

# Saguaro Astronomy Club

Metro Phoenix, Arizona

## SACNEWS



October 1997 — Issue #249

v9.20

## Star Catalogues

by Brian Skiff

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It's occurred to me that most sci.astro.amateur readers are completely unaware that several major changes are coming along soon in the field of comprehensive star catalogues and star atlases. By about this time next year, whatever you're using now (in both print and machine-readable form) will be obsolete. Here's a summary of what's happening along with some Web links for further information, in case you want to get a head start.

### Obsolete star catalogues (AGK3, SAO)

Under this heading are the two venerable equinox B1950.0 catalogues: the AGK3 and the SAO. The AGK3 has about 200,000 stars north of  $-2$  Dec, containing po-

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sitions, proper motions, and photo-blue magnitudes complete to about blue magnitude 8.5, but with many stars down to mag. 12 or so. This used to be the catalogue of choice for the northern hemisphere, since it had twice as many stars as the SAO catalogue, and the positions were more accurate. At present, the positions in the AGK3 are good to about  $0''.75$ .

The SAO catalogue was compiled in the 1960s from a large number of sources, reduced as well as possible (at that time) to a common system. The catalogue contains about 260,000 stars for the whole sky (less dense than the AGK3 in the north). It was intended for satellite tracking (from the ground) and also for attitude-control on orbiting spacecraft. Despite having these origins as an engineering tool, the compilers tried to make it useful for astronomy as well. At present the positions in the SAO have rather large errors, typically around  $1''.2$  in the north, and progressively worse south of about  $-20$  Dec, with many cases of errors up to  $10''$  in the far-southern sky. The reason for

## Quick Calendar

All-Arizona Star Party  
Arizona City Site  
Friday & Saturday, October 3-4

SAC Meeting  
Speaker: Peter Wehinger: *ASU Observatory Progress*  
7:30 PM, Friday, October 17  
Board Meeting — 7:00 PM

SAC Star Party  
Buckeye Hills Recreation Area  
Saturday, October 25

Magazine & Membership  
Renewals Due  
See Note on Page 9

Officer Nominations Open

this is the sheer age of the positions that went into the catalogue, which have a mean ending epoch around 1940. As a result, when the proper motions derived from the older data are extrapolated to the present, substantial errors creep in, even if the original positions are good.

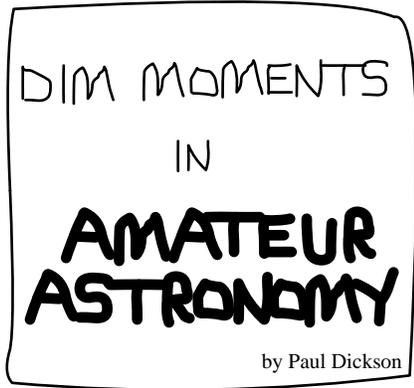
**Star catalogues that are about to be superceded (PPM, ACRS, GSC v1.1)**

For most purposes there are again two "catalogues

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of precision” in use for doing astrometry, making charts, etc. One is the ACRS (“Astrographic Catalog Reference Stars”), which was produced about 1990 by the U. S. Naval Observatory. It is an all-sky catalogue of about 380,000 stars, compiled as was the SAO from a large number of older sources. In this case, the analysis of the input data was much better than before, and more stars could be included as well from modern observations. The current accuracy of the positions is about 0".3, a factor of four better than the SAO; the motions are factors of six to ten more accurate.

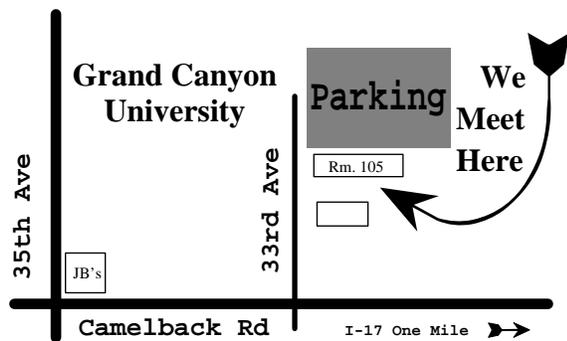
The other catalogue is the PPM (“Positions and Proper Motions”), which was compiled in a similar way by the Astronomisches Rechen-Institut in Heidelberg. This catalogue contains altogether about about 470,000 stars with mean errors similar to the ACRS. Since many people get confused: in the northern sky, the PPM lists the

photo-blue magnitudes directly from the AGK3. These magnitudes will thus be about 0.5 to 1.0 (typically) fainter than visual magnitudes. In the south, the magnitudes are a mix of photo-visual and photo- blue magnitudes, and even some real visual estimates surviving from hundred-year-old catalogues such as the Cordoba Durchmusterung. There is a code in the PPM-South that tells the source of the magnitude for each star. In all cases, the magnitudes scatter from “truth” by around +/- 0.3-0.5 mag. For most of the naked-eye stars, however, no matter where in the sky they are, accurate photoelectric V magnitudes are given (to 0.1 mag. precision).

Far more comprehensive, but of lower accuracy, is the Space Telescope Guide Star Catalogue (GSC). The GSC version 1.1, which now appears in many software packages intended for the amateur market, including those produced by contributors to this newsgroup. It contains

