

AD ASTRA

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The Newsletter of the Atlanta Astronomy Club

February 1987

TABLE OF CONTENTS

Club Minutes.....	1
An Observation of Solar Halos.....	1
"Weather" to Observe.....	2
Asteroid Appulses.....	3
Notes from the Past.....	4
Silvering Telescope Mirrors.....	5
Board Minutes.....	5
Observer's Almanac.....	6

CLUB CALENDAR

Next Meeting: February 20

Program: John Burgess, an astronomer with the Fernbank Science Center, will speak on archaeoastronomy and ancient Indian astronomy in Georgia.

AD ASTRA is published monthly during the academic year by the Atlanta Astronomy Club, Inc. The Atlanta Astronomy Club, an organization dedicated to the advancement of amateur astronomy, meets on the third Friday of each month (second Friday of December) at the Bradley Observatory on the Agnes Scott College campus at 8:00 PM. Membership dues are \$25 annually and include a subscription to *Sky & Telescope* magazine and use of club observatory facilities.

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..... Rick Clark, Sharone Franklin
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Vice Presidents:..... Dave Roberts, Mark Wilkinson
Treasurer:..... Bud Rosser
Secretary:..... Sharone Franklin

CLUB MINUTES

The January 16, 1987 meeting was held at the Bradley Observatory with Dr. Joe Gibson presiding.

This month's program was our annual "star-bowl". Two teams were formed to answer astronomy related questions in a competition that very entertaining. Pat Frank asked these questions while David Roberts kept score. The teams were:

- I. Rick Clark, Bud Rosser, Tom Buchanan and Sharone Franklin. (This was the winning team.)
- II. Charley Levinson, Bob Lowenthal, Blaine Brooks and Lee Wilson. (This team took a tremendous early lead.)
- III. The audience. (An unofficial team that almost won!)

NOTE: We are soliciting volunteers to help with mailing and registration for the SERAL convention to be hosted by the club in June. Please contact Lee Wilson if interested.

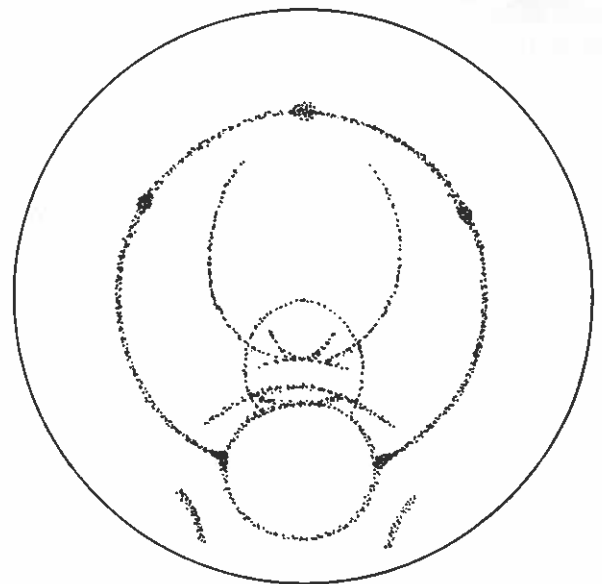
AN OBSERVATION OF SOLAR HALOS

by David Roberts

Usually cloudy weather on a weekend away from full moon will make most amateurs groan and consider taking up geology. There are exceptions, however. On December 20, 1986 Atlanta, and presumably much of North Georgia, was treated to a spectacular display of solar halos, arcs, and parhelia. The display was caused by refraction, reflection, and diffraction of sunlight by ice crystals in high cirrus clouds. Several of the *Ad Astra* staff were together getting the January issue ready for printing when our attention was drawn to this display.

Most people are familiar with the 22 degree parhelia, or "sun dogs", the glowing, multicolored spots of light that flank the sun on days when the sky is filled with cirrus. Almost as many have seen the 22 degree halo, the ring of light centered on the sun and passing very near the sun dogs. Both of these were present in the December 20 display, and much more. An all sky diagram is presented below. The outermost circle is the horizon, and the zenith is the center of the circle. The small oval near the bottom is the 22 degree halo with the sun in its center. The sun dogs are the spots to the immediate left and right of the halo.

