

Saguaro Astronomy Club

Metro Phoenix, Arizona

SACNEWS



June 1998 — Issue #257

v5.30

Star Testing Telescopes National Magazine Style

By Howard Moore

This article is from the March 1998 issue Prescott Astronomy Club's newsletter, Ephemeris, and is used with permission.

“Star testing at high power proved the optics to be quite good. The well-known Double Double, Epsilon Lyrae, was cleanly split and, at 600X, all four components were surrounded by diffraction rings. Views of Jupiter and the Moon were also sharp and pleasing.” This quote is from the December 1997 issue of *Sky & Telescope*, and refers to the optics of the 6 inch f/8 “Sovietski” telescope being tested. I have read similar statements from such magazines *ad nauseam*—all optics are wonderful, or at least very good, and it would seem that resolving Epsilon Lyrae is a true challenge for an amateur. Really it's one of the easiest of doubles, the much-maligned 60mm “department store telescope” will easily resolve it. If **any** 4 to 6 inch reflector fails to cleanly split all components, something is terribly wrong.

Our “tester” goes on to say that the “primary mirror was indeed a rather good sphere.” and therefore the wavefront error is only 1/4 wave, so the mirror was “diffraction limited.”

I think it is a big mistake to think that the famous Rayleigh tolerance of 1/4 wave is a blanket “figure of merit” for all optics, a conclusion which Rayleigh never intended. Optical tolerances differ for different purposes. Planetary observers claim that a wavefront error of 1/20 wave adversely affects planetary images. Photometrists and spectroscopists often happily work with errors exceeding 1 wave, as do photographers. Besides, the Rayleigh limit applies to the total wavefront error of the **system**, not just the objective.

A reflector is much more sensitive to environmental conditions than a refractor—its light path is open and folded, the diagonal degrades the image and also adds astigmatism if not perfectly flat, and since reflectors are

Quick Calendar

SAC Meeting
Member's Night & Swap Meet
7:30 PM, Friday, June 12

SAC Star Party
Buckeye Hills Recreation Area
Saturday, June 20

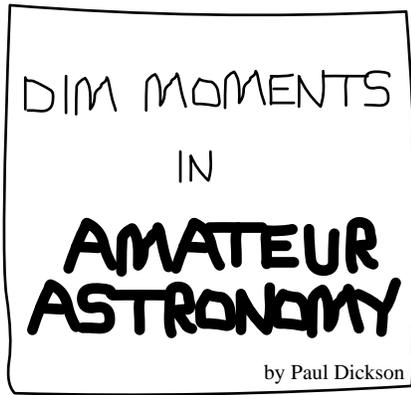
Grand Canyon Star Party
North/South Rim of the Grand Canyon
June 13–20

generally faster than refractors, eyepieces usually don't work as well on a reflector. Focusing errors also degrade the wavefront. If the total error allowance is used up by the primary mirror, in view of all the forgoing factors that conspire to add aberrations, the system as a whole has **no chance** of being “diffraction limited.”

For a large or fast mirror, the parabola deviates strongly from a sphere, and under those conditions, achieving 1/4 wavefront accuracy is about all an optician can produce for the price that most people are willing to pay. But a six inch, f/8 mirror is **easy** for a good optician to parabolize to 1/8 wave or better, and it is shameful not to do so. Such a mirror performs far better than a 1/4 wave sphere, as we shall see.

In the April 1993 issue of *Sky & Telescope* magazine, Sissy Haas wrote a “focal Point” article entitled “Phooey on the Midsize reflector,” in which she said that, in her opinion, her 60mm refractor outperformed her 6 inch f/6 reflector, as well as her 13 inch Dobsonian for double star work—and the 60mm was much more convenient. As a fanatical proponent of Midsize reflectors, naturally I disagreed. But if, as seems reasonable, her Amerikanski telescopes were no better than the above-mentioned Sovietski, she is quite probably right.

For a truly valid test of the optics of the Sovietski telescope, the “tester” should have tested it in the proximity of a comparable reflector of known high quality. They could have used the excellent 6 inch f/9 reflector made by Allyn Thompson, which *Sky & Telescope* owns. Then they would have seen that 1/4 wave reflecting optics are pathetic when it comes to planetary detail.



