

# Saguaro Astronomy Club

Metro Phoenix, Arizona

## SACNEWS



August 1994 — Issue #211

v7.24

## Choosing Eyepieces A Buyer's Guide

by Alan Dyer,  
Astronomy Magazine

*This article is reprinted from the May, 1994, issue of Focal Point (Vol. VI, No. 9), the monthly notices of the Atlanta Astronomy Club, Inc. Which in turn, reprinted it from the June, 1993, issue of Astronomy magazine. Copyright © 1993 Kalmbach Publishing Co. The original article contains a 4-page table listing specifications and prices for all of the eyepieces offered by manufacturers in North America as of early 1993. Back issues of Astronomy can be ordered by calling 800-533-6644. Club members can subscribe to Astronomy at a discount. See back cover for details.*

*Keep this article handy. After completing this article, it will be followed by another from Rick Blakely with references back to this article. Rick's article is directed to those who are committed amateurs.*

1 Can't tell an Ortho from an Erfle? Not to worry. We'll guide you through the marketplace of eyepieces and help you pick a set that's right for you.

2 Happiness is a sparkling new eyepiece. Or better yet, a matching set of them. Eyepieces are the most important accessories you'll ever buy for your telescope. Although it is the main lens or mirror of your telescope which forms the image, it is the eyepiece which magnifies the image. A good eyepiece does so without adding to or subtracting from the image. With a set of fine eyepieces you'll be able to resolve all the celestial wonders your telescope is capable of revealing.

### The Myth of High Power

3 To get the most out of your telescope you should have three or four different eyepieces because on an astronomical telescope you switch magnification by switching eyepieces. You need to change magnification because celestial targets come in various sizes and brightnesses. A big object such as a sprawling cluster of stars is best framed with a low-power (25X to 50X) eyepiece. Inspecting details on

## Quick Calendar

SAC Star Party  
Buckeye Hills Recreation Area  
Saturday, August 6

Perseid Meteor Shower  
Thursday-Friday, August 11-12

SAC Meeting  
Speaker: Dr. Paul Schmidtke  
7:30, Friday, August 19

SAC Star Party  
Buckeye Hills Recreation Area  
Saturday, September 3

## Magazine Renewals Are Due

Renewals must be in by the September meeting.  
See Member Services Form on the back page.

a planet's tiny disk calls for a high-power (150X to 200X) eyepiece. Hunting galaxies or planetary nebulae might be best with a medium-power (80X to 120X) eyepiece.

4 The chief mistake new telescope owners make is to immediately insert the highest-power eyepiece they have in their arsenal. High-power eyepieces "see" only a tiny section of sky, making it frustrating to find even the Moon. Although newcomers sometimes feel compelled to buy an ultra-high-power model as their first extra eyepiece, a good low-power model is often a far wiser addition.

5 In fact, many entry-level telescopes sold through department and camera stores come with eyepieces that provide far too much magnification. How can you tell? If

## SAC Officers

President	Bob Gardner	274-5046
Vice President	Susan Morse	934-7496
Treasurer	Adam Sunshine	780-1386
Secretary	A.J. Crayon	938-3277
Properties	Pierre Schwaar	265-5533
SACNEWS Editor	Paul Dickson	862-4678
Public Events	Rich Walker	997-0711

yours is one of the many imported 60-mm refractors or 4.5-inch reflectors, chances are you'll find the tops of the eyepieces marked with designations such as AH20, HM9, HM6, or SR4. The numbers indicate the focal length of the eyepiece in millimeters. The smaller the number the higher the power that eyepiece provides.

6 To determine the magnification an eyepiece produces on your telescope, first look for the focal length of the telescope. It will be a number between 500 mm and 1,500 mm marked on the tube or in the manual. Take this number and divide it by the focal length of the eyepiece. For example, a 4-mm eyepiece on a 900-mm focal-length telescope gives 225 power ( $900 / 4$ ), or 225X for short. That same eyepiece on a 1,500-mm focal-length scope will give 375X.