The first indication that an exceptional display was starting was the presence of the parhelic circle, a ring of light passing through the sun and the 22 degree parhelia. The circle continues right 'round the sky and is parallel to the horizon. Seeing this, we immediately began looking for the 120 degree



All Sky diagram of 20 December 1986 Atlanta

parhelia, spots of light that lie on the parhelic circle 120 degrees from the sun. These patches of light were indeed visible, as was the anthelic spot, 180 degrees from the sun and also on the circle. These three spots were dimmer than the sun dogs, and the patchiness of the cirrus made them come and go as the clouds moved overhead.

As more cirrus moved in, more arcs showed themselves. The first and brightest was the upper tangent arc, a rainbow colored arc tangent to the top of the 22 degree halo. A Parry arc formed (named after W.E. Parry who first recorded this arc in 1820), concave to the sun and just above the tangent arc. At times the Parry arc and tangent arc touched, the Parry arc extending well away from the 22 degree halo.

A circumzenithal arc made its appearance at about this time. This arc is tangent to the 46 degree halo, which is centered on the sun like the 22 degree halo. The 46 degree halo was never visible except in the immediate area of the circumzenithal arc. Down near the horizon two contact arcs had formed, also tangent to the 46 degree halo. All of these arcs had beautiful rainbow colors, fading from red to a blue-white.

We were quite pleased with what we were seeing, but the show wasn't over yet. A cirrus wave passed overhead which must have been just right, because the aforementioned display greatly intensified and even more arcs appeared! A multicolored arc tangent to the 22 degree halo and passing through the anthelic spot appeared. This arc is known as a Wegener anthelic arc after the man who first explained its origin. Simultaneous with this arc was a heliac arc, a teardrop-shaped arc with the tip of the teardrop touching the sun and the round end extending up near the zenith, encompassing the circumzenithal arc. This display did not show the teardrop tip through the sun, only the component outside of the 22 degree halo. The heliac arc was narrow and sharply defined, unlike the rest of the arcs which were broad. It showed none of the rainbow colors of the other arcs, as it is caused solely by reflection from ice crystal faces.

The peak of the display lasted only about five minutes as the cirrus patch was moving off. The entire display began to dim and a half hour later thicker cirrus moved in, blotting out the delicate arcs and halos.

No doubt some think I am exaggerating, but I have been careful to report only what I saw. I also have three witnesses (John Marsh, Don Barry, and Pat Frank) who will back me up! The next day I bought *Rainbows, Halos, and Glories* by Robert Greenler (Cambridge University Press) so I could learn more about what I had seen (where else would I get a term like Wegener anthelic arc?). I highly recommend this book to anyone with an interest in the world around them.

Next time the sky turns white with cirrus and another observing session bites the dust, keep looking up. You may be treated to an ice crystal display you'll never forget.

"WEATHER" TO OBSERVE-- OR HOW I STOPPED CURSING AND CAME TO LOVE THE GULF

by John Marsh

In the November *Ad Astra*, I penned a piece entitled "A Call To Observing". In it, I made reference to the imminent arrival of Arctic cold fronts and the fine observing weather which would surely follow. It was an argument which, at the time, seemed right as rain-- and that's exactly what we've had ever since-- rain! Whither the Arctic fronts? To paraphrase a remark made by Enrico Fermi in reference to extraterrestrials, where are they?

In most years, we can indeed expect a number of Arctic fronts to come our way, usually once every few weeks or so. In the past few winters, some of these occurrences were more vivid than anyone (who is normal) would want. A particularly intense arctic outbreak two winters ago brought Atlanta its coldest temperature this century-- minus 9 degrees below 0! Some of us more hardy observers (fools) racked up quite a few observing sessions during these periods. At the time of this writing, this season's coldest reading has been a "mere" 16 degrees; the winter of 1986-7 has thus far been the mildest in several years. The comparative lack of Arctic fronts in our region is the chief factor responsible.