After reading the Sovietski article, I decided that I could make a similar test, using as a control my 6 inch f/12 spherical mirror Newtonian, which is accurate to about 1/14 of a wave. The 1/4 wave telescope was Bill Kelley's 8 inch f/6 spherical mirror telescope, which he pulls into a parabola with a wingnut. For the test I stopped the mirror to 6 inches and loosened the wingnut, to achieve a 1/4 wavefront error sphere. The results were interesting—stellar images in Bill's telescope looked quite good, and yes, Epsilon Lyrae was easily resolved, showing good diffraction rings (to be expected since spherical aberration actually brightens the first diffraction ring.)

Images of Jupiter and Saturn were indeed crisp and pleasing through the 1/4 wave instrument, there was just not much detail! Two bands were visible on Jupiter, but the 4 Galilean satellites looked like fuzzy blobs. On Saturn, no bands were seen, nor was Cassini's Division visible

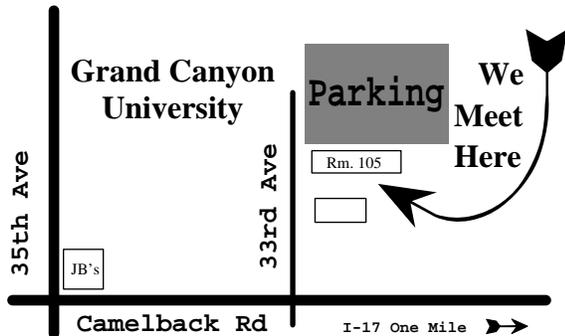
(the rings were fairly close to edge-on at the time.)

The difference in planetary detail was obvious when I looked through my f/12 reflector. Lots of detail was visible on Jupiter, and the moons shone like little disks—I could identify them from their size alone. I confess that telling Io from Europa was hard, but my computer later showed my judgement correct (whew!) I could easily see a band on Saturn, and Cassini's division was "soup of the duck," as you Americans say.

The remedy for poor optics is simple for small mirrors. For many years Coulter Optics sold a 6 inch, f/10 unabashedly spherical mirror and, since the wavefront error was about 1/8 wave, they had many happy customers—especially in light of the \$25 price tag. If the Russkies (or Amerikanskis for that matter) find parabolizing a 6 inch, f/8 mirror too difficult, they should follow Coulter's lead! A good 6-inch f/8 parabola, or a good 6-inch sphere with

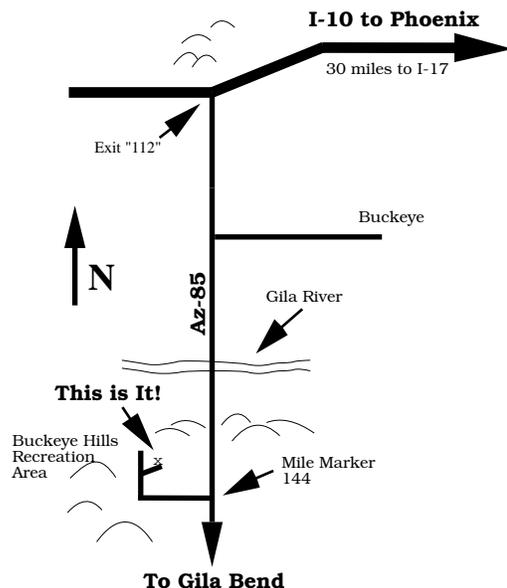
Directions to SAC Events

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.



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: 12" Newtonian telescope, equatorial mount and heavy gauge metal pier, originally mounted in cement. 2 1/4-inch polar shaft with counterweights, sheet metal 6 foot tube assembly. 6 eyepieces: 6, 8.4, 12.5, 16, 32, 42mm; color filters. Believe worth \$1000, price negotiable. Contact Bill Roehr — (520) 474-8108.

a focus of more than 60 inches will yield stunning planetary images, especially if the diagonal obstruction is 1-inch or smaller.