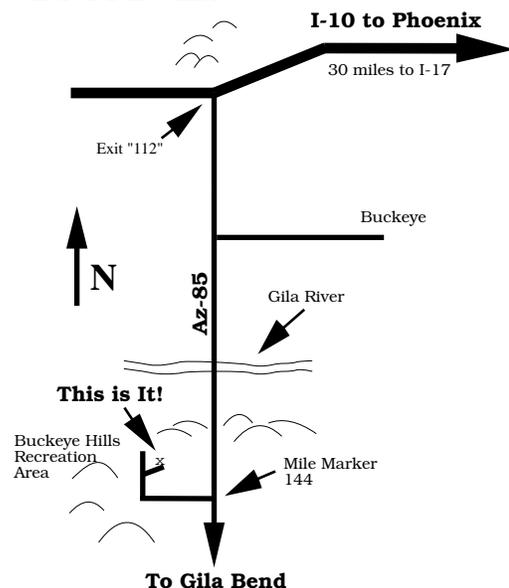
## Directions to SAC Events

**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.**



about 16,000,000 ‘things’ from digitally-scanned Schmidt plates. Most of these are stars and galaxies, but also emulsion flaws, asteroids, parts of galaxies, pieces of diffraction spikes emanating from bright stars; there are also bits of dust, dandruff flakes, and whatnot included in the GSC. It is also an engineering product (to point and track Space Telescope), not a true astronomical catalogue, no matter that both professionals and amateurs are using as if it were the latter. For the star positions, the GSC v1.1 used as the reference net the AGK3 in the north and the SAO in the south, there being no other reference catalogues available when the plates were scanned. On top of this problem, the equations used to convert the x,y pixel coordinates of the scans into RA and Dec did not adequately model the distortions of the Schmidt plates. As a result, in the corners of the plates, the star positions are frequently off by 2”-3”, plus having the general errors caused by the old star catalogues. Mean errors, however, are about 0”.8 at present.

It is worth re-emphasizing that the GSC is *not* an inventory of the sky, only a list of stars for controlling Space Telescope. Thus there are plenty of fairly bright stars missing from the catalogue that will screw you up if you compare charts made from them with views at the

eyepiece. Along the Milky Way, the catalogue starts to become incomplete around mag. 11.5, even though there are a lot of mag. 13 and 14 stars given in the same area. And there are certainly plenty of mag. 10 stars missing from the GSC.

This is a good place to mention the magnitudes in the GSC: they suck! In the north (specifically north of about +3 Dec), the GSC derives from short- exposure yellow-light plates taken in a special survey at Palomar. South of +3 Dec, the deep blue-light survey plates from the UK Schmidt in Australia were used. Along the southern Milky Way, in order to avoid severe crowding problems, a series of V-band plates was taken with the UK Schmidt. Special plates were taken for such areas as the Magellanic Clouds, M31, etc. The magnitudes were calibrated with sequences of about six stars near the centers of each field. In the immediate region of the those sequences, say within a circle 1 degree across, the GSC magnitudes are often pretty good. Outside that area, all bets are off, and the GSC magnitudes scatter over a range of two to three whole magnitudes. Sometimes they’re okay, but usually they’re off by half a magnitude or more. And since they’re based on only a single plate, the internal errors are no better than +/- 0.3-0.4 mag. at best. In the north, of course,

# Comet Comments

by Don Machholz

(916) 346-8963 CC230.TXT September 8, 1997  
<http://members.aol.com/cometcom/index.html>  
 DonM353259@aol.com

1995 O1 (Hale-Bopp)					
Date	RA-2000-Dec	Elong	Sky	Mag	
09-09	07h56.2m -28°15'	58°	M	5.6	
09-14	07h59.5m -30°19'	60°	M	5.7	
09-19	08h02.5m -32°25'	63°	M	5.8	
09-24	08h05.1m -34°31'	65°	M	5.9	
09-29	08h07.3m -36°38'	68°	M	6.0	
10-04	08h08.9m -38°46'	70°	M	6.1	
10-09	08h10.0m -40°53'	72°	M	6.2	
10-14	08h10.5m -43°00'	75°	M	6.3	
10-19	08h10.3m -45°05'	77°	M	6.4	
10-24	08h09.3m -47°08'	79°	M	6.5	
10-29	08h07.6m -49°09'	81°	M	6.6	
11-03	08h04.9m -51°07'	83°	M	6.7	
11-08	08h01.2m -53°00'	84°	M	6.8	

A faint comet has been discovered “automatically” by the Spacewatch equipment at Kitt Peak. Comet C/1997 P2 (Spacewatch) will remain faint. Six more short-lived faint comets have been found on images obtained by the solar-orbiting SOHO satellite; its total is now 26. Meanwhile, Comet Hale-Bopp is now in the morning southern sky and Comet Meunier-Dupouy slowly brightens in our evening northern sky.

COMET HUNTING NOTES: With so many comets from the Kreutz Sungrazing Group being discovered by

the SOHO satellite, amateurs have taken a renewed interest in sweeping along the path by which these comets are arriving. That path is now in the morning sky, having been behind the sun this past summer. The comets are very faint in the weeks before perihelion and it may take CCD imaging to capture them. The brightest members, although rare, can still be discovered visually.

C/1997 J2 (Meunier-Dupouy)					
Date	RA-2000-Dec	Elong	Sky	Mag	
09-09	13h52.5m +63°49'	65°	E	11.4	
09-14	14h07.1m +63°11'	66°	E	11.3	
09-19	14h22.0m +62°31'	68°	E	11.3	
09-24	14h37.2m +61°49'	69°	E	11.2	
09-29	14h52.6m +61°04'	70°	E	11.2	
10-04	15h05.1m +60°15'	71°	E	11.1	
10-09	15h23.8m +59°24'	72°	E	11.1	
10-14	15h39.5m +58°30'	73°	E	11.0	
10-19	15h55.2m +57°33'	73°	E	11.0	
10-24	16h10.9m +56°33'	74°	E	10.9	
10-29	16h26.5m +55°30'	74°	E	10.9	
11-03	16h42.0m +54°25'	75°	E	10.8	
11-08	16h57.2m +53°17'	75°	E	10.8	

### Orbital Elements

Object:	Hale-Bopp	Meunier-Dupouy
Peri Date:	1997 04 01.13800	1998 03 10.4346
Peri Dist:	0.9141405 AU	3.050393 AU
Arg/Peri (2000)	130.58915°	122.6927°
Asc Node (2000)	282.47069°	148.8384°
Incl (2000):	089.42943°	091.2715°
Eccentricity:	0.9951172	1.001491
Orbital Period:	~2500 years	Long Period
Reference:	MPC 29568	MPC 30429
Epoch:	1997 06 01	1998 03 08
Absol Mag/“n”:	-1.0/4.0	3.0/4.0

# Fuzzy Spot

by Ken Reeves

Cepheus

October 1997

Cepheus is a north circumpolar constellation with one edge sitting on the Milky Way and the other end stretching almost to Polaris. Because of this, spans about 12 hours of right ascension even though it is not considered a large constellation. I always consider the pattern of the leading stars to form a stick drawing of a house. As a beginner, I had a hard time finding this constellation, expecting it to be much brighter and smaller. Even now, it takes me a while to get oriented when working Cepheus.