While the weather in North America has been mild, the opposite has been the case through much of Europe and Asia. Early in January, Moscow recorded a temperature of minus 40 degrees, the coldest there in over four decades. London recorded a low mark of 16 degrees at about the same time, their coldest since 1940. Record snow falls also occurred in many places as well. By contrast, when we were enduring our record cold a few years back, sidewalk cafes in Geneva were doing spring-like business; the Olde World basked in record winter warmth. Cold air masses descending from the Polar regions seem to preferentially choose either the Eastern or Western Hemispheres; rarely does record cold or warmth occur in both during the same period of time. Why should this be so? As Einstein assured us God is not malicious, we can rule out any sort of climatological lottery. Climatologists are not certain, but some have suggested that The Brat may be to blame.

The Brat, aka El Nino, (Spanish for "The Child", so called as the effect usually begins around Christmas) is an aberration in the large-scale circulation of the Eastern Pacific off the coast of South America. Normally cold water circulation is cut off by what is effectively an oceanic inversion layer near the surface. The cause of this effect is (naturally) not well understood. The result may be what we have seen this winter-- weather which is abnormally warm and wet for us, abnormally cold for other areas of the globe. Every so often, The Brat throws a tantrum, and some meteorologists have suggested that a mild El Nino effect may be taking place. The explanation is little more than speculation, but it seems as good as any; and it may get yours

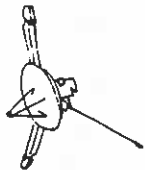
truly off the hook for failure of this season's weather to behave as advertised in last November's article.

'Tis An Ill Wind...

As I understand it, the mechanism works thus: El Nino warms the Eastern Pacific (as a matter of interest, a similar effect seems to occur in the Western Pacific as well); as a result, a warm circulation is set up in the atmosphere just south of the equator. This may influence the counterpart circulation north of the equator. The overall effect is a large zone of atmospheric warmth in the Eastern Pacific. This may influence both the path and relative warmth of the sub-tropical jetstream, the river of air at high altitude upon which many of our winter storms ride. Deflected sufficiently far northward, the sub-tropical jet tends to block outbreaks of Arctic air over much of the United States. At the same time, low pressure systems forming in the Gulf and riding along the jet would influence our weather with sad rapidity-- resulting in extended episodes of cloudiness and rain. This is, of course, what we have suffered through all winter. Since the sub-tropical jet's path crosses the Gulf of Mexico, the low pressure systems have tended to be unusually warm and wet.

As I am no meteorologist, the above description doubtless leaves much to be desired. It does, however, "preserve the phenomena", a function which any valid scientific theory must perform. In addition, I have seen many satellite photos showing a near continuous band of cloudiness reaching from the East-central Pacific, up across Mexico, into the Gulf of Mexico and then- yes- directly across the Southeastern U.S. This band is the visible marker of the sub-tropical jetstream; a graphic illustration of how events in the Pacific Ocean thousands of miles distant conspire with the good-ole Gulf of Mexico to ruin our observing weather!

The Brat needs a good spanking. The Gulf should be drained.



June 22, 1983 — Pioneer 10 overtakes Harry Langstrom's hat, blown off at the corner of 23rd and 3rd on March 12, 1936, and never seen on Earth again.

W Miller

ASTEROID APPULSES

by Don Barry
from predictions by Paul Sventek
CompuServe (CIS 74375,1317)

With the final arrival of wintry clear skies and a healthy 20" reflector at Villa Rica, prospects brighten for a chance to observe those oft ignored minor members of the solar system, the asteroids. And what better way to locate these elusive objects than in pairings with the jewels of the night sky, the Messier objects? Paul Sventek recently posted the following table of appulses between these two families on CompuServe, and each event provides an opportunity to get to know the elusive, yet personable remaining planetesimals of the solar system.

Probably the best way to use the information below in locating an asteroid is to view the Messier partner prior to the event, and prepare a sketch of the local starfield within a 30 minute to one degree radius of the object, down to the magnitude of the asteroid. As the appulse begins, then, you need merely consult your prior diagram to locate the intruder. Motion of the asteroid over an interval of a few hours or a day will confirm its identity.