Comet Comments by Don Machholz

(530) 346-8963 CC238.TXT May 7, 1998
<http://members.aol.com/cometcom/index.html>
 DonM353259@aol.com

1995 O1 (Hale-Bopp)					
Date	RA-2000-Dec	Elong	Sky	Mag	
06-01	05h51.5m	-49°39'	74°	E	10.1
06-06	05h56.5m	-49°42'	74°	E	10.2
06-11	06h01.4m	-49°48'	74°	E	10.2
06-16	06h06.4m	-49°58'	74°	E	10.3
06-21	06h11.4m	-50°10'	74°	E	10.3
06-26	06h16.4m	-50°26'	74°	E	10.4
07-01	06h21.4m	-50°44'	74°	M	10.4
07-06	06h26.3m	-51°06'	74°	M	10.5
07-11	06h31.2m	-51°30'	74°	M	10.5

The SOHO satellite as found two more comets, one of which should be visible in the evening sky, with Southern Hemisphere observers favored. Positions are given below.

Patrick Stonehouse of Wolverine, Michigan discovered a comet on April 22, his first comet find. He used a 17.5", f/4.5 reflector at 62x. **C/1998 H1 (Stonehouse)** is in a highly-inclined orbit and remains in the Northern sky.

COMET HUNTING NOTES: Patrick Stonehouse does not systematically sweep the sky for comets, but does so only occasionally at the end of some of his observing ses-

sions. I suspect there are numerous other amateurs who conduct comet hunting on a casual basis. For Stonehouse the search lasted about 100 hours over 20+ years.

C/1997 J2 (Meunier-Dupouy)					
Date	RA-2000-Dec	Elong	Sky	Mag	
06-01	22h30.8m	+29°55'	80°	M	11.5
06-06	22h31.0m	+29°37'	84°	M	11.5
06-11	22h30.6m	+29°15'	88°	M	11.5
06-16	22h29.7m	+28°49'	92°	M	11.4
06-21	22h28.2m	+28°18'	97°	M	11.4
06-26	22h26.1m	+27°41'	101°	M	11.5
07-01	22h23.4m	+26°58'	106°	M	11.4
07-06	22h20.2m	+26°08'	111°	M	11.3
07-11	22h16.5m	+25°09'	116°	M	11.3

C/1998 H1 (Stonehouse)					
Date	RA-2000-Dec	Elong	Sky	Mag	
06-01	12h39.7m	+49°06'	92°	E	12.6
06-04	12h33.8m	+49°34'	89°	E	12.7
06-07	12h28.8m	+49°22'	86°	E	12.9
06-10	12h24.7m	+50°11'	83°	E	13.1
06-13	12h21.3m	+50°23'	81°	E	13.2
06-16	12h18.7m	+50°32'	79°	E	13.4

C/1998 J1 (SOHO)					
Date	RA-2000-Dec	Elong	Sky	Mag	
06-01	06h37.4m	-13°47'	47°	E	5.5
06-04	06h53.6m	-17°53'	51°	E	6.0
06-07	07h08.9m	-21°30'	54°	E	6.5
06-10	07h23.4m	-24°41'	57°	E	6.9
06-13	07h37.2m	-27°30'	60°	E	7.3
06-16	07h50.4m	-29°59'	62°	E	7.6

Orbital Elements

	Hale-Bopp	Meunier-Dupouy	Stonehouse	SOHO
Object:	Hale-Bopp	Meunier-Dupouy	Stonehouse	SOHO
Peri Date:	1997 04 01.1347	1998 03 10.4365	1998 04 14.205	1998 05 08.837
Peri Dist:	0.914008 AU	3.051015 AU	1.48678 AU	0.16264 AU
Arg/Peri (2000)	130.5787°	122.6755°	001.146°	110.666°
Asc Node (2000)	282.4653°	148.8429°	222.103°	349.963°
Incl (2000):	089.4268°	091.2731°	104.668°	58.089°
Eccentricity:	0.995085	1.000760	1.0	1.0
Orbital Period:	~2500 years	Long Period	Long Period?	Long Period
Reference:	MPC 30738	MPC 30738	IAUC 6887	MPEC 1998-J14
Epoch:	1997 12 18	1998 03 08	1998 04 14	1998 05 09
Absol Mag/"n":	-1.0/4.0	4.0/4.0	10.0/4.0	7.0/4.0

Fuzzy Spot

by Ken Reeves

Boötes

June 1998

Boötes is a prominent northern constellation, containing the premier star Arcturus. The constellation is normally describes as kite shaped, but I like the description that Michael E. Bakich has in *The Cambridge Guide to the Constellations*, as looking like an ice cream cone with Arcturus (α) at the tip, and with Mu (μ), Beta (β), and Gamma (γ) forming the scoop of ice cream. It used to be a two scoop cone, but the second scoop fell off and is now lying to the east as Corona Borealis.