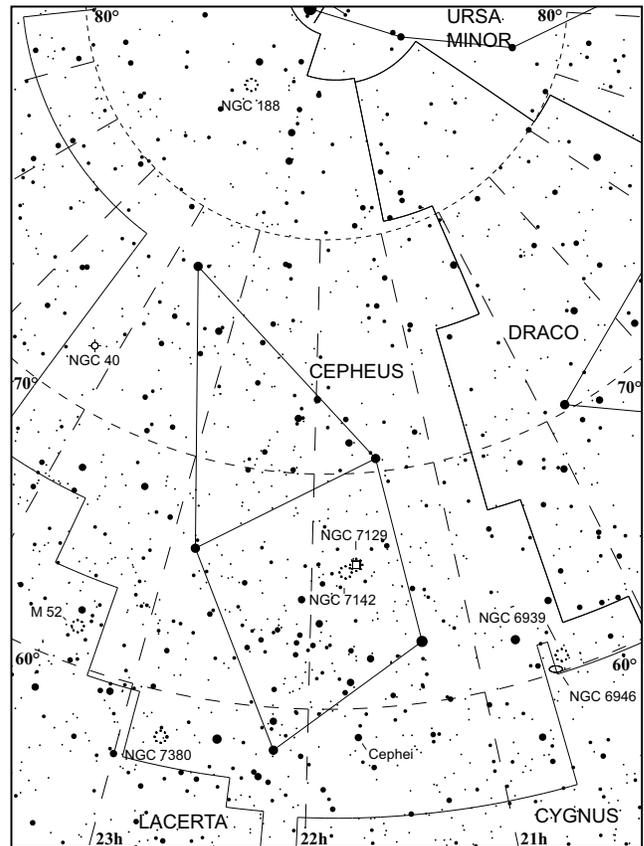
Cepheus' fame to claim is the star Delta Cepheus, the first discovered cepheid variable, and one of the major yardsticks in measuring cosmic distances. It turns out that the absolute luminosity or brightness of the star is related to the period of the variation. Therefore, once the period is determined, and the apparent brightness is measured, the absolute luminosity can be calculated, and based on the difference in the apparent and absolute luminosity, the distance can be calculated. Although I have never observed the variability of a star, the range is from about 3.6 to 4.3 over a period of about 5 1/2 days which should be easily detectable.

**NGC 40** (00h13.0 +72°32) At 140X, this planetary nebula is not too big, contains a very bright central star, but the nebula itself is not real bright. Using the UHC filter or averted vision really helps bring out the nebula. I was unable to see any anularity or color. With filter, it may be elongated E/W with dark spots on N and S. The bright star makes this planetary unusual.

**NGC 188** (00h44.4 +85°20) Although this open cluster isn't on either the SAC 110 Best of the NGC or the Herschel 400 lists, I decided to include this ob-

ject due to it's location, being the farthest north easily observable deep-sky object. At 70X, I considered it as easy to find, not real bright, and fairly condensed. 3 layers of stars were seen with about 40 stars counted over granular haze.

**NGC 6939** (20h31.4 +60°38) This open cluster was seen as not too bright, pretty big, with the bright stars form a "V" shape. A string of 5 stars is on SW side and a lot of haze in background, which I suspect is unresolved stars. About 20 stars were counted, many stars pop out with averted vision, perhaps 50 or so.



*Continued on next page...*

the magnitudes are in the yellow, but in the south they're blue-light magnitudes (i.e. fainter than visual for most stars). However, except for the southern near-Milky Way regions, none of the magnitudes are on the standard V ("visual") system. In the north, they're redward of visual, so red stars come out too bright; in the south, they're blue, so red stars come out too faint. The bottom line is not to use the GSC magnitudes for anything. No, not anything.

**Current star catalogues (circa June 1997; TAC, GSC v1.2, A1.0)**

The ACRS mentioned above was compiled mainly to re-reduce measurements from the "Astrographic Catalogue" (AC). The AC and accompanying "Carte du Ciel" (Sky Atlas) was a mammoth project from the turn of the Century to compile a catalogue of stars down to about mag. 11.5, and a photographic star atlas down to about 14th magnitude. About 20 different observatories partici-

pated in the project, each assigned a narrow strip of Declination to cover. The project was simply too unwieldy, and was completed only in a few of the zones. However, nearly all the observatories got as far as publishing raw x,y measurements of stars from the photographic plates taken for the atlas, totalling some four or five million stars. These printed volumes take up about 20 feet of shelf space. It turns out the accuracy of these x,y measurements is quite good enough to be still useful a century later. What they provide is a very long time baseline from which to determine the proper motions for stars. The USNO-Washington folks have done this work, and the results are now becoming available. These old observations aren't really of that much use without some new positions to go along with them, however.

What the Naval Observatory has done is to prepare a new star catalogue combining the old AC x,y posi-

*Continued from previous page...*

**NGC 6946** (20h34.8 +60°09) This large spiral face-on galaxy sits on the Cepheus/Cygnus border, and some lists consider this object as in Cygnus. At 70X, I considered it as very large, not real bright, slightly brighter center which fades smoothly into the halo. Averted vision makes the halo stand out a little, and I even suspected counter-clockwise spiral.

**NGC 7129** (21h41.3 +66°06) This nebula contains a grouping of 4 bright stars with an additional fainter star. The nebulosity is fairly faint around the stars, using the UHC filter does not help. At 140X, the views were a little better. Nearby (to the E) is nebula 7133.

**NGC 7142** (21h45.9 +65°48) At 100X, this fairly large open cluster is not very bright. There are 2 bright stars to W and another bright star to the N. Averted vision helps resolves the haze a little. I counted 35 stars using direct vision in 2 levels of stars. I particularly liked the shape of this object.

