

Saguaro Astronomy Club

Metro Phoenix, Arizona

SACNEWS



February 1993 — Issue #193

The Great Moon Race: The Long Road to Success

by Andrew J. LePage

Part 2

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This article from the September, 1992 (Volume 4, Number 2) issue of the Electronic Journal of the Astronomical Society of the Atlantic (EJASA) of the Astronomical Society of the Atlantic (ASA).

The Big Push

With the completion of the RANGER program, lunar exploration for the next fourteen months was dominated by the efforts of the Soviet Union. Their next launch occurred on May 9, 1965. This time the MOLNIYA booster vehicle operated as intended to place the 3,250-pound (1,476-kilogram) LUNA 5 on a trajectory towards the Moon. While no information was released on the spacecraft's design, this time there was no doubt of its intended mission: It was announced that LUNA 5 would attempt a soft lunar landing.

A course correction the day after launch put the probe on target for the Moon. After 3.5 days of travel, LUNA 5 arrived at its target. At an altitude of 40 miles (64 kilometers), the onboard radar altimeter would trigger the retrorockets to slow the probe from 5,800 miles per hour (2,600 meters per second) to a virtual stop at the lunar surface. Then, at the moment the retrorockets were to fire, nothing happened. LUNA 5 crashed at 31 degrees south, 8 degrees west.

Unphased by the loss, another probe was launched less than one month later. The 3,175-pound (1,442-kilogram) LUNA 6 was launched on June 8 and successfully placed on a translunar trajectory. As with its predecessor, LUNA 6 performed a mid-course correction the day

Quick Calendar

SAC Meeting
7:30, Friday, February 5

Star Party
Buckeye Hills Recreation Area
Saturday, February 13

SAC Meeting
7:30, Friday, March 5

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after launch, after a dozen communication sessions with its controllers. However, unlike its sister craft, the probe malfunctioned at this point and the course correction engine continued to burn past its intended cutoff time despite desperate commands sent from controllers on Earth. As a result of this extra added impulse, LUNA 6 missed the Moon by about 100,000 miles (161,000 kilometers) and continued on into solar orbit. The Soviets were robbed of another success for the eighth time in two years. The new, second generation LUNA design apparently needed more work.

The next lunar mission launched by the Soviets was flown by an entirely different type of spacecraft. Launched on July 18, ZOND 3 was flown as an engineering test of the same type of interplanetary probe unsuccessfully used on the MARS 1 and ZOND 2 missions to Mars in 1962 and 1964 respectively and the ZOND 1 mission to Venus in early 1964. Some in the West have speculated that ZOND 3 was originally meant to be launched with ZOND 2. The

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launch was canceled possibly because of last-minute problems, making ZOND 2 the only solo planetary mission the Soviets have ever launched. With three VENERA probes using this same design scheduled to be launched during the next Venus launch window in four months, Soviet engineers apparently wanted to test this design one last time using this “surplus” spacecraft to make sure they had worked out all the bugs in the design.

This first generation interplanetary probe consisted of two compartments, the orbital compartment and the planetary compartment. The orbital compartment was the heart of the probe. This pressurized 3.6-foot (1.1-

ZOND 3 was also the longest-surviving Soviet lunar or planetary probe to date...

meter) diameter cylinder contained the probe’s control systems, transmitters, batteries, thermal control, and astro-orientation systems, as well as some cruise experiment electronics. Mounted on top of the compartment was a 440-pound (200-kilogram) thrust KDU-414 propellant course correction engine capable of at least two burns, yielding a total velocity change of about 180 miles per hour (80 meters per second). Also located here was a nitrogen jet attitude control system to maintain control of the 12-foot (3.6-meter) long, three-axis stabilized probe.

Mounted on the sides of this compartment were two solar panels used to recharge ZOND’s batteries. While not needed for a short mission to the Moon, they were vital for an interplanetary mission. The panels had a total span of about thirteen feet (four meters) when deployed. On the

ends of each panel were mounted large hemispherical radiators used to control the spacecraft’s temperature. On the anti-Sun side of the craft, a 6.6-foot (two-meter) high-gain antenna was mounted. Also attached to this compartment were instruments to study micrometeoroids, cosmic radiation, low-frequency radio waves, and magnetic fields. And like its predecessor, ZOND 2, it also carried a set of experimental ion thrusters for use in attitude control tests.