7 A figure of 375X sounds terrific. It's not. Although your import telescope may boast three or four eyepieces, the 6-mm and 4-mm models produce so much magnification that images through them look faint and fuzzy. Under the best conditions (using good optics in a steady atmosphere), the highest power you can usually employ on any telescope is about 50X to 60X per inch of aperture. For a 60-mm (2.4-inch) telescope this works out to a maximum power of 120X to 150X. On typical 60-mm aperture refractors with focal lengths of 700-mm to 900-mm, a 4-mm eyepiece gives an excessive power of 175X to 225X. A 6-mm eyepiece produces 120X to 150X, right at the upper limit. Under most conditions, you'll find these eyepieces of little use.

8 Compounding the problem is that many entry-level telescopes come with eyepieces of poor quality. Even the lower-power 20-mm and 12-mm eyepieces often provide poor images. The worst offenders are the ones marked AH, HM, or SR. These letters refer to the optical design of the eyepiece (AH = Achromatic Huygenian, HM = Huy-

genian Mittenzwey, SR = Symmetric Ramsden). All are simple two- or three-element designs that add fringes of false color around images of bright objects and have narrow, tunnel-like fields of view. Far better are the Kellner, Modified Achromat, and Orthoscopic eyepieces that manufacturers such as Celestron, Meade, Orion, and Parks are now supplying with their entry-level telescopes.

### Eyepiece Designs

9 We recommend replacing poor eyepieces as a first step to improving your telescope. But choosing eyepieces involves more than simply picking ones with suitable focal lengths. Eyepieces also come in various optical designs. "Design" means the number of lens elements, the type of lenses, and their arrangement.

10 The most economical eyepiece designs of good quality are the 3-element Kellners (a classic design sold by several manufacturers), Meade's Modified Achromats, and Edmund's RKE line. These affordable eyepieces are the very minimum you should consider when choosing a budget set.

11 The next step up is to an orthoscopic. Although "orthoscopic" can mean any highly-corrected eyepiece, the term usually refers to a specific design invented in 1880 by Ernst Abbe, an optician with Zeiss in Jena, Germany. Orthos contain four elements and correct optical aberrations better than 3-element designs do. Orthos are fine eyepieces for viewing the planets.

12 In recent years, the 4-element Plössl has become very popular. It boasts a slightly wider field than most Orthos and a similar freedom from aberrations such as false color. It is a good general-purpose eyepiece capable of providing high-contrast planetary views.

13 Although not an officially sanctioned term, Modified Plössls is our name for a new family of eyepieces which adds a fifth element between the Plössl's two pairs of

## 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 same week of the month. The same is true of the club's star parties. Star parties at Buckeye Hills are mostly held on the Saturday of the third quarter moon.

### 1994 SAC Meetings

Jan. 28  
Feb. 25  
Mar. 25  
Apr. 22  
May 20  
Jun. 24  
Jul. 22  
Aug. 19  
Sep. 16  
Oct. 21  
Nov. 18  
Dec. 17 Party

### 1994 SAC Star Parties

Date	Sunset	Moonrise
Jan. 8	5:38pm	5:22am
Feb. 5	6:05pm	4:11am
Mar. 5	6:29pm	2:58am
Apr. 9	6:55pm	5:42am
May 7	7:16pm	4:17am
Jun. 4	7:34pm	2:52am
Jul. 2	7:42pm	1:27am
Aug. 6	7:24pm	6:09am
Sep. 3	6:51pm	4:56am
Oct. 1	6:14pm	3:40am
Oct. 29	5:40pm	2:24am
Nov. 26	5:22pm	1:12am

lenses. Examples include Celestron's Ultima line, Meade's Super Plössls, Orion's Ultrascopics, and both Parks' and Roger Tuthill's premium Plössl series. All provide superb color correction, sharp on-axis images, and excellent suppression of ghost images, the term for annoying internal reflections of bright stars and planets.