**NGC 7380** (22h47.0 +58°06) The final open cluster in this column. At 70X, I considered this as pretty bright, pretty big, kind of triangular shape, in a nice field of stars. 25 stars were counted, with averted vision, more stars pop out. A bright star on SW end was seen with a faint companion, and there is another nice double star further off of the same point of the triangle. Finally, there is a bright star some distance out from double. This cluster should be nice in small scopes.

**m Cepheus** (21h43.5 +58°47) This red star is one of the brightest of the carbon stars in the sky, and named the **Garnet Star** by William Herschel. The color of this star is beautiful whether you are looking at it naked eye, through binoculars, or in the telescope. Just south of the star is the open cluster and large nebula IC 1396. There's not much to the cluster, and so far my attempts to view the nebula has been unsuccessful.

#### **Herschel 400 Objects**

40, 6939, 6946, 7142, 7160, 7380, 7510

#### **SAC's 110 Best of the NGC Objects**

40, 6939, 6946, 7129

tions (reduced to RA/Dec) and new positions measured on plates taken with a 20cm Twin Astrograph in Washington DC. This catalogue obviously doesn't cover the whole sky (yet), but reaches to -18 Dec. In this area are some 750,000 stars, nominally complete to photo-blue mag. 10.5, with a lot of stars included that are up to one magnitude fainter. This is triple the real density of the ACRS or the PPM, and further, the accuracy of the positions is three times better, approaching 0".1! This is limited now mainly by the fundamental reference frame of positions on the sky. You can download the "Twin Astrograph Catalogue" (TAC) in one-degree strips directly from the USNO at:

<http://aries.usno.navy.mil/ad/tac.html>

It's three times larger than the PPM, so have plenty of disc space ready! Be sure to read the introductory text at the Web site, since there are some caveats on the quality and completeness of the data for certain zones. This Web page also has a link to the original AC re-reductions, too. There's some interesting historical reading provided about the origins of the AC.

The TAC doesn't include all the stars contained in the AC re-reductions, but new positions at similar precision for these fainter stars can be obtained from another up-to-the-minute catalogue: GSC, version 1.2. This is a re-reduction of the GSC using this time the PPM star catalogue as the reference net, and also taking into account very carefully the distortions of the Schmidt plates. The GSC v1.2 is not available yet 'in toto', but can be explored on a star-by-star basis at the Web site for the "Catalogues and Surveys Branch" (CASB) at Space Telescope:

<http://www-gsss.stsci.edu/gsc/gsc12/gsc12'form.html>

The claim is that the GSC v1.2 is reliable at the 0".3 level, and this appears to be the case for several examples tested

by asteroid occultation predictions. Thus the data are five to ten times better than v1.1! The main CASB Web area homepage is at:

<http://haven.stsci.edu/>

...which contains other interesting stuff.

Even the GSC is small change nowadays, thanks to complete deep scans of the original sky survey plates in both hemispheres in two colors. How deep? Magnitude 20. How big? How does 500,000,000 stars sound?! That's something like one-half percent of *all* the stars in the Milky Way galaxy! Compared to the GSC, this is like a hippopotamus squatting on a pocket Bible. The ten degree square region centered on the Large Magellanic Cloud contains about 15,000,000 stars—as many stars as are in the entire GSC. The sky survey that's readily available now has been produced by the U. S. Naval Observatory's Flagstaff station. The products from the "Proper Motion Machine" (PMM, not PPM!) are described at another USNO Web site:

<http://www.usno.navy.mil/pmm>

This page includes links to three on-line search engines (CDS, ESO, Lowell) as well as third-party software for reading the data.

There are two main catalogues. "SA1.0" is a selected list of a mere 54 million stars between mag. 16 and 19 uniformly distributed around the sky. It is intended to be used as an astrometric reference net for large telescopes and narrow-field instruments, such as for amateurs doing asteroid and comet astrometry with commercial CCDs. Often there are only a few GSC stars in a field, not really enough to get a good asteroid position. This catalogue will allow even small chips to get enough reference stars to do such measurements. Obviously, this is not a catalogue to use to make star charts, since the stars are chosen by

their distribution, not for an inventory of the sky. If you do astrometry, head to the Web page above to read about getting a copy of the CD this catalogue is on, although it is now being included in astrometric reduction software packages.

The catalogue everyone should be excited about is "A1.0". This is a real inventory of the Schmidt sky survey plates, done from the original plates (not copies), and reaching even fainter than you can see on the POSS

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## For some the data show only that the star is not in the room with you, and sometimes not even that...

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prints, comprising 488,000,000 'detections', with some star/nonstar discrimination. Using the catalogue we have on-line at Lowell, I have extracted positions for mag. 19 variable stars in the thickest parts of the Aquila and Cygnus Milky Way. This comes on 10 CDs (6 gigabytes), and will not be generally available (at least for now) except to professionals, partly because USNO-Flagstaff is not in the business of spending their time cutting CD-ROMs to sell, but mainly because of the complicated legal entanglements involved.

Because a lot of people have their fingers in the pie, it is not clear how these can be used in commercial products. Besides the Navy, there's also the National Geographic (who's paid for both surveys in the north), the European Southern Observatory and the Anglo-Australian Observatory (for the south), SERC/PPARC, Cal Tech, and Space Telescope Science Institute, all of whom have claims to various intellectual property rights and copyrights on the source material. As the project maestro Dave Monet has said, "don't make me wake up the lawyers." However, because the material can be freely searched on-line, I don't see that this is much of a hindrance for ordinary amateur visual/CCD observing.

### Catalogues of the near future (Hipparcos/Tycho, Millenium Star Atlas)

If you talk to anybody making star catalogues now, they'll all tell you that everything is going to be swept aside by Hipparcos. The Hipparcos spacecraft operated

in the early 1990s to obtain parallaxes, positions, plus B and V magnitudes for stars. The results have been under tight wraps, but have now been released. The parallax part of the mission (Hipparcos) produced parallaxes good to about 1 milliarcsecond (one thousandth of an arcsecond) and high-precision proper motions for about 100,000 bright stars. Another instrument on the same spacecraft, called Tycho, has produced positions of lesser (but still high) precision plus B and V magnitudes for one million stars—complete to mag. 10.5, and lots of stars to 11.5 (not quite as complete as the TAC).