Though this a large constellation, there aren't any Messier objects in it (although M3 is just out of the constellation, see my May column.) The objects are not show-stoppers, but still worth hunting down.

NGC 5248 (13h37.4 +08°53') I have yet to observe this galaxy. According to Brian Skiff and Christian Luginbuhl in *Observing Handbook and Catalogue of Deep-Sky Objects*, "In 25 cm it lies on the E side of an isosceles triangle of stars 8' long whose acute apex points S. Slightly elongated E-W, it is about 1.5' diameter with a sharply concentrated core. A mag. 13 star is visible 1.7' SSW." In *Observe the Herschel Objects by the Ancient City Astronomy Club*, it is listed as "Spiral galaxy located in Boötes, magnitude 11.3, 6.1'x4.4' in size. Very large, oval, bright nucleus fading towards outer edges. Use averted vision for best results. (8-inch Refl.)"

NGC 5466 (14h05.5 +28°32') Here is a globular cluster in the midst of galaxy country. At 70X, it is very large, little bright, very rich, and pretty loose, with about 15 stars over some granular haze. Use averted vision and look at this for a while and you will see many threshold stars pop in and out. Overall, it is irregularly shaped, maybe kind of triangular. The stars are pretty faint as the cluster starts to disappear at 100X. To the SE is a fairly bright star which does interfere slightly. Try not to compare this against M3, M5, or M13 and let this globular take on a charm of its own.

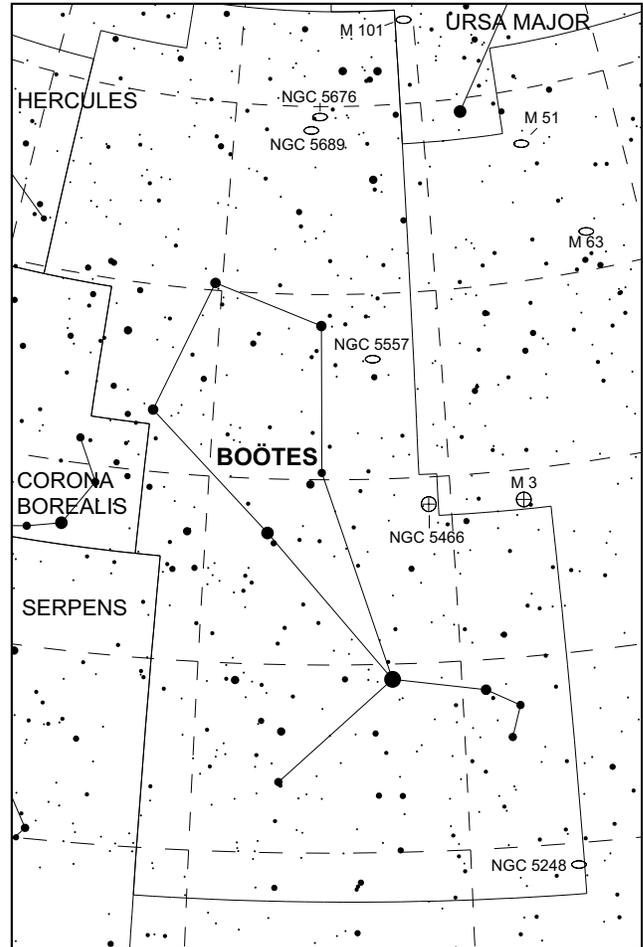
NGC 5557 (14h18.3 +36°29') At 100X, this galaxy is fairly bright, pretty small and round. The halo is pretty faint but suddenly brightens up to a good bright middle, and reveals an occasional stellar nucleus. There is a bright star to WNW which does not interfere. Staring at this for a while, I noticed some possible mottling.

NGC 5676 (14h32.8 +49°27') This nice galaxy is somewhat bright, somewhat small, and elongated 3:1 NNE/SSW. It consists of a fairly faint halo which brightens up slightly towards the middle with a faint non-stellar nucleus occasionally seen, and with some mottling suspected.

CH Boötes is just out of field of view to E. This along with 2 more bright stars on the W and S make a nice frame for the galaxy.

NGC 5689 (14h35.5 +48°44') The final galaxy for this month is somewhat bright, somewhat small, and elongated 3:1 WNW/ESE. The halo is a little faint, but slightly brightens up to the middle, with a non-stellar, possibly binary nucleus. Averted vision only helps slightly. Look nearby for faint galaxies 5682, 5683, 5693, and 5700. I suspected all of them with 5693 being the most certain.

Although Boötes is not rich in bright deep sky objects, there are several binary stars worth observing. Delta (δ) is an easy and wide white/blue pair, while Epsilon (ϵ) is a toughie yellow/blue pair with only 2.9" separation. Mu (μ) is a fun triple star.



Herschel 400 Objects
5248, 5466, 5557, 5676, 5689

June Club Meeting

Member's Night & Swap Meet

The June SAC meeting will be our yearly member's night. This is the meeting where club members show off their astronomy projects. If you are doing something that might interest other club members, this is the meeting to show off. This will be an extended Show-N-Tell session.

After the Show-N-Tell, there will be swap meet. This

will be your chance to sell off old equipment that you no longer use or purchase something new stuff.

Coming Events

Star Parties

Grand Canyon Star Party	Jun. 13-20
Northern Arizona Star Party	Sep. 18-19
All-Arizona Star Party	Oct. 16-17
Starry Nights Festival	Oct. 16-18

June 1998

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	First Quarter Moon 6:44 P.M. 1	2	3	4	TAAA Meeting (Tucson) 5	6
7	Wednesday Mercury at superior conjunction (moves into evening sky) 8	Full Moon 9:19 P.M. 9	Wednesday EVAC Meeting (SCC: Rm. PS172) 10	Earliest Sunrise for Phoenix 11	SAC Meeting Grand Canyon University, Fleming Rm. 105 12	13
Grand Canyon Star Party June 13-20 See March SACNEWS for Details			Last Quarter Moon 3:38 A.M. 17	18	19	SAC Star Party Buckeye Hills (members&guests) 20
14	15	16	21	22	23	24
Summer Solstice 7:03 A.M. 21	Yesterday Sun enters Gemini 11 A.M. 22	New Moon 8:51 P.M. 23	24	25	26	27
28	29	30	All Times are Mountain Standard Time			

SAC Information

Area Code (602)

President & SACNEWS Editor	Paul Dickson Ans. & FAX: 841-0509 dickson@primenet.com
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Properties	Adam Sunshine 780-1386 asunshine@netzone.com
Public Events	Rich Walker 997-0711 rhwalker@aztec.asu.edu
Deep-Sky Group	A.J. Crayon 938-3277 acrayon@primenet.com

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.....\$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:

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.

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.

1998 SAC Meetings

Jan. 9
Feb. 13
Mar. 13
Apr. 10
May 8
Jun. 12
Jul. 10
Aug. 7
Sep. 11
Oct. 2
Nov. 6
Dec. 5 Party

1998 SAC Star Parties

Date	Sunset	Moonrise
Feb. 21	6:18PM	3:40AM
Mar. 21	6:39PM	2:23AM
Apr. 18	6:59PM	1:08AM
May 16	7:19PM	11:54AM
Jun. 20	7:37PM	3:27AM
Jul. 18	7:34PM	2:10AM
Aug. 15	7:12PM	12:57AM
Sep. 12	6:37PM	11:45PM
Oct. 10	6:00PM	10:32AM
Nov. 14	5:27PM	3:48AM
Dec. 12	5:22PM	2:35AM

SACNEWS

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

Stamp

First Class Mail

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SAC Meeting — June 12

SAC Star Party — June 20

Grand Canyon Star Party — June 13-20