14 The new Vixen Lanthanum LV design has a 5-element Modified Plössl at its heart, but adds a 1-, 2-, or 3-element lens called a Barlow ahead of the main group. The advantage is that all LV models share a valuable characteristic—long eye relief. Eye relief is the distance your eye needs to be from the top of the eyepiece in order to see the entire field of view. Short focal-length eyepieces usually have short eye reliefs; you have to place your eye uncomfortably close to the eyepieces to look through them. But each LV eyepiece boasts a generous eye relief of 20 mm.

### Wide-Angle Eyepieces

15 All the eyepieces described so far provide a “standard” field of view. There is another group of eyepiece designs that provide wide fields of view.

16 To understand field of view, hold an eyepiece up to your eye and aim it at the sky or at a window. You'll see

a circle of light. The angular diameter of that circle is the eyepiece's apparent field. Standard-field eyepieces have apparent fields of 40 to 50 degrees. Wide-angle models have apparent fields of 60 to 70 degrees. A new generation of eyepieces we've dubbed “extra-wide-angle” models have apparent fields around 80 degrees across.

17 But a number such as 80 degrees doesn't mean you see 80 degrees of sky when you look through that eyepiece on your telescope. How much sky you do see is called the “actual field of view.” To determine the approximate actual field of an eyepiece, divide its apparent field by the magnification that eyepiece provides on your telescope. For example, an eyepiece with a 50 degree apparent field which produces 50X will show you  $50 / 50 = 1$  degree of sky. An 80 degree apparent-field eyepiece that also produces 50X on your scope will show you  $80 / 50 = 1.6$  degree. The magnification hasn't changed, but with the 80 degree eyepiece you see more of the sky.

18 Wide-angle eyepieces provide impressive picture-window views of starfields, deep-sky objects, and lunar vistas. For many years, the most popular wide-angle eyepieces were the Koenigs (a 3- or 4-element design) and Erfles (a 5- or 6-element design). The Koenig provides

# Comet Comments

by Don Machholz

(916) 346-8963    CC192.TXT    July 7, 1994

Many of our comets have now faded, leaving only three observable comets in our skies. Meanwhile, one returning comet has been recovered, and one bright and one faint comet discovered.

**Periodic Comet Borrelly (1994l):** This comet was recovered in Mid-June by Alan Gilmore and Pam Kilmartin of Mt. John Observatory in New Zealand and by G. Garrard of Siding Spring, Australia. At that time it was at magnitude 17, but this comet, with a period of 6.9 years, will brighten to magnitude 7 by the end of the year. You can presently find it in the morning sky.

**Comet Nakamura-Nishimura-Machholz (1994m):** Three independent discoveries were made of this comet over a course of sixteen hours on July 5–6. M. Nakamura and H. Nishimura of Japan both used 25x150 binoculars to find this tenth magnitude object in Camelopardalis. I used my homemade 27x120 binoculars, built in 1983 out of surplus parts for under \$400. For me this was 574.75 hours and 337 sessions since my last discovery two years ago. Presently no orbit has been determined. By the middle of July, I expect to have it posted on Kingmont BBS at (916) 652-5920; look for file CC192.TXT.

**Comet McNaught-Hartley (1994n):** Robert McNaught discovered this comet on a 110-minute plate exposed by Malcolm Hartley on July 5 from Siding Spring,

Australia. It was then at magnitude 16 in the southern morning sky. The orbit is not yet known.