Of note is the 26 March appulse of 5 Astraea, which on 1 February reached perihelic opposition with Earth, in its closest approach in 40 years. This asteroid, discovered 37 years after Ceres by Karl Henck, a German postmaster, was only the second to be discovered! This startling find touched off the observing frenzy that led to the rich harvest of asteroids found in the latter half of the 19th century.

Also of note is the 11 Dec appulse of 532 Herculina with M9, a globular cluster in Ophiuchus. Herculina was the first asteroid suspected of having a possible orbiting companion, and if it indeed passes near the dense starfield of the globular, there are possibilities of occultations with individual stars in the cluster. Surely here is a difficult test of powers for a nonpareil observer.

Approx date of near approach	Asteroid	M Obj	Ast. Mag
Jan 25	7 Iris	M20	12.0
Feb 19	354 Eleonora	M84/86	10.8
Feb 29	354 Eleonora	M99	10.7
Mar 26	5 Astraea	M44	11.0
May 25	68 Leto	M55	11.9
May 30	324 Bamberga	M74	11.8
Jun 9	1 Ceres	M8	8.2
Jun 9	29 Amphitrite	M45	11.8
Nov 1	6 Hebe	M75	10.7
Dec 1	14 Irene	M65/66	11.5
Dec 6	7 Iris	M72	10.9
Dec 11	532 Herculina	M9	11.9
Dec 26	4 Vesta	M44	7.7

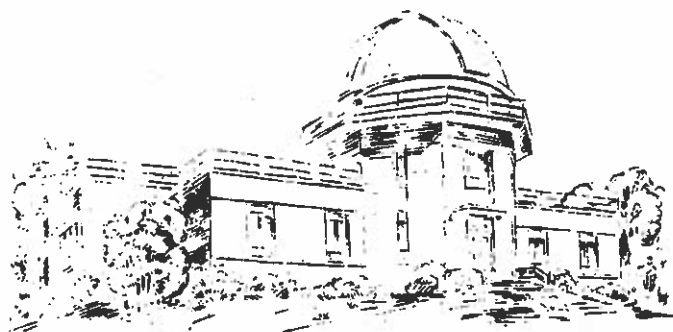
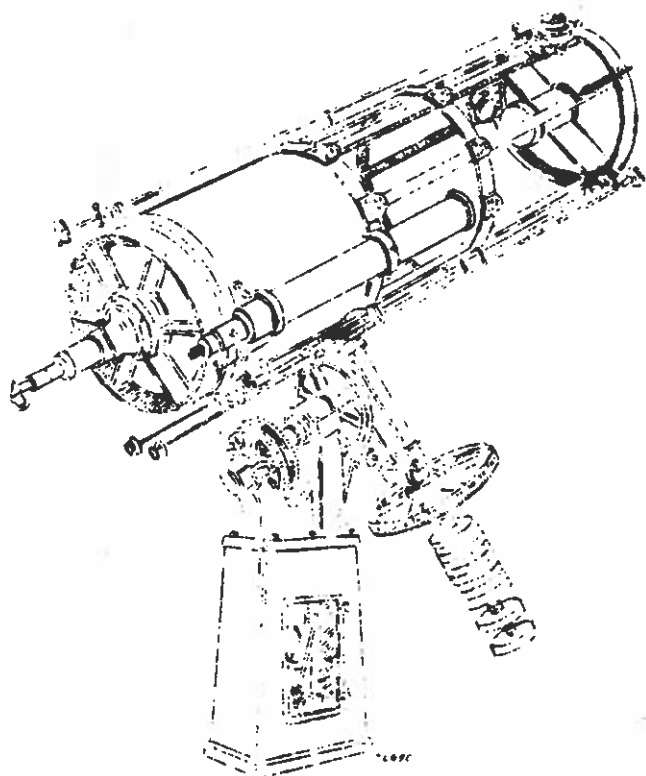
NOTES FROM THE PAST: 1987 is the Fortieth Anniversary year of the Atlanta Astronomy Club. The editorial staff of the *Ad Astra* thought it would be interesting to republish material from early editions of the Atlanta Astronomer's Report, our club's original newsletter. This month, we present Dr. Calder's 1948 article describing the, then new, 30" Fecker reflector at Bradley Observatory:

THE NEW 30" TELESCOPE

by Dr. William Calder

Last month, our cover boldly showed the "new Thirty Inch Telescope for the new Agnes Scott Science Hall." At the time, however, there was nothing certain about our acquiring such a fine instrument. Today (praise be to Dr. McCain!) we are assured that this treasure is on the way. Meanwhile, the telescope is being completely overhauled at the Perkin-Elmer Corporation, Glenbrook, Connecticut. The mirrors are being re-aluminized, the polar axis is being lowered by six degrees to conform to our latitude, and the metal parts are being enameled to withstand moisture, which is always present in an observatory dome.

The mounting of the telescope was made by the world-famous Warner and Swasey Company. There are beautiful setting circles finely divided in silver, with reading microscopes. The optical work was done by the late J. W. Fecker, maker of some of the best mirrors in existence. In addition to the usual battery of eyepieces, the accessories include a plate-holder for photography and a Warner and Swasey filar micrometer for measuring double stars. The telescope can be used either in the Newtonian or Cassegrainian arrangement, but the latter will be used principally because of easy access to the eyepiece.



In size, the instrument exceeds anything in the southeastern United States. In one respect the instrument is unique. It is perhaps the largest telescope which is to be used primarily for instruction of college students and the general public. Most of the large observatories are intended primarily for research, and the telescopes are given grudgingly a few hours each month to visitors. This is usually looked upon as an interruption of business. Research is the lifeblood of science, and we expect to add to our store of knowledge by the Agnes Scott telescope. But this pioneer instrument in the Atlanta area has a strategic position in being of service in showing celestial wonders never before seen in Dixie, and of stirring up interest on the part of astronomically hungry citizens. Fortunately, man cannot control more than his own world (and what a mess he makes here!). The rest of the universe we can't do much about except enjoy it. So let's look upon this telescope as a wonderful luxury for sheer enjoyment. And let us share the grandeur of the heavens with all races of people.

Everyone is asking what the telescope will do in the way of performance. For one thing, it will gather about 14,400 times as much light as the naked eye. It will give a view of the Orion nebula that will make one gasp. It will reveal curiosities like Pluto, the moons of Mars and Uranus, etc., that everyone reads about but seldom gets a chance to see. It will separate double stars as close as the opposite sides of a penny when viewed from a distance of 16 miles. It will show a hundred million stars (the eye alone can see only five thousand) and it will photograph galaxies something like a hundred-million light-years away. What is more astonishing, it will take our minds off of the insignificant things that tend to clutter us.

The cover of this issue (also executed by Bill Close, and a marvel of artistry on a mimeograph stencil) shows the proposed Agnes Scott Observatory. Here again we have the initiative of Dr. McCain. I had been thinking cautiously of a simple housing on the top of the new science hall, or perhaps a shed located separately. Before I knew what was happening, Dr. McCain called in the architect, we discussed what we would like if we could have the ideal observatory, and the building depicted was planned. Let us wish Dr. McCain success in finding someone with the rare combination of cash, imagination and citizenship to put the drawing into brick and steel!

SILVERING TELESCOPE MIRRORS

by Don Barry

After a few years with our telescopes, most of us feel as if they are our children -- we know how to deal with every tantrum and fix every cut and bruise. Yet when the mirrors age and tarnish into senescence, we grumble as we dismantle our behemoths and dispatch the mirrors in gigantic excelsior boxes to the factory for a face-lift. But we don't have to send them to foster care: with a little patience and the right chemicals, the following recipe will restore a mirror to pristine youth, and even increase its reflectivity some 8 percent over an aluminum coating.

First the old coating must be removed. This can be done with a wash in pure nitric acid in the case of an old silver mirror, or a teaspoon of lye in a cup of water for an aluminum coating. After this and a thorough rinse, a second and third wash in nitric acid is mandatory in either case, applied (using gloves!!) with cotton balls, and rubbed with considerable pressure, followed by rinsing until the characteristic squeak of cotton on wet glass is heard. Following a final rinse in distilled water, the impeccably clean glass is kept under water until silvered as follows:

A: Silver Nitrate	6 grams
distilled water	to make 100 ml.
B: Ammonium Nitrate	9 grams
distilled water	to make 100 ml.
C: Sodium Hydroxide	10.5 grams
distilled water	to make 100 ml.
D: Glucose	10 grams
Denatured alcohol	15 ml.
distilled water	to make 100 ml.

Wrap the mirror face-up about the edge with waxed paper (never foil) and hold with a rubber band in order to make a dish supporting the chemicals. Alternately, lay the mirror face-down on two wooden dowels in a non-metallic pan. Calculate the amount of fluid in each case to cover the surface thoroughly or to reach halfway up the mirror side - this is about 30 to 40 ml. total volume for a 6" mirror. Divide this by 3 to obtain the quantity of solution A required. Now mix separately equal volumes of solutions A, B, and C, adding C last, stirring to note that the last bit of C added causes the solution to turn brown to black. Stop just at the point that precipitate begins to form - the ideal solution should be a slightly turbid tea-color. Next add D in quantity one third to that of A, and immediately pour upon the mirror.

The solution will turn black and begin to deposit the coating. The mirror will appear invitingly bright after only a minute or two, but the deposit must be thickened by allowing silvering to proceed for at least 5 to 8 minutes so that the mirror is not overly transparent. After the coat is deposited, immediately rinse the mirror in copious amounts of distilled water, then wash down with alcohol and allow to dry. After a day of aging, the film can be polished somewhat if necessary by rubbing lightly with lens-cloth with perhaps a little rouge.

It is impossible to damage a mirror in any way by improper deposition of silver. If the film produced is too thin, it may be thickened by repeating the process. If too thick and rough, it

may be removed and the process repeated. The ideal film will be just thick enough so that a lamp filament is barely visible by transmitted light, yet thin enough that the surface requires but little polishing to bring out a full lustre.

Perhaps the only disadvantage to a silver coat is the inevitable tarnish that results and limits the useful life of a silvered mirror to only one or two observing seasons. Even heavy tarnish, however, will not impact viewing of most deep sky objects, whose emission is in the red end of the spectrum. Blue objects, however, will be affected early in the mirror's life as tarnish gradually extinguishes the mirror's ability to reflect short-wave light. A useful way to extend the mirror's tarnish-free heyday is by lining its holder and telescope cap with alum-paper, prepared by soaking paper in a saturated solution of common alum. This paper scavenges from the air the agent (hydrogen sulfide) responsible for tarnish deposition. This paper can also protect your finest sterlingware!

Remember to use only the finest chemicals available and distilled water. As with all toxic and corrosive chemicals, use appropriate precautions such as protective eye-wear, gloves, aprons, etc. Never use a metal pan or metal supports for the mirror. Flush all end products down a drain with copious amounts of water. If black silver spots are deposited in unwanted places, they may be removed with a dilute solution of nitric acid. Don't worry about these spots on the skin - they aren't toxic, but may take a day or two to wear off. Wash your hands thoroughly immediately after handling the chemicals, and keep them out of reach of children.

It is sometimes difficult to find local sources of the chemicals required, but they are always available by mail-order from chemical supply corporations such as Fisher or Cenco. If there is sufficient interest, a workshop in mirror-silvering can be conducted at a future club meeting. Bonne Chance!

BOARD MINUTES

by Sharone Franklin

The Board meeting of the Atlanta Astronomy Club was held January 16, 1987. The following attended: Dr. Joe Gibson, Sharone Franklin, Lee Wilson, Tom Buchanan, Bud Rosser, David Roberts, John Marsh, Pat Frank, Rick Clark and Don Barry.