Mounted underneath the orbital compartment was the planetary compartment. This compartment would carry the instruments needed to study the target planet. Starting with the flight of VENERA 3, launched in November of 1965, these compartments were designed to detach from the orbital compartment and land on the surface of Venus. It is highly likely that the planetary compartment of ZOND 2 was of similar design and meant to land on the planet Mars. It is also possible that as many as four of the five unannounced failed attempts to reach Venus and Mars in 1962 — as well as ZOND 1 and KOSMOS 27, targeted for Venus in 1964 — carried similar payloads.

The planetary compartment of ZOND 3 was different. It was designed to stay attached to the orbital compartment as the spacecraft flew by its target. Contained in this three-foot (0.9-meter) sphere were three experiments: A photo-television system capable of taking either photographs or ultraviolet spectra in the 250 to 350 nanometer range as well as ultraviolet and infrared spectrophotometers sensitive to the 190 to 270 nanometer and the three to four micron wavelength bands, respectively. An earlier version of this system was carried by MARS 1. It was also likely carried by one of the failed Venus attempts in late 1962 and possibly by either KOSMOS 27 or ZOND 1, instead of a lander, in early 1964. This compartment

Summary of Lunar Probe Launches, 1964–1965

Name	Launch Date	Country	Weight lbs (kg)	Launch Vehicle	Comments
RANGER 6	Jan 30, 1964	US	803 (365)	ATLAS-AGENA B	Failed photographic lunar impact attempt
<i>Unannounced</i>	Feb/Mar, 1964?	USSR	3,135 (1,420)?	MOLNIYA	Possible failed lunar hard landing attempt
<i>Unannounced</i>	Apr 20, 1964	USSR	3,135 (1,420)?	MOLNIYA	Possible failed lunar hard landing attempt
RANGER 7	Jul 28, 1964	US	806 (366)	ATLAS-AGENA B	Photographic lunar impact
RANGER 8	Feb 17, 1965	US	807 (366)	ATLAS-AGENA B	Photographic lunar impact
A-C 5	Mar 2, 1965	US	2,000 (900)	ATLAS-CENTAUR	Unsuccessful deep space launch vehicle test
KOSMOS 60	Mar 12, 1965	USSR	3,150 (1,476)?	MOLNIYA	Failed lunar hard landing attempt
RANGER 9	Mar 21, 1965	US	808 (367)	ATLAS-AGENA B	Photographic lunar impact
LUNA 5	May 9, 1965	USSR	3,250 (1,476)	MOLNIYA	Failed lunar hard landing attempt
LUNA 6	Jun 8, 1965	USSR	3,175 (1,442)	MOLNIYA	Failed lunar hard landing attempt
ZOND 3	Jul 18, 1965	USSR	2,100 (960)?	MOLNIYA	Photographic flyby and engineering test
A-C 6	Aug 11, 1965	US	2,084 (946)	ATLAS-CENTAUR	Deep space launch vehicle test w/simulated payload
LUNA 7	Oct 4, 1965	USSR	3,316 (1,506)	MOLNIYA	Failed lunar hard landing attempt
LUNA 8	Dec 3, 1965	USSR	3,417 (1,552)	MOLNIYA	Failed lunar hard landing attempt

NOTES: Probe names given in *italics* are used if no official name exists.
Weights given are the launch weights of the probes and do not include any additional equipment that may have been carried by the escape stage.

was virtually identical to the one carried by VENERA 2, launched in November.

The spectrophotometers and ultraviolet spectrometer were originally designed to study planetary atmospheres, so they were of little use in a lunar mission. The 14-pound (6.5-kilogram) photo-television system, however, was to be invaluable on this mission. It was basically a much improved version of the system employed six years earlier by LUNA 3. Images from a single 106.4-millimeter focal length f/8 lens were focused onto one-inch (25.4-millimeter) film. A total of 25 exposures of one-thirtieth or one one-hundredth of a second were made. Using the same film, the ultraviolet spectrometer would expose the eighth, ninth, and tenth frames, bringing the total number of exposures up to 28. After the film was exposed, it was automatically developed on board.