Periodic	Comet		Borrelly	(1994l)	
Date	RA-2000-Dec	Elong	Sky	Mag	
07-17	03h08.2m	-13° 57'	76°	M	12.2
07-22	03h20.3m	-13° 13'	78°	M	11.9
07-27	03h32.6m	-12° 30'	79°	M	11.6
08-01	03h45.0m	-11° 44'	80°	M	11.4
08-06	03h57.4m	-10° 58'	81°	M	11.1
08-11	04h09.9m	-10° 11'	82°	M	10.8
08-16	04h22.4m	-09° 22'	82°	M	10.5
08-21	04h35.0m	-08° 31'	83°	M	10.3
08-26	04h47.6m	-07° 38'	84°	M	9.9
08-31	05h00.3m	-06° 41'	85°	M	9.7
09-13	05h13.0m	-05° 42'	86°	M	9.4
09-16	05h25.7m	-04° 38'	87°	M	9.2

Periodic	Comet		Tempel	1	
Date	RA-2000-Dec	Elong	Sky	Mag	
07-17	14h08.1m	-15° 27'	101°	E	9.2
07-22	14h19.3m	-17° 19'	99°	E	9.4
07-27	14h31.2m	-19° 06'	98°	E	9.5
08-01	14h43.6m	-20° 49'	96°	E	9.6
08-06	14h56.6m	-22° 26'	95°	E	9.8
08-11	15h10.5m	-23° 57'	93°	E	9.9
08-16	15h23.9m	-25° 21'	92°	E	10.1
08-21	15h38.2m	-26° 38'	91°	E	10.3
08-26	15h52.8m	-27° 48'	89°	E	10.5
08-31	16h07.7m	-28° 49'	88°	E	10.7
09-05	16h22.8m	-29° 44'	87°	E	10.9
09-10	16h38.1m	-30° 30'	85°	E	11.1

# What's Up

## by Steve Coe

August 1994

Vulpecula

Well, it is August in the Southwest and time for astronomers to try and guess where the storms will appear and where the clear skies will be available. A.J. and I have gotten pretty good over the years, but anyone trying to "estimate" the weather during the Monsoon season is going to be fooled. We have been rained on at Dugas Rd. and hailed on at Mount Hopkins. However, we have also have plenty of good evenings between the storms. Watch the weather and you can get good at following the patterns of cloud build up. All the deep sky goodies for this month are in the small, but well-placed, constellation of Vulpecula. Being in the middle of the Summer Milky Way means that this area has plenty of excellent clusters and nebulae to observe.

NGC 6802 is bright, pretty large, elongated 2 X 1 and much compressed at 165X in my 13"  $f/5.6$ . 15 stars were counted on a mottled surface and this cluster stood out from the Milky Way very nicely. There are two sets of double stars that "guard" this cluster on either side, both pairs of stars are light orange and white.

NGC 6820 is a nebula that is involved in the cluster NGC 6823. It is very faint, pretty large and can just be detected at 100X with the UHC filter. It is most obvious on the south side of the cluster.

NGC 6823 is pretty bright, pretty large and pretty

rich at 100X. 28 stars were counted with 4 stars forming a tiny (20") quadruple system.

NGC 6834 is a bright, pretty large, pretty rich, somewhat compressed cluster of 32 stars at 135X. This nice cluster stands out well from the Milky Way, there are several beautiful curved chains of stars and an 11th mag star in the cluster.

NGC 6853 is also M 27, the Dumbbell Nebula. It is the most easily seen planetary nebula in the sky. The Helix and the Owl have low surface brightness and the Ring is much smaller. This object is easy in the 10X50 binoculars as a small cloud afloat in the Milky Way. I have always been fascinated by the Dumbbell and have looked at it every Summer since I first learned the skies. The central, bright "Dumbbell" section is obvious in the 13". On a night I rated 9/10 the dimmer nebulosity stands out unmistakably and makes the total circumference of the nebulosity appear round. This effect is more pronounced in the UHC filter at 135X. Lord Rosse drew the Dumbbell in the 72" Leviathan and he included 18 stars involved in the nebula. I have tried with several large scopes to match that number and have never quite caught up with the Third Earl of Rosse. Using my old 17.5" Dobsonian at 7000ft. in the mountains near Flagstaff, I could pick out 10 stars within the Dumbbell. On an excellent night in Mayer, Az. at Richard and Helen Lines' Observatory their 20"  $f/6$  Newtonian could reveal 13 stars, one of the easiest being the very hot (85,000 degrees Kelvin) 13.5 mag central star. Both of those large scopes at about 250X would show some light and dark areas within the nebula. This strikingly beautiful planetary is lime green in all the telescopes mentioned above.

a wide apparent field of about 60 to 65 degrees at a relatively affordable price. University Optics offers a fine series of Koenigs in a wide range of focal lengths. Erfles are available from a few suppliers but this economical design has now been overshadowed by newer eyepieces carrying the trade names of various manufacturers. The new designs provide improved image quality toward the edge of the field and few or no ghost images.

