary*

Newsletter Deadline

Mail items for Such-a-Deal at least two weeks before the end of the month. Articles that need to be published in a timely fashion must be submitted or the newsletter editor notified of the article at least 6 weeks before month they are published. Items arriving too late for an issue will be included in the next newsletter.

Deep-Sky Group Meeting

The Deep-Sky Group is a Special Interest Group made up of people who like to discuss observing and observing techniques. They particularly like to observe objects out past the Orrt Cloud that's why they're called the Deep-Sky Group. The type of objects include stars, nebulae, and galaxies.

If you are interested in sharing your observations, or are interested in observing techniques, then by all means come join in. The meetings are held at John McGrath's

house every other month on the Thursday after the SAC meeting; directions are found on page 2 of this newsletter.

Consider this to be an invitation to this meeting. This meeting is OPEN to all SAC members. All you have to bring is an interest in what objects look like when view through a telescope.

For the November Deep-Sky Meeting we will discuss the objects in Ken Reeves' September and October *Fuzzy Spot* columns (Sagittarius and Pegasus), which total 17 objects.

If you have new or old observations, bring them along. Even if you have no observations, come anyway. This is a good way to improve your observing skills.

Speaker for the January SAC Meeting

The main speaker for the January meeting will be Glen Sanner, co-author of the two volume book *The Night Sky Observer's Guide*. This book could possibly replace Luginbuhl and Skiff's book as a reference as to what objects look like in the sky. Especially now that the latter book is out of print.

SAC Information

Area Code (602)

President & SACNEWS Editor	Paul Dickson Ans. & FAX: 841–0509 dickson@primenet.com	
Vice President	Steve Coe	000–0000
Treasurer	Jack Jones looka.fuzzy@mcione.com	944–5488
Secretary	Jennifer Keller ken.reeves@cas.honeywell.com	000–0000
Properties	Ken Reeves asunshine@netzone.com	878–9460
Public Events	Rich Walker rhwalker@aztec.asu.edu	997–0711
Public Events	Wil Milan wmilan@airdigital.com	8am–6pm: 996–8329
Deep-Sky Group	A.J. Crayon acrayon@primenet.com	938–3277

February 1999

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	**SAC Deep-Sky Meeting** 7:30 P.M. 4	**TAAA Meeting** (Tucson) 5	6
7	Last Quarter Moon 5:00 A.M. 8	9	**EVAC Meeting** (SCC: Rm. PS170) 10	11	12	13
14	New Moon 11:41 P.M. 15	Sun entered Aquarius 5 A.M. 16	17	18	Mir Space Station Launched (1986) 19	20
SAC Star Party Buckeye Hills (members&guests) 21	Mercury at superior conjunction (moves into evening sky) 22	Anniversary of Supernova 1987A 23	Yesterday Jupiter at conjunction with Sun (moves into morning sky) 24	25	**SAC Meeting** Grand Canyon University, Fleming Rm. 105 26	27
Tomorrow Full Moon 12:00 A.M. 28						

All Times are Mountain Standard Tim

E-Mail Mailing Lists

SAC-mls is a mailing list for club announcements and quick notification of astronomical events.

SAC-Board is for SAC business. All club members are welcome to participate.

AZ-Observing is a fairly general mailing list about observing in Arizona. Where the star parties are and who's going, as well as what's up.

To join, send E-mail with the `Subject: subscribe` to the "`-request`" mailing address at `psiaz.com`. For example, you would send the request for AZ-Observing to `AZ-Observing-request@psiaz.com`.

SAC Web Sites

`www.accessarizona.com/groups/group_access.html`
`www.primenet.com/~dickson/sac.html`

Saguaro Astronomy Club Member Services Form

Membership

Memberships are for the calendar year and are prorated as follows: Jan - Mar 100%, Apr - Jun 75%, Jul - Sep 50%, Oct - Dec 25%.

- ❑ $28.....Individual Membership
- ❑ $42.....Family Membership (one newsletter)
- ❑ $100.....Business Membership (includes advertising)
- ❑ $4.....Nametag for members
- ❑ $14.....Newsletter Only

Subscriptions

The following magazines are available to members. Subscribe or renew by paying the club treasurer. You will receive the discounted club rate only by allowing the club treasurer to renew your subscription.

Sky & Telescope.....$27.00 for one year ❑

Astronomy.....$29.00 for one year ❑

Write your name, address, phone number, and E-mail address in the space below.

Make checks payable to SAC. Mail the completed form to:

Jack Jones
SAC Treasurer
2313 W Sierra St
Phoenix AZ 85029

SAC and SAC Meetings

Saguaro Astronomy Club (**SAC**) was formed in 1977 to promote fellowship and the exchange of scientific information among its members — amateur astronomers. **SAC** meets monthly for both general meetings and star parties, and regularly conducts and supports public programs on astronomy.

SAC meetings are usually held on the Friday nearest the full moon. This means that over the course of the year, meetings are not held on the same week of the month. The same is true of the club's star parties. Star parties at Buckeye Hills Recreation Area are mostly held on the Saturday of the third quarter moon.

1999 SAC Meetings

Jan. 29
Feb. 26
Mar. 26
Apr. 30
May 21
Jun. 25
Jul. 23
Aug. 27
Sep. 24
Oct. 22
Nov. 19
Dec. 4 Party

1999 SAC Star Parties

Date	Sunset	Moonrise
Jan. 9	5:41PM	1:24AM
Feb. 6	6:07PM	12:08AM
Mar. 6	6:31PM	10:51PM
Apr. 10	6:57PM	3:21AM
May 8	7:18PM	1:59AM
Jun. 5	7:37PM	12:38AM
Jul. 3	7:44PM	11:17PM
Aug. 7	7:25PM	2:55AM
Sep. 4	6:52PM	1:46AM
Oct. 2	6:14PM	12:40AM
Oct. 30	5:41PM	11:45PM

SAC General Meetings: 7:30 PM at Grand Canyon University, Fleming Building, room 105 — one mile west of Interstate 17 on Camelback Rd, north on 33rd Ave., second building on the right. See inside for a map to the meeting location.

SACNEWS
c/o Paul Dickson
7714 N 36th Avenue
Phoenix AZ 85051

Stamp

First Class Mail

Inside: