AD ASTRA

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CLUB CALENDAR

Next Meeting: November 21
Program: Dr. David Finkelstein, who was unable to attend the September meeting, will present a talk on the early universe and Grand Unification Theories.
Observing Sessions: November 28, 29.

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.

CLUB MINUTES

The October 17, 1986 meeting was held at the Bradley Observatory with Dr. Joe Gibson presiding.

I. Program chairman David Roberts has received a letter from Dr. David Finkelstein of Georgia Tech. Dr. Finkelstein stated that he regretted not giving his scheduled talk at the September meeting. He had gotten confused about the date, therefore, he will be speaking at the November meeting.

II. The October program was a slide presentation on observatories given by Rick Clark and Dr. Richard Williamon. Beautiful domes and the telescopes contained within them were shown from pictures taken in such places as: Arizona, Texas, Virginia, Canada, California, Mexico, Switzerland, France and Chile.

A CALL TO OBSERVING

by John Marsh

In the Arctic region of our planet, night is falling. On September 23, the sun set at the geographic North pole and will remain hidden for six months. Inexorably the shroud of night progresses ever southward, toward its greatest extent at the Winter Solstice. The Arctic air chills, growing heavy against the increasingly cold water and rock surface of the Far North. A chain of events as old as time (or at least the Cenozoic Era) is once again set into motion.

With no solar radiation for warming, the polar air forms a cold reservoir over the Arctic. Reacting to the spin of the Earth, pockets of this cold polar air break off, swirling south toward the temperate latitudes of habitable North America (defined as any place south of Cleveland, Chicago, or New Jersey). The cold air pocket manifests itself as an arctic cold front as it races across the Prairie Provinces of Canada. With rude force, Fall becomes Winter in such places as Calgary and Edmonton. The front now races toward the northern tier of American states. Comparatively mild temperature readings in the forties and fifties fall in a matter of hours into sub-zero levels. Born on wind gusts nearing hurricane force, snow squalls throw a carpet of white on the Dakota Black Hills.

As low pressure anchoring the cold air mass swirls over Hudson Bay, its boundary, the arctic front, crosses the Mississippi River Valley. Its course is clear: invasion and occupation of the Southeast. The cold weather season is marching toward Georgia.

In the skies over Atlanta, wispy streaks of cirrus give way to ever thickening bands, then decks, of clouds. The cloud base progressively lowers as winds at the surface increase out of the southwest. A band of heavy rain, perhaps even thunderstorms, accompany the front as it arrives. The warm weather regime of moist Gulf of Mexico air is thrust out into the Atlantic before the juggernaut of on-rushing cold air.

As the heavier rain squalls pass by Atlanta, the wind shifts -- southwest to west and finally to northwest. As it picks up speed, breaks appear in the overcast. In a matter of hours, the sky is clear with temperatures rapidly falling. It is Friday evening, the sunset is crimson and fire-orange. The first stars appear early in the transparent Arctic air; by the end of astronomical twilight, the sky is ablaze in stars.

It all means just one thing -- TIME TO OBSERVE! The observing season (such as it is) has finally arrived. True, we have to import air from the tundra in order to observe, and dependable deliveries are uncertain at best. However, the above scenario does occur at least a few times between late October and early April -- to waste such opportunities in virtually criminal. It's time to dust off the varied apparatus for observing, as well as the Admiral Perry suits for Arctic survival.

There exist two main reasons to maintain an active observing program. First and most important, observing is the amateur's lifeline to active astronomy, to direct participation in the science. Observing is a part of the astronomical adventure. Observing with the club reenforces this by fostering shared

experiences and shared wisdom. The larger the number of active observers, the stronger the Atlanta Astronomy Club.

Second, by observing regularly, one gains insights and experiences that can be shared with other members of the club -- preferably in the form of articles for *Ad Astra*! New members are especially encouraged to come out -- current members will lend help in any way possible. So the call goes out -- *Get Thee to Villa Rica*! Good observing opportunities are too rare to permit being passed up.

NOTES TO MEMBERS

The *Ad Astra* computing department is currently updating the club database. Unfortunately it has gotten a little out of date and we no longer have accurate expiration dates for some members. Thirty five of them to be exact. Some of them are two years overdue. In order to rectify this situation, we are asking the members to help us out. If your mailing label shows your membership has expired and it actually hasn't, you *MUST* let us know. Otherwise, this is your last issue of *Ad Astra* and your membership terminates. This sounds harsh, but we're blowing a considerable amount of postage on people whose memberships have actually expired. Just drop a note to Bud Rosser or Dave Roberts (or call them) to let them know there is a problem. That's all it takes.

Speaking of postage, it costs a lot. Now comes the time to beg. The club could save some money if some generous members would donate stamps. If each member sent six stamps for the remaining six issues of *Ad Astra* for this meeting year, the club would save a good bit of money (over $200). It's not that our newsletter costs more now to print or mail. We're just looking for ways to keep money in the bank.

We still need volunteers for after-meeting refreshments! Thomas & Evelyn Whalen have graciously consented to handle this job for the November meeting. Any other volunteers? Wanna be volunteered?

And finally, *Ad Astra* needs more article submissions. This rag eats up articles at a prodigious rate. The more people that write, the better *Ad Astra* will get.

ASTROPHOTOGRAPHERS ARE....

by A Non-Astrophotographer

Essayist Stephen Leacock thought Americans were funny. He chided them for making tea by boiling water to make it hot, then putting ice in it to make it cold; they put lemon in it to make it sour, then add sugar to make it sweet.

He should have known some astrophotographers.

They buy daylight film, then take their pictures at night.

They'll buy the slowest film on the market, then acquire $300 worth of equipment to make it faster.

They'll buy film rated at ISO 400 then expose it at 1600.

They'll develop color slide film as negatives and make slides of print film.

They'll acquire an assortment of lenses of various sizes and focal lengths, but will take them all off to make deep sky photos.

Astrophotographers will buy the fastest lens available at f/1.2 or f/1.4, then stop it down to f/2 for taking pictures.

They will use a camera that will stop action at 1/1000 of a second to expose a shot of an unmoving object for 40 minutes.

They'll equip their telescopes with the finest setting circles to locate dimly-seen objects, then disdain their use in favor of sky-hopping from one object to another.

They'll buy telescopes you can't even look through, and put film in the telescope instead of their camera.

Astrophotographers are forced to develop their own film because processors seldom see anything worth printing.

Normally nice people, when taking pictures they become so sensitized to the dark that even a bright remark will cause their pupils to dilate and their dander to rise.

Kidding aside, astrophotographers really do know their stuff. So if you want to know the best film to use, all you need do is ask one. Right?

Well let me put it this way. I asked four.

No. 1: "Fuji 400 is the best thing on the market, and you can push it."

No. 2: "The only color film to use is 3M 1000. For black and white use a panchromatic."

No. 3: "I never use anything but 2415."

No. 4: "Don't sweat it. All you need is Ektachrome 400 and Tri-X."

So there you have it.

As Stephen Leacock said, "Americans (read astrophotographers) are funny."

The author adds "Please publish anonymously. I'm going to need some more advice on film."

THE SWAN OF THE MILKY WAY

by Sharone Franklin

In 1893, the Finnish composer Jean Sibelius wrote a tone poem called *The Swan Of Tuonela*. According to Finnish mythology, Tuonela is the Hades or kingdom of Death. It is surrounded by a swift moving dark river upon which a graceful swan floats and sings.

One is definitely reminded of this legendary swan by observing M17 which lies on the northern border of Sagittarius. M17 has been appropriately named the Swan nebula, but is also known as the Omega and/or Horseshoe nebula.

Last July I patiently observed this beautiful glowing mist through my 6 inch reflector. There are many objects in the night sky that excite one's feelings, but this object demonstrates nature's most talented artwork.

The Swan nebula was first observed in the spring of 1764 by Swiss astronomer de Cheseaux and in June of that year by Charles Messier. De Cheseaux's first impression was the same as mine: it looked like the tail of a comet. But as I continued gazing through my eyepiece much more detail was revealed. Its over-all shape does resemble that of a swan. The main body shows a dense elongated mass of glowing gas with faint filaments extending in all directions. The west end, or Swan's head, curves around in a horseshoe fashion and contains a mysterious patch of darkness. This blackness is easily distinguished from the surrounding space. The Swan's visible nebulosity has enough total mass to form about 800 stars like that of our sun. With a magnitude of six, the dimensions are 45'x 35' or about 40 light years in length.

I must admit that the Trifid and Lagoon nebulae, also found in Sagittarius, do rival the