19 For example, Tele Vue's Wide Field and Meade's Super Wide Angle eyepieces are both 6-element designs with apparent fields of 65 to 67 degrees. Both series offer low-to medium-power focal lengths and are excellent choices for deep-sky and general-purpose viewing, especially with  $f/6$  to  $f/15$  telescopes. Another wide-angle variation, Orion's MegaVista, is a 7-element eyepiece available in focal lengths from 40- to 10.5-mm. It provides freedom from ghost images and a 67 to 70 degrees field at an economical price.

20 Although superb performers, all of these wide-angle designs still exhibit some traces of an aberration called astigmatism, which turns stars at the edge of the field from ideal pinpoints into fuzzy elongated streaks. All eyepieces

exhibit more astigmatism when used on fast telescopes, ones with  $f$ /ratios of  $f/4$  to  $f/6$ . However, in the last few years, designers have created eyepieces that produce almost pinpoint stars edge-to-edge even when used on fast telescopes.

21 For example, Tele Vue's 6-element Panoptic models provide a 68 degree field with ghost images completely gone, generous eye relief, and only a trace of astigmatism even at the edge. Even more remarkable are the new generation of extra-wide-angle eyepieces. The most popular are the Ultra Wide Angle models from Meade and Nagler and Nagler II series made by Tele Vue. All provide pinpoint stars virtually right to the edge of an amazing 82 to 84 degree field. All work well on  $f/4$  to  $f/6$  telescopes and have long, comfortable eye reliefs for their focal lengths.

*Continued next month...*

## Newsletter Deadline

Mail items at least two weeks before the end of the month. Items arriving too late for an issue will be included in the next newsletter.

# Bits and Pieces

## Coming Events

### Star Parties

Perseids	Aug. 11
All-Arizona	Oct. 7 & 8
Solstice Party	Dec. 17

## Gone and Lost Forever...

The spacecraft Clementine, in which a computer failure on May 9 used up all its attitude-control propellant and left the spacecraft spinning, will have left its loose Earth orbit on July 20th and enter a heliocentric orbit.

In spite of the successful attempts to orient the spacecraft so that the solar panels were in a favorable position to gather sunlight, the spacecraft was unable to perform an orbital correction before the second lunar swingby.

The first part of the Clementine mission was highly successful, mapping the moon from lunar orbit, sending back more than 1.5 million images. Clementine is unique. It is designed to test military sensors while performing a science mission. [Source: Usenet posting to sci.space.science by Bill Higgins quoting Dean Bakeris]

Interestingly enough, the computer glitch that caused Clementine's problems occurred not in the experimental instruments, but in an older, "reliable" computer on board. It was not known if the computer problem was hardware or software in origin.

At this time a Clementine 2 mission is being proposed to Congress and the White House. This mission would land a tiny lunar rover on the Moon's surface and do so at a price lower than nearly all NASA missions while testing new materials. [Source: Usenet posting to sci.space.news by Henry Spencer summarizing space news from the June 6, 1994 issue of Aviation Week & Space Technology]

## Failure = Success

At last February's SAC meeting Henry Vanderbilt spoke about DC-X, a scaled prototype of a Single Stage To Orbit (SSTO) rocket. The project ran out of funding last October and Congress gave the project \$5 million more to finish testing. After direct intervention by members of congress, the money was finally released to the project to test flights could continue last June.

On Monday, June 27, DC-X lifted off after a 7 day turn-around between flights. At engine ignition an explosion took place. After ignition, the vehicle completed its internal checks, determined it was ready to fly and lifted off. At approximately 10 seconds, upon completing a roll maneuver, a hole came into view of controllers and the auto-land sequence was commanded.

Apparently it wasn't an on-board explosion and an examination of the vehicle shows absolutely no sign of an internal explosion.

The vehicle landed away from the pad after a flight of approximately 80 seconds with 50% fuel still on board. At no time did telemetry show any onboard anomalies.

Showing the ability of a vertical take-off and vertical landing SSTO craft to land just about anywhere is definitely a success for the DC-X program. [Source: Usenet posting to sci.space.news by Maura Rebholz]

## August SAC Meeting

For August, Dr. Paul Schmidtke from ASU, will be the main speaker for the meeting. His topic is "Images of faint galaxies from the Hubble Space Telescope."

## Deep Sky Meeting

The Deep Sky Group is made up of people that like to observe celestial bodies out past the far reaches of our Solar System. These bodies include stars, nebula and galaxies. If you are interested in sharing your observations, or knowing what they look like in telescopes — then by all means come join us at the next meeting. The meeting will be held at John McGrath's house; directions are here in the newsletter.

Continuing our discussion of the 110 Best NGC objects, the next 15 will cover the summer constellations Cepheus, Cygnus, Aquila, Lacerta and Pegasus. The following objects will be discussed in the indicated constellation: Cep 40, 6939, 6946, 7129; Cyg 6819, 6826, 6960, 6992, 7000, 7027; Aqr, 7009, 7293; Lac, 7209, 7243; and Peg, 7331.

You don't need to RSVP, we don't extend special invitations to anyone — ourselves included. If you are interested show up, we'd love to have you.

The Deep Sky meeting will take place on Thursday, September 22 at 7:30pm.

## Minutes of the June Meeting

The President gavelled the meeting to order at 7:35pm MST and made two announcements. First was the Show-and-Tell nature of the meeting and second; the Treasurer, Carol Lee, had resigned because her husband was accepting a position in San Jose, CA.

The Treasurer gave her last report, indicating our bank account was getting quite low. It was noted that current attendance was down to 88, as opposed to 110 at this time last year.

AJ Crayon announced the next Deep Sky meeting for July 28th and that the set of objects to discuss were in the newsletter.

Paul Lind made a pitch for a letter writing campaign to our esteemed and respective representatives in the US Congress to support funding of the United States Space Program.

The President opened nominations for replacing the Treasurer. No names were mentioned.

Susan Morse announced the speaker for our next meeting.

Rick Rotramel opened the Show-and-Tell portion of the meeting by showing slides from his visit to the Riverside Telescope Makers Conference. We are still trying to determine the light path through a Schiefspiegler. He also showed an 40" telescope that towered over everything—except mountains in the distance.

Steve Coe gave a plug for a very nice publication named Clear Skies. It comes out of California and is a very good value at \$15.00 per year.

Rick Walker showed slides from his eclipse tours. One Lunar eclipse in November viewed from Buckeye and one Solar in May viewed from somewhere in New Mexico. His girls thoroughly enjoyed the outing.

The final Show-and-Teller, Paul Lind, discussed his completed 12 pound, 14" mirror. It was also on display for all to see. It is scheduled to be Dobsonian mounted.

A Board of Directors meeting was announced that followed the meeting.

—A.J. Crayon, SAC Secretary

## Minutes of the June 24 Board of Director's Meeting

The meeting was held in the regular SAC meeting room at Grand Canyon University and following the meeting of that date. Present were Bob Gardner, Susan Morse, Carol Lee, AJ Crayon, Rich Walker and Paul Dickson.

The treasurer described the declining state of the clubs financial situation. She attributed this to a declining membership and increases in the Newsletter mail. There was also concern about future increase in postal rates.

For declining membership, Carol noted that currently there are 88 members on the roll; at this time last year there were 110. Down 20%.