You can do star-by-star searches using the CDS-Strasbourg "VizieR" look-up facility:

<http://vizier.u-strasbg.fr/cgi-bin/VizieR>

This page produces a catalogue "order form". In item 1 here, type in the catalogue number, which is I/239. Submit this, then on the succeeding page select either the Hipparcos or Tycho portion of the catalogue, and continue. This brings you to the search page, which allows searches by star name or by position, and selection of what data you would like to see.

The entire dataset is also available via ftp from the CDS:

<http://cdsweb.u-strasbg.fr/cgi-bin/Cat?I/239>

The files come to 427Mb, so the VizieR service is likely to be more useful for most folks.

As a result of using the Hipparcos/Tycho data in the last two weeks, I can offer the following advice. First, note especially that the positions supplied are for epoch 1991.25 and equinox 2000. Because the time baseline of the positions was only a few years, the proper motions derived from the Tycho data are rather poor compared to up-to-date astrometric catalogues mentioned above. The Hipparcos motions seem to be very good, and conform to those shown in the PPM and TAC. Thus I would avoid using the proper motions given by Tycho. For most purposes it is also better to use positions for both epoch and equinox 2000, such as those in the PPM.

The Hipparcos parallaxes are the best available, but bear in mind that most stars are far enough away that the errors of these observations are a substantial fraction of the parallax itself. For only about 20,000 of the 120,000 Hipparcos stars is the parallax error 10 percent or less of the parallax. In other words, for most stars the parallax

## Such-A-Deal

**SUCH-A-DEAL** is a place to advertise equipment, supplies, and services related to amateur astronomy. This is a free service for SAC members and friends. SAC is not responsible for the quality of advertised items or services. All insertions must be submitted in writing.

**For Sale** — Twenty years of Sky & Telescope magazine (1977–1997), all in excellent condition. Asking \$200. Call Mike, 926–4765.

**For Sale** — 8" f/6 Meade Newtonian Equatorial mount w/ clock drive, 12 volt variable speed control, Camera w/ mount, 3X barlow, 32mm Super Plössl, 25mm Meade, 15mm Super Plössl, 4.8mm Nagler. Steve Chase, 373–6144

distance is merely competitive with other methods of distance determination. For some the data show only that the star is not in the room with you, and sometimes not even that when the errors are larger than the parallax itself. (There are also a fair number of spurious negative parallaxes.) When using the data, be sure to check the value given for the uncertainty.

The VizieR search results also show various data resulting from the photometry done by the instruments. The corrected V magnitudes shown as one of the earlier columns of data seem to be adjusted very closely to the standard V system. Also given in later columns are the raw data, uncorrected for what appears to be a strong color term in the B and V results. The individual magnitudes here seem to be “wrong”, but the B-V colors listed seem to be correct when compared to Landolt equatorial standard stars. Again, be sure to look at the errors listed, as these can be quite large for fainter stars in the Tycho catalogue. At mag. 10, the per-observation error of the magnitudes was about 0.4 magnitudes. Only by having made one hundred or more observations was the error of the mean beat down to an acceptable level. The large per-observation errors however, mean that small-amplitude variables among the fainter stars went unnoticed, “lost in the noise”.

Many variable-star hunters have despaired that the Hipparcos results will mop up all the bright variable stars that are not already known. I can confirm, however, that this is simply not so. Yes, there are some 8000 new variables detected, but because the data were taken in a temporally very irregular fashion, not every variable was caught, particularly eclipsing binaries of the Algol type for bright stars, and just about any type fainter than mag. 9.0 or so. Plenty of work still to be done!

More interesting for most amateur observers is that a new large-scale star atlas, the “Millenium Star Atlas”, is being produced from the Tycho data by Roger Sinnott and colleagues at Sky Publishing. When it comes out later this year, it will likely be a significant advance on the Uranometria and Herald-Bobroff atlases. (Is it going to be perfect? No.) Advertising for this has already appeared, where further details can be sought.

You can find out more generally about the Hipparcos/Tycho mission and its products at the ESA Web site:

<http://astro.estec.esa.nl/SA-general/Projects/Hipparcos/hipparcos.html>

The high-precision positions from Hipparcos/Tycho mean that all previous ground-based fundamental reference frames are obsolete. Now that the data are available to mere mortals, *everyone* will re-reduce their position catalogues using the Hipparcos stars as the reference frame. The GSC will be redone again, A1.0 will become A2.0 (or something), the Twin Astrograph Catalogue will get re-reduced; new star catalogues will be started to extend the high-precision to fainter limits. Already the USNO-Washington has planned a digital sky survey to 15th magnitude that will have the same accuracy as Hipparcos.

This is scheduled to start in Chile in 1998.

You read/hear about a lot of amazing stuff coming out of astronomy, but it's mostly about specific objects, or an obscure new discovery. Here are some things that will really change the way we do even amateur astronomy. Watch this space!

## 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.

## Bits and Pieces Coming Events

### Star Parties

All-Arizona Oct. 3-4  
Starry Nights Festival Oct. 24-26

### Meteor Showers

Leonids Nov. 16

## Minutes from the August Meeting

The August meeting was called to order by Adam Sunshine at 7:30 PM.

Adam welcomed our guests and asked them to introduce themselves. We had 1 person introduce themselves. Welcome!

Regina Lawless gave the treasurers report.

A.J. Crayon discussed the Deep-Sky meeting which is next month (Sept. 25th). The constellations will be Scorpius and Scutum. A.J. also talked about the Messier Marathon. He said the marathon will be March 28, 1998. A.J. had an idea to see if we can get in the Guinness Book of world records with possibly the most people to see all 110 in one night or the most observers at a Messier Marathon.

Paul Dickson talked about his books, *The Messier Catalog* and *SAC's 110 Best of the NGC*. He is also finishing up the Herschel 400 book, *Finding the Herschel 400*, which he hopes to have for sale at the September club meeting.