The dried negatives were then scanned and transmitted back to Earth in one of two formats. A quick look format broke the photograph into 67 lines that could be transmitted in 135 seconds. A more detailed scanning of the photographs was also possible. In this mode, each photograph was broken into 1,100 lines of 860 points each that were comparable in quality to RANGER's full scan television images. In this mode a single photograph could be transmitted over interplanetary distances in 34 minutes. Each image could be scanned multiple times to help increase the image's signal-to-noise ratio.

For this engineering test, ZOND 3 was targeted to flyby the Moon's western edge and photograph most of the Moon's far side missed during the historic LUNA 3 mission in late 1959. Unlike that mission, the lighting conditions and viewing angles were much more favorable for picking out details in this previously unmapped region. After its successful launch by a MOLNIYA launch vehicle, ZOND 3 headed towards the Moon. Since it only weighed two-thirds as much as the recent LUNA probes, ZOND 3 reached its rendezvous point 5,730 miles (9,220

kilometers) above the Moon after a flight of only 33 hours.

Starting at a distance of 7,190 miles (11,570 kilometers), ZOND 3 took one exposure of the Moon every 134 seconds. Images included not only the unmapped far side but also the near side so that newly discovered features could be tied into the already existing lunar mapping control net. This continued as the fast-moving probe reached its closest point to the Moon and then receded to a distance of 6,190 miles (9,960 kilometers). After this 68-minute photography session, ZOND 3 immediately developed its film as it headed into a simulated trajectory to Mars — simulated since Mars was not in position for a low-energy encounter and would not be for another 1.5 years.

On July 29, at a distance of 1.4 million miles (2.2 million kilometers), ZOND 3 was far enough for its high gain antenna to lock onto Earth and transmit back the recorded images to waiting scientists. The images were spectacular, far superior to the ones returned by LUNA 3. Details as small as three miles (five kilometers) across could be seen in the photographs, which showed little more than a cratered wasteland. These photographs confirmed that there was a lack of maria on the Moon's far side

**...the retrorockets started
to fire seconds too late and
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engines still blazing away...**

compared to the familiar near side, which was dominated by these dark and relatively flat expanses of ancient, hardened lava.

The photographs also showed no signs of Mare Parvum, which some observers had claimed to see near

The 1993 Arizona Messier Marathon

The 1993 Arizona Messier Marathon will be held on March 20–21 as part of the monthly SAC star party. The object of the marathon is to view as many entries in the Messier Catalog as the night and your observing skills permit.

At the February meeting, there will be available a handout containing observing tips and a suggested observing order.

Awards will be presented in recognition of your efforts. Certificates will be awarded to those observing 50 or more entries. Telescope plaques will be awarded for first, second and third places. Duplicate plaques will be presented in case of ties.

The site of the marathon is near Arizona City, which is south of Phoenix. Next month's newsletter will contain a map and directions to the observing site.

Other area Astronomy Clubs have also been invited. The East Valley Astronomy Club has accepted the invitation. The Tucson Club has also been invited.

Mare Orientale during especially extreme librations of the Moon. ZOND 3 discovered a new type of lunar feature called thalassoids. These were the battered concave-shaped remnants of basins over three hundred miles (five hundred kilometers) across and were thought to be the precursors of maria. For some reason these far side structures were never flooded with lava to form true maria. The other optical instruments onboard ZOND 3 showed that the Moon reflected one percent of the ultraviolet radiation hitting its barren surface. In contrast, the lunar surface reflected eighty to ninety percent in the incident infrared light, with a broad peak around 3.6 microns. With these photographs in hand, the Soviets had mapped all but five percent of the Moon's surface.

ZOND 3 continued to operate as it traveled further from Earth. On September 19, at a distance of 7.8 million miles (12.5 million kilometers), ZOND 3 performed a burn of its KDU-414 engine to change its velocity by 112 miles per hour (50 meters per second) as part of a simulated mid-course correction. On October 23, at a distance of 19.6 million miles (31.5 million kilometers), ZOND 3 successfully retransmitted its photographs and probably did so again at still greater distances. The probe was tracked until it had receded to a distance of 95.4 million miles (153.5 million kilometers) in March of 1966, when contact was finally lost.

It was a very successful test of this probe design. At 225-plus days, ZOND 3 was also the longest-surviving Soviet lunar or planetary probe to date, beating the previous record holder, MARS 1, by almost three months. Ironically, its Venus-bound sister probes did not fare as well. VENERA 2, launched on November 12, which carried the same instruments as ZOND 3, failed just as it was to perform its photographing session of Venus on February 27, 1966, after a flight of 107 days.

Contact with VENERA 3, launched on November 16, was lost on March 1 just as it was to drop a probe into the Venusian atmosphere 105 days after launch. Both VENERA probes failed due to overheating caused either by an inadequate thermal control system or an outright failure of it. A third probe, KOSMOS 96, launched on November 23, never made it out of Earth orbit due to a malfunction in the MOLNIYA's escape stage.

The planetary compartment design that worked so well on ZOND 3 would never fly to the planets again,

despite the fact it could record over an order of magnitude more image and spectroscopic data than any planetary mission the Americans were to fly until the launch of the MARINER 6 and 7 Mars probes in 1969.

Soviet lunar landing attempts resumed on the eighth anniversary of the launch of SPUTNIK 1, October 4, 1965, with the launch of the 3,316-pound (1,506-kilogram) LUNA 7. The following day, the spacecraft successfully performed a mid-course correction maneuver. On October 7, as LUNA 7 was nearing the Moon, its retrorockets fired. But before it could reach the surface, the spacecraft exhausted its fuel supply and crashed at 9 degrees north, 49 degrees west. There were some unconfirmed reports that some signals from the lander were briefly received after this crash landing, but no usable data were extracted.

The November launch window to the Moon was skipped to allow the launch of the three ill-fated Venus probes. LUNA 8 was finally launched on December 3, but instead of proceeding into a parking orbit inclined about 65 degrees to the equator — as had every previous Soviet planetary and second generation lunar probe — LUNA 8 was placed into a parking orbit inclined 51.9 degrees to the equator. Such an orbit makes better use of Earth's rotation to boost a payload into orbit and would become the standard parking orbit for all Soviet space probes afterwards. As a result, about 100 pounds (45 kilograms) of extra payload could be sent towards the Moon.

LUNA 8 would need this increased performance margin. Weighing in at 3,418 pounds (1,552 kilograms), LUNA 8 was the heaviest probe of the series. Obviously the incremental improvements being made to the second generation LUNA were slowly increasing its launch weight nearly to the payload limits of the MOLNIYA launch vehicle. Like its predecessors, it made a mid-course correction the day after launch. After a flight of 83 hours, LUNA 8 passed the 40-mile (64-kilometer) altitude mark and the retrorockets were ignited. Unlike LUNA 7, the retrorockets started to fire seconds too late and LUNA 8 crashed with its engines still blazing away west of the crater Kepler at 9.12 degrees north, 63.30 degrees west.

So ended 1965: The Americans had two spectacular successes in two tries, while the Soviets had only one successful photographic flyby and five failed landing attempts. As it would turn out, 1966 would be a much better year for Soviet lunar exploration.

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.

Software:—For Sale: SPSS/PC+ Vers. 4.0 for DOS—\$130. SPSS/PC+ is a statistical analysis package for IBM PC compatibles. Tutorial disk included. Call Alex at 978-2183.

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About the Author:

Andrew J. LePage is a member of the Boston Group for the Study of the Soviet Space Program, Krasnaya Orbita. In addition to his interests in astronomical and space related topics, Andrew has been a serious observer of the Soviet (now C.I.S.) space program for over one decade.

Comet Comments

by Don Machholz

(916) 346-8963

January 7, 1993

Periodic	Comet	Schaumasse	(1992x)		
Date	RA-2000-Dec	Elong	Sky	Mag	
01-23	03h33.9m	+29°28'	115°	E	9.2
01-28	03h38.5m	+31°29'	111°	E	9.0
02-02	03h45.3m	+33°32'	108°	E	8.8
02-07	03h54.3m	+35°37'	105°	E	8.6
02-12	04h05.6m	+37°42'	103°	E	8.4
02-17	04h19.6m	+39°44'	101°	E	8.3
02-22	04h36.1m	+41°40'	100°	E	8.2
02-27	04h55.4m	+43°27'	98°	E	8.1
03-04	05h17.5m	+45°00'	98°	E	8.1
03-09	05h42.3m	+46°14'	98°	E	8.2
03-14	06h09.4m	+47°04'	98°	E	8.3

Let's briefly review the comet activity of 1992.