Several scenarios were discussed to alleviate this financial situation. Two steps were agreed upon. First, is to transfer \$1000.00 from savings to checking account. This amount, while quite a sum, should prevent us from having to go back to savings and withdraw more later. Second, we agreed to reduce the number of pages to the Newsletter. This will reduce printing costs, one of the biggest costs of the newsletter and, in turn, the operating budget.

Other things discussed to add to checking account were to canvas the city for advertisers in the Newsletter, conduct a new member drive or raise the Newsletter subscription only fees. None of these got much support.

Also discussed was transfer of the treasurer's material to the President, who will be the acting treasurer, until a new one can be elected.

Carol Lee noted the important date of October 15, 1994 as being the date to get subscription renewal notices for Kalmbach Publishing Co.

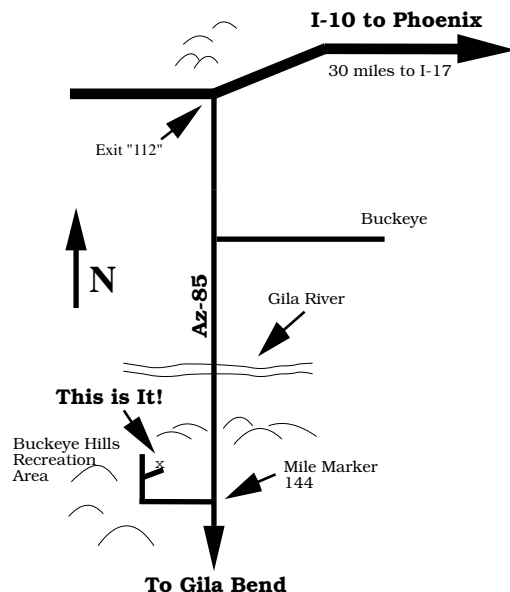
—A.J. Crayon, SAC Secretary

## 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 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.

**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.



# August 1994

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
	<p style="text-align: center;"><b>Observe the Perseid Meteor Shower at Tortilla Flat</b></p> <p style="text-align: center;">Thursday, August 11, 7 PM – 4 AM</p> <p>Tortilla Flat is 70 miles east of Downtown Phoenix. Take the Superstition Freeway to Apache Junction. Then go north on route 88 beyond Canyon Lake (Tortilla Flat is just beyond Canyon Lake).</p> <p>About 3 miles beyond Tortilla Flat is a road to the left (FR 80), take this road. About a 100 yards on the right is the site (a turn-out). Try to arrive before 7 PM.</p> <p>Remember to bring chairs, insect repellent, and food.</p>					<b>TAAA Meeting</b> (Tucson)	<b>SAC Star Party</b> Buckeye Hills (members&guests)
						3	4
New Moon 12:45 A.M.				<b>Perseid Meteor Shower</b> August 11–12		First Quarter Moon 10:57 P.M.	
7				10	11	12	
					<b>SAC Meeting</b>		
14	15	16	17	18	19	20	
	Full Moon 11:47 P.M.		<b>EVAC Meeting</b> (SCC: Rm. PS172)				
21	22	23	24	25	26	27	
		Last Quarter Moon 11:41 A.M.		<b>All Times are Mountain Standard Time</b>			
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 pro-rated as follows: Jan - Mar 100%, Apr - Jun 75%, Jul - Sep 50%, Oct - Dec 25%.

- \$20.....Individual Membership
- \$30.....Family Membership (one newsletter)
- \$100.....Business Membership (includes advertising)
- \$4.....Nametag for members
- \$10.....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 treasurer to renew your subscription.

Sky & Telescope.....\$20.00 for one year

Astronomy.....\$18.00 for one year

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

Make checks payable to SAC.

Mail the completed form to:

Adam Sunshine  
SAC Treasurer  
20401 N 30th Drive,  
Phoenix AZ 85027



## SACNEWS

c/o Paul Dickson  
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