Rich Walker told us that there were no public events in the near future, but he is working to change that. He talked about an organization that is looking for an astronomer to talk to their kids at a campfire. They gave him 10 dates from October to April. Lets get out there and talk to these kids.

Chris and Dawn Schur just got back from Australia and he gave us a report on Comet Hale-Bopp. He observed the comet near Sirius at about 5:00 AM. Comet Hale-Bopp was sporting an anti-tail, which was about 3° naked eye.

# All-Arizona Star Party

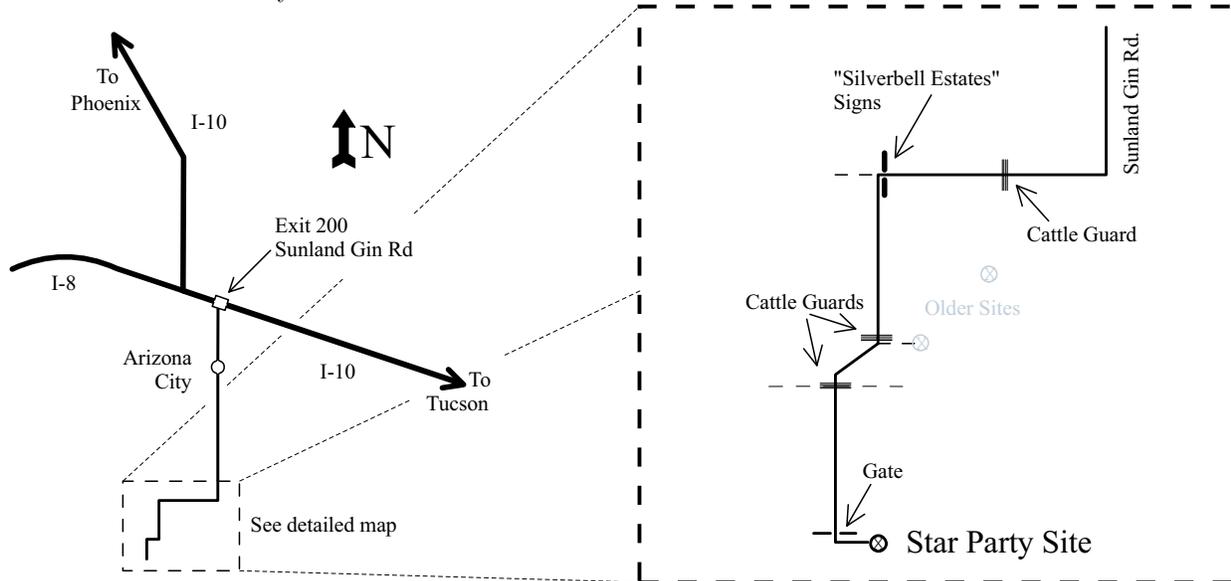
## October 3-4, 1996

This is the sixteenth annual All-Arizona Star Party. It is a two night event, held during the new moon of October. This year's event is once again sponsored by the East Valley Astronomy Club (EVAC). In the distant past, this event has been sponsored by other Arizona clubs.

The star party take place at a site south of Arizona City, which is almost equal distant (about 55 miles to Arizona City) from Phoenix and Tucson (see the map). The site is remote and very dark. The only facilities available will be a port-a-pottie.

Staying the night means you have to plan ahead. The desert tends to be hot and sunny during the day and cold at night. Last the temperature ranged from the lower 50's at night, to 104 during the day. After a 100 degree day, a 50 degree night can seem bitterly cold, so plan accordingly. Remember to bring warm clothes, food, and drinks. It's best to bring too many warm clothes than too few.

All Arizona astronomy clubs are invited and it's



Take I-10 to exit 200 (Sunland Gin Road.) Turn right (south) after exiting the freeway. After about 15 miles, the pavement ends and about one mile further, the road turns sharply to the west. After another four miles, the main road will turn south just after the "Silverbell Estates" signs. Three miles past the signs, the road will veer off to the west, and five miles further, the road will pass through a gate. Turn left immediately after the gate and continue for another 2/3 of a mile to the site.

We had some slides by Stan Gorodenski of Comet Hale-Bopp. These were some of his first attempts at photography. Good job, Stan. Rick Tejera brought in some free astronomy computer programs. If you want any of these you can get him a disk and get your copies. Dean Ketelson invited us to the Tucson club meeting of TAAA to hear their next speaker who is a project manager for the Mars Pathfinder mission. There may also be a walk through of the 8.4 m mirror after the meeting.

hoped for a large turn-out. Last year there were more than 50 vehicles on the observing field on Saturday night. So plan on being there early to see old friends and making new ones. Last year, Friday night was clear the entire night while on Saturday night, it clouded up by 10 PM.

Those planning on staying for both nights may want to get a motel room back at the Interstate. The 100+ degree days make it difficult to get any rest. Having a room can save you two hours on driving home and you get to sleep in air conditioned comfort.

**Please make every attempt to arrive before dark. After dark the site is difficult to find, even if you know where it is.**

## Swap Meet

On the Saturday afternoon, October 4th, there will be a swap meeting at the site from **4:30 PM until sunset**. Bring money to buy or things to sell or trade.

For those staying both nights, here are a list of restaurants at the given I-10 exits: **194** — Dairy Queen, Burger King, Denny's, **198** — Wendy's, **200** — Iron Skillet, Subway, Burger King, **203** — Pizza Hut, McDonald's, Taco Bell, Waffle House, and Mexican Food.

At the break we had about 40 people present.

After the break, Paul Dickson told us about the All-Arizona Star Party on Oct. 3rd and 4th.

Gerry Rattley introduced Sheri Cahn, president of the East Valley Astronomy Club, who talked about using the Hubble Archives and the project she worked on for college credit. She worked with 5 different H II regions. The 5 regions were Orion, the Lagoon, the Trifid, the Omega, and the Eagle nebulae. She talked about her

observations and comparisons of these 5 regions. Afterwards she showed us some slides of her trip to the Royal Astronomical Society. Thank you, Sheri.

After we adjourned, thirteen of us “star hopped” (or cloud hopped, it being Arizona and August) to JB’s where we continued our astronomical talks.