I. The Astronomical League's Executive Committee has requested an amendment to their by-laws. They want to require only 40% attendance for a quorum. All Board members present disagreed to the amendment stating that for the League's members to be properly represented, they need at least 50% attendance for a quorum.

II. Tom Buchanan, Chairman of the Light Pollution Committee, is investigating new criteria to propose to Marta for light shielding on their new construction. Bud Rosser made a motion that a letter be written to Marta concerning this matter. His motion was approved unanimously. John Marsh and Dave Roberts will work with Tom to draft the letter.

OBSERVER'S ALMANAC
Moon Rise, Set, and Phase
(All times are EST)

Date	Rise	Set	Phase	Date	Rise	Set	Phase
02/15	20:17	08:32	98%	03/03	09:04	22:45	12%
02/16	21:17	08:57	94%	03/04	09:34	23:47	19%
02/17	22:18	09:22	89%	03/05	10:07	----	28%
02/18	23:21	09:49	81%	03/06	10:44	00:49	37%
02/19	-----	10:19	72%	03/07	11:26	01:49	47%
02/20	00:28	10:55	62%	03/08	12:15	02:45	56%
02/21	01:38	11:37	51%	03/09	13:08	03:37	65%
02/22	02:49	12:30	40%	03/10	14:06	04:22	74%
02/23	03:57	13:33	29%	03/11	15:06	05:02	82%
02/24	04:58	14:44	19%	03/12	16:07	05:36	89%
02/25	05:50	15:58	10%	03/13	17:07	06:07	94%
02/26	06:33	17:13	4%	03/14	18:08	06:34	98%
02/27	07:09	18:24	1%	03/15	19:08	07:00	99%
02/28	07:41	19:32	0%	03/16	20:10	07:26	99%
03/01	08:09	20:38	1%				
03/02	08:37	21:42	5%				

(-----) indicates phenomena will occur the next day

LUNAR PHASES

Month	New Moon	First Qtr	Full Moon	Last Qtr
Feb.	27 19:51	05 11:21	13 15:58	21 03:56
Mar.	29 07:46	07 06:58	15 08:13	22 11:22

David Levy and N. Nishikawa discovered comets on 5 January and 19 January respectively. Preliminary parabolic elements by Brian Marsden and S. Nagano are:

Comet Levy (1987a)
T = 1986 Dec 18.31 ET w = 96.70°
q = 0.9319 A.U. W = 15.96°
i = 97.17° 1950 Equator and Equinox

Comet Nishikawa-Takamizawa-Tago (1987c)
T = 1987 Mar 18.192 ET w = 203.649°
q = 0.84675 A.U. W = 176.046°
i = 172.122° 1950 Equator and Equinox

Masanori Terasako has discovered an 8th magnitude comet in Sculptor, but elements are not yet available.

COORDINATES FOR CURRENTLY VISIBLE COMETS

Date	Comet	RA-2000	Dec-2000	Rise	Mag
Feb 15	Sorrells	23:42.3	+10°31	19:00	11
Feb 15	Halley	10:49.1	-15°09	21:00	14
Feb 15	Levy	16:24.1	-04°32	02:00	12
Feb 15	Nishi	23:35.5	-00°40	19:00	8
Feb 20	Halley	10:43.5	-14°42	20:00	14
Feb 20	Levy	16:10.6	-06°53	01:00	12
Feb 25	Halley	10:37.9	-14°11	20:00	14
Feb 25	Levy	15:54.3	+09°25	01:00	12
Mar 02	Halley	10:32.4	-13°38	20:00	15
Mar 02	Levy	15:34.3	+12°07	01:00	12
Mar 07	Halley	10:27.0	-13°04	20:00	15
Mar 07	Levy	15:11.4	-14°52	00:00	13

POSTMASTER:

If undeliverable, please return to:

AD ASTRA
c/o Rick Clark
584 South Mt. Carmel Rd.
Atlanta, Georgia 30253



W. Tom Buchanan
3518 Roswell Rd. Apt. C-6
Atlanta, GA 30305

8801

If marked with X above, your membership has expired.
Please contact the Treasurer promptly to insure continuous membership.