Six new comets were found by amateurs, but four of them dimmed unexpectedly some time after discovery. Six more comets were discovered by professional astronomers. Fifteen returning comets were recovered, including five each by J. Scotti and T. Seki.

One of the returning comets was recovered by an amateur, that being Periodic Comet Swift-Tuttle by T. Kichu. The comet, the best of the year, put on a good show, displaying a high level of coma and tail activity. Early suggestions that the comet may hit the earth next time around can now be laid to rest. Further observations, (including some predisccovery photos from Jan. 1992) indicate that the next two perihelions will be July 11, 2126 and Aug. 12, 2261, plus or minus one day. Therefore it misses the July 26 perihelion date which is necessary for an earth-comet collision.

An object designated 1992QB, was discovered on Aug. 30 at magnitude 23. Found almost exactly on the equator at RA 00h01m, the object is presently about 41 AU away, has an orbital period of 296 years, and will be closest to the sun at roughly 39 AU early next century. It's about 200 miles across. Is it a comet or an asteroid? It is hard to tell at this time, it may be in a class of its own.

In August we learned that an object which usually shows no cometary activity and appears as an asteroid is actually a comet, first seen in 1949. It is Periodic Comet Wilson-Harrington, its orbital period of 4.3 years, and sometime it outbursts, producing a cometary appearance.

Now a few notes about comets recovered and discovered lately:

Periodic Comet Kojima (1992z): J. Scotti of Kitt Peak recovered this comet on Oct. 21. It will remain faint.

Comet Ohshita (1992a₁): We now know that Ohshita used 25x150 binoculars to discover this comet on Nov. 24. My ephemeris positions were a bit off last month due to my entering of a wrong element into the computer. The comet is now not expected to produce a meteor shower.

President's Column

by Bob Dahl, SAC President

As I write this, the Clinton-Gore team is about to be sworn into office, George Bush is packing up his fishing rod, and the man I voted for, Ross Perot, is probably getting a haircut ("Just cut it short, but watch the ears!") I'd like to take this opportunity to thank our own departing officers for a job well done. Paul Lind performed admirably as President, conducting SAC meetings and answering numerous phone calls from prospective SAC members. Steve Coe had the thankless task as Vice-President of arranging for monthly speakers, and he did it quite well. Lastly, I had the pleasure of being SAC Treasurer and pretending that I knew something about finances, all the while refraining from skimming any more than ten percent from the treasury. The club also owes a debt of gratitude to Gene Lucas for coordinating our Public Star Parties with the various Parks departments of the cities composing greater Phoenix.

Our new President is yours truly, who probably knows even less about the job than Bill Clinton. Our new Vice-President is Tom Polakis, who is one of the best, most dedicated deep sky observers anywhere. Susan Morse continues her fine work from last year as Secretary. The woman with the beleaguered look on her face has got to be our new Treasurer, Carol Lee, trying to cope with the onslaught of SAC members paying their dues, subscribing to magazines, and ordering nametags. It's a big job, so be nice to her. Properties are handled by Rich Walker, who continues in this job from last year. Pieter Burggraaf returns to the fold of SAC officers — and about time — as our Public Events Coordinator, an appointed position held last year by Gene Lucas. Finally, Paul Dickson continues ad infinitum as our Newsletter Editor, by far the most time-consuming job in the club. Paul has steadily improved the newsletter and has become so proficient in the use of desktop publishing software that mistakes and misspellings will beee elimmiatteeed.

So far, we've planned several major star parties, some of them in addition to our regular monthly star party at Buckeye Hills. On March 20 we will hold our SAC star party at EVAC's Arizona City site, and will conduct a Messier Marathon at that time for those wishing to participate. A second annual Sentinel Star Party is in the works,

possibly for April or May. We try to conduct several public star parties in the Spring and Fall so the city folks can look at the moon and bright planets. Pete Burggraaf informs me that Phoenix Parks has requested our participation on March 27th at Reach-11 Park, and Glendale Parks has asked for May 1st at Thunderbird Park. Public star parties for the Fall have not yet been scheduled.

If you would like to pursue a special interest, please speak to me about it and we might put together a subgroup or class. In past years we have conducted Novice classes, a telescope-making class, and a camera-tracker construction class. Collectively, SAC members have a great deal of astronomical expertise — more so than in most other clubs. So get to know your fellow SAC members — you might learn something!

I leave you now with a variation of a Paul Simon song, downloaded from an Internet BBS, that applies to all of us who are computer weenies.

50 Ways To Hose Your Code...

Kind of by Paul Simon

The problem's all inside your code she said to me;
Recursion is easy if you take it logically.
I'm here to help you if you're struggling to learn C,
There must be fifty ways to hose your code.

She said it's really not my habit to include,
And I hope my files won't be lost or misconstrued;
But I'll recompile at the risk of getting screwed,
There must be fifty ways to hose your code.

Just blow up the stack Jack,
Make a bad call Paul,
Just hit the wrong key Lee,
And set your pointers free.

Just mess up the bus Gus,
You don't need to recurse much,
You just listen to me.

She said it grieves me to see you compile again.
I wish there were some hardware that wasn't such a pain.
I said I appreciate that and could you please explain,
About the fifty ways.

She said why don't we both just work on it tonight,
And I'm sure in the morning it'll be working just right.
Then she hosed me and I realized she probably was right,
There must be fifty ways to hose your code.

Just lose the address Les,
Clear the wrong Int Clint,
Traverse the wrong tree Lee,
And set your list free.

Just mess up the bus Gus,
You don't need to recurse much,
You just program in C.

— by Miles Deforest (deforest@sundae11.dab.ge.com)
and Al Pena

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

Two public star parties are planned for this spring. The first will be on March 27 at Reach 11. The second is scheduled for May 1 (National Astronomy Day) at Thunderbird Park. There will be more info in next month's newsletter.

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. We will discuss Deep Sky objects in Leo. The meeting will be held at John McGrath's house and the directions will be found elsewhere in the Newsletter.

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, March 11 at 7:30pm.

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 Saguardo Astronomy Club name to receive the discount. Sky Publishing will check their records to verify that you are eligible to receive the discount.

Minutes of the January Meeting

The January 8, 1993 meeting opened at 7:30 pm by new President Bob Dahl, who welcomed all visitors and new members. There was a round of applause for outgoing officers he thanked Gene Lucas for coordinating the public events of the past year. Bob called for a volunteer to take over Gene's position for the next year, and Piet Burggraaf volunteered for life. Bob reminded members about the upcoming star party on January 16 at Buckeye Hills.

There was no Treasurer's report from Carol Lee because of the transition of the books. A. J. Crayon mentioned the Deep Sky meeting on Thursday, January 14 at the McGrath house. The discussion will be on the constellations of Taurus and Auriga. The Messier Marathon is planned for the March 20 Star Party at Arizona City in conjunction with EVAC. The March newsletter will have a map to the site. There will be awards for participation and sighting of 50 or more objects, and plaques for the most objects observed that night.

For Show 'n Tell, Steve Coe had some slides of the comet Swift-Tuttle, and Pierre had pictures of the recent lunar eclipse. Following the break, Vice-President for programming, Tom Polakis, introduced the speaker for the evening, one of our newer members, Leon Knott, who showed slides of telescope making.

—Susan V. Morse, SAC Secretary

Better Mnemonics?

When you get bored with the mnemonic **Oh Be A Fine Girl, Kiss Me Right Now Sweetheart** (which could be considered sexist), try one of the following from the Occultation Section of the RAS of New Zealand.

**Obese Balding Astronomer Found Guilty; Killed Many Recent Non-science Students
Octopus Brains, A Favorite Gastronomical Kitchen Menu, Requires No Sauce
Oh Big And Ferocious Gorilla, Kill My Roommate Next Saturday
On, Backward Astronomer, Forget Geocentricity; Kepler's Motions Reveal Nature's
Simplicity
Odd Ball Astronomers Find Generally Kooky Mnemonics Really Nifty Stuff**

E-Mail Roster

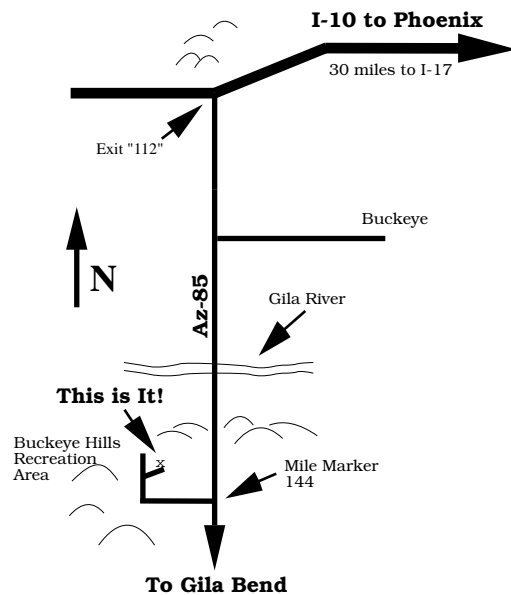
Still yet another update to the e-mail addresses of SAC members. BIX now has E-mail access to the Internet. The Compuserve addresses are given in the Internet format: `nnnnn.nnn@compuserve.com` are really in the format `nnnnn,nnn` within Compuserve. GENIE addresses aren't currently addressable from the outside world (the Internet), but their addresses are given as `@genie` to specify which host. All other hosts are directly accessible from the Internet.

- | | |
|----------------|--|
| Bob Bryant | Bob_Bryant@
poncho.phx.sectel.mot.com |
| Steve Coe | 74040.2071@compuserve.com |
| A J Crayon | a.crayon@az05.bull.com |
| Paul Dickson | p.dickson@az05.bull.com
pdickson@bix.com |
| Carol Lee | 71361.3541@compuserve.com |
| Tim Lee | 71361.3541@compuserve.com |
| Paul Lind | plind@sedona.intel.com |
| Pete Manly | petemanly@bix.com |
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72117.1372@compuserve.com |
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| Tom Polakis | 70413.1543@compuserve.com |
| Chris Schur | 72070.2612@compuserve.com |
| Brian Skiff | bas@lowell.edu |
| Steve Strazdus | sstrazdu@sedona.intel.com |
| Alex Vrenios | 71024.3024@compuserve.com |
| Diane Vrenios | 71024.3024@compuserve.com |
| Dan Ward | 72040.3357@compuserve.com |
| Mike Willmoth | 76170.1037@compuserve.com
mwillmoth@bix.com
m.willmoth@genie |

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.

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.

1993 SAC Meetings

- Jan. 8
- Feb. 5
- Mar. 5
- Apr. 2
- May 7
- Jun. 4
- Jul. 2
- Aug. 27
- Sep. 24
- Oct. 29
- Nov. 26
- Dec. 18 Party

1993 SAC Star Parties

Date	Sunset	Moonrise
Jan. 16	5:46pm	3:11am
Feb. 13	6:12pm	2:05am
Mar. 20	6:41pm	5:24am
Apr. 17	7:01pm	3:55am
May 15	7:22pm	2:25am
Jun. 12	7:38pm	12:55am
Jul. 17	7:38pm	4:44am
Aug. 14	7:15pm	3:39am
Sep. 11	6:40pm	2:15am
Oct. 9	6:03pm	1:04am
Nov. 6	5:33pm	11:57pm
Dec. 11	5:22pm	6:35am

February 1993

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			Mars near waxing gibbous Moon		SAC Meeting	Full Moon 4:55 p.m. MST
	1	2	3	4	5	6
	Mars is fast fading		EVAC Meeting Jupiter near waning gibbous Moon			SAC Star Party Buckeye Hills (members & guests)
7	8	9	10	11	12	13
				PAS Meeting Directions: Jerry Belcher 938-2932		Mercury at greatest elongation
14	15	16	17	18	19	20
New Moon 6:05 a.m. MST	Mercury few degrees left of thin crescent Moon		Venus Brightest -4.6			
21	22	23	24	25	26	27
28						

Wanted

The newsletter editor is compiling an Observer's Column about the AAS meeting that took place in the beginning of January. If you wish to contribute, please write down your impressions of the meeting and send it to the editor.

What's being looked for is a description of your experiences at the meeting. If a particular presentation struck your interest, please feel free to mention a line or two about it. The purpose of this is to let other members know what took place, since even those who attended were too busy to attend everything.

Your newsletter editor wrote down his experiences over four days and easily filled a newsletter page without getting around to mentioning what the presentations were about. The rest of you who attended must have equally interesting experiences.

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.....\$16.00 for one year

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

Make checks payable to SAC.
Mail the completed form to:
Carol Lee
SAC Treasurer
3314 N 68th Street, #205-W
Scottsdale AZ 85251



SACNEWS

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

Stamp

First Class Mail