—David Fredericksen, SAC Secretary

## October Club Meeting

The speaker for the October club meeting will be Dr. Peter Wehinger from A.S.U. He will talk about the progress he has made with A.S.U.’s Student Observatory as when as some of the science learned from Comet Hale-Bopp.

# Magazine & Membership Renewals Due

The end of the year is fast approaching and it is time to renew your magazine subscriptions and your memberships. The club gets a discounted rate for astronomy magazine subscriptions because members subscribe in a block. Subscriptions at other times of the year must be held until the minimum number of subscribers is reached. So it’s best to renew early, so no issues are lost. *Sky & Telescope* is \$27 for a year and *Astronomy* is \$20.

The SAC membership is based on the calendar year. Membership is from January through December. Please make an effort to renew your membership at the October or November SAC meetings. In 1998, SAC will have a

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## Moistron Theory All Wet by Michael Lerch

Concerning the publication of the “Milan Moistron Theory” in the September, 1997 (#248) issue of the Saguaro Astronomy Club’s newsletter, *SACNEWS*; the theory is misdirected and based on faulty observation at best! In short it’s all wet!

For this theoretical particle to be so easily captured by cloth, cardboard or wood, then, upon release, to have enough energy to travel to the stratosphere or all the way from the moon is dubious at best. While the physics involved gets strung out and sticky at times I offer the following formula/equation that leaves little doubt to the problem of energy level:

$$S \circ Y^R \uparrow = (@bI^N)^{Log}$$

Furthermore it is obvious that the quantity of moistron rays/particles would be proportional to the total mass of the newly acquired telescope.

Do we get just a little cloud on an evening when someone takes a view with new binoculars for the first time? Do we get a haboob when a new 24” newtonian is set up for view?

This M&M Theory, as I call it, only puts a candy coating on a far darker reality. Mr. Milan missed the most subtle, yet, when recognized, the easily observed; it is only when the telescope is in close proximity with the human being that the calamitous events befall the night observer!

If one must know why pristine skies puff up with clouds upon arrival of new optics then one cannot discern what causes the overcast, which leads to knowing where clear skies exist but not being able to determine

when. Yes the “Other Reality” of human being’s “Quantum Existence,” where one can observe the manifestations of these multidimensional forces but have little or no control or conception of how they interrelate with each other is the probable cause of local and global depressing skies!

To put it simply, the quantum being, upon arrival of new optics, new car, new anything is unbalanced. The energy levels produced by anticipation, anxiety, happiness, etc. that are reached by the fortunate/unfortunate quantum being have to be dissipated quickly in order to maintain a manageable balance. If not achieved, an implosion equal to or greater than the energy level may occur. This is why men pass out in delivery rooms.

These released quantum forces are what de-stabilizes high pressure zones, ushering in the low pressure with its entourage of moisture. Now, if you have a high enough percentage of a concentrated population getting giddy over the approach of a new moon, obviously this uncontrolled release of attributed energy has been enough to disrupt whole regions worth of weather with predictable results.

Yet, there remains many clouds of question on the horizon of this fascinating new field of research. For example: while it may take two hours to drive to a dark sky site, how is it that the released energy is reacting with local conditions before you get there? If one acquires a new refractor and equatorial mount and you take the scope 100 miles west and a friend takes the mount 100 miles east, how is it that neither of you see anything? And most bewildering, how is it that the guy with the brand new, never been out of the box, \$99, 600X, Christmas Scope sets up next to you on the clearest, darkest night ever?

Just because this fine mess of a theory got published, Mr. Milan shouldn’t anticipate the Nobel Prize or any such laurels. I do hardily thank Mr. Milan, though, for giving me this opportunity to put things straight. I look forward to the endless cycle of questions and answers.

Humbly Yours, Michael Lerch.

new treasurer, not having to keep track of a large number of late subscribers will make the job a lot easier. Dues are \$28 for individuals and \$42 for families (one newsletter).

Your last newsletter will be the December issue unless you renew before January.

The form to fill-out is at the top of the back page.

Also coming up is the ordering of Royal Astronomical Society of Canada's *Observer's Handbook*. A final count of the number of books needed will be taken at the October club meeting. If you want one, be sure to attend one of these meetings to be counted.

—*Regina Lawless, SAC Treasurer*

## The SAC Offices by Paul Dickson

It's now October, and once again it's time to open nominations for the club offices. Nominations are taken from the October club meeting up to the election at the November meeting.

If you want to get involved with the club or find out how the club works, the best way is get elected as a club officer. At first thought you might consider this a "trial by fire" method, but it really isn't that bad. Most of the club offices only require a couple of hour each month. If you don't procrastinate, the work is easily and quickly done. Most tasks can be done at home with some obvious exceptions: the President must lead club meetings, the Secretary must take meeting minutes, the Treasurer must go to the bank to move money, and the Properties Director must set up equipment at meetings and signs at star parties. Of course, there's nothing wrong with delegating tasks to someone else in case you can make specific event.

If you have been to a few meetings or looked at the first page of the newsletter, you probably know the offices of the club. Those who have been with the club for more than a year probably know which offices are elected. But do you know what each office oversees? If you haven't served as an officer, it's unlikely that you would know.

The Saguaro Astronomy Club is fairly unique in that club members can not serve more than two consecutive terms in the same office. Some years this has meant some difficulty finding members willing to fill positions. This rule happens to be one of the resulting forces that formed the club, so is unlikely to change in the foreseeable future.

SAC has five offices that are elected. These offices are President, Vice-President, Secretary, Treasurer, and Properties Director.

The **President** is ultimately responsible for the running of the club and provides the leadership necessary for doing so. The President organizes the monthly meeting and board meetings, finding locations for these meetings when necessary. This means that President is the contact person for the club.

The **Vice President** take the President's place when necessary. Otherwise, the Vice-President is in charge

of coordinating and scheduling general business meetings and the program agenda. The Vice-President is also responsible for both general club publicity and program publicity, but this job has been delegated to the Public Events committee.

The **Secretary** is the custodian of all official documents and records of the organization. The Secretary also records the minutes of all meetings, including the Board of Directors meeting, for publishing in the next newsletter. The Secretary is also the official correspondent with other clubs, organizations, etc. The Secretary is also responsible for the publication of the club newsletter, but this has been delegated to the Newsletter committee.

The **Treasurer** maintains and proposes the club's budget, handles the clubs bank accounts, handles the collection of dues and subscriptions. The Treasurer and Newsletter Editor maintain the newsletter's mailing list.

The **Properties Director** is in charge of SAC properties which include the club library, and club's telescopes, and is the host for the regularly scheduled star parties or delegates the role.

There are three non-voting officers on the SAC Board of Directors. These are not elected officers, but are the appointed chairmen for the Newsletter, Deep-Sky Subgroup, and Public Events committees. Except for the Deep-Sky Subgroup, these standing committees have usually had only one member (but it wouldn't hurt to have more help).

## Astroimage '97

Where: Cal State Fullerton — Ruby Gerontology Center  
When: Saturday, 11/8/97, 9:00 AM – 5:00 PM  
Cost: \$25

The Orange County Astronomers (OCA) and its special interest group (SIG), the Electronics Oriented Astronomers, with California State University Physics Department are co-sponsoring ASTROIMAGE 97, a one-day seminar on astronomical imaging. It will be held on Saturday, November 8, 1997 at the Cal State University Fullerton Ruby Center, from 0900 to 1700. The seminar discusses both electronic and silver-based astronomical imaging, techniques, equipment, and applications. There will also be several vendors present showing off their latest products. Attendance has averaged 120 to 150 persons the past few years. Images from anyone are called for, and a computer with large screen will be available for their display, as well as a print show for film images. Admission for the day is \$25, which includes refreshments.

Papers Chair: Wayne Johnson Email: wpjohnson@anet.bna.boeing.com Phone: (909) 653-8813

Exhibits and General Coordinator: John Sanford Email: JRSanf@aol.com Phone: (714) 722-7900

AstroImage 97 Registrar: Charlie Oostdyk, P.O. Box 1762, Costa Mesa, CA. 92626 E-mail: charlie@ccd.edu, Phone: (714) 438-4624

More information is available at the Orange County Astronomers (OCA) website at Chapman College, Orange, California: <http://www.chapman.edu/oca/>

# October 1997

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;">                     All Times are Mountain Standard Time                 </div>			New Moon 9:51 A.M.	<b>PAS Meeting</b> Tomorrow <b>TAAA Meeting</b> (Tucson)	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> <b>Fri. &amp; Sat., Oct. 3-4: All-Arizona Star Party</b>                      Arizona City                 </div>	
			1	2	3	4
	Launch Window Opens for Cassini Launch		<b>EVAC Meeting</b> (SCC: Rm. PS172)	Saturn at Opposition	Yesterday First Quarter Moon 5:22 A.M.	
5	6	7	8	9	10	11
	Mercury at superior conjunction (moves into evening sky)		Full Moon 8:46 P.M.	Asteroid Vesta at opposition (Mag. 6.4)	<b>SAC Meeting</b> Grand Canyon University, Fleming Rm. 105	
12	13	14	15	16	17	18
Moon occults Aldebaran 2 A.M.			Last Quarter Moon 5:06 A.M.	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> <b>Friday Night, Oct. 17, 7 PM: SAC Board Meeting</b>                      There will be a board meeting 30 minutes prior to the main meeting.                 </div>		<b>SAC Star Party</b> Buckeye Hills (members&guests)
19	20	21	22	23	24	25
				Sun enters Libra 2 P.M.	New Moon 3:01 A.M.	
26	27	28	29	30	31	

## Magazines & Discounts

Club members may subscribe to astronomical magazines at reduced rates through the club Treasurer. See the Member Services Form on the back page of this newsletter. Furthermore, club members are encouraged to align their subscriptions with the Jan.-Dec. calendar year. This eases the burden both on the Treasurer and the Publisher by permitting a single Group Renewal to be placed in the autumn for the upcoming calendar year.

Those members who experience problems with their subscriptions to *Astronomy* magazine may call Kalmbach Publishing Customer Service at (800) 446-5489.

Those members who experience problems with their subscriptions to *Sky & Telescope* magazine may call Sky

Publishing at (800) 253-0245.

Besides the club discount on *Sky & Telescope* magazine, Sky Publishing offers club members a 10% discount on all other Sky publications. This means books, star atlases, observing aids, Spotlight prints, videos, globes, computer software, and more.

Club members who subscribe to *Sky & Telescope* through the Club Discount Plan may order Sky publications directly, at the above toll-free number, without going through the club Treasurer. Simply mention the Club Discount Plan and give the Saguaro Astronomy Club name to receive the discount. Sky Publishing will check their records to verify that you are eligible to receive the discount.

## 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.....\$20.00 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:

David Fredericksen  
SAC Secretary  
6222 W Desert Hills Dr  
Glendale AZ 85304

## 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.

**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.

### 1997 SAC Meetings

Jan. 24  
Feb. 21  
Mar. 21  
Apr. 25  
May 16  
Jun. 20  
Jul. 18  
Aug. 22  
Sep. 19  
Oct. 17  
Nov. 14  
Dec. 13 Party

### 1997 SAC Star Parties

Date	Sunset	Moonrise
Jan. 4	5:37PM	3:50AM
Feb. 1	6:03PM	2:35AM
Mar. 1	6:28PM	1:23AM
May 31	7:34PM	3:01AM
Jun. 28	7:44PM	1:43AM
Jul. 26	7:34PM	12:25AM
Aug. 30	6:58PM	4:56AM
Sep. 27	6:20PM	3:46AM
Oct. 25	5:46PM	3:33AM
Nov. 22	5:25PM	1:18AM
Dec. 27	5:31PM	6:22AM

## SACNEWS

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

Stamp

First Class Mail

### Inside:

- Star Catalogues by Brian Skiff
- Dim Moments by Paul Dickson
- Comet Comments by Don Machholz
- Fuzzy Spot by Ken Reeves
- Moistron Theory All Wet by Michael Lerch

**All-Arizona Star Party — October 3-4**  
**SAC Meeting — October 17**  
**SAC Star Party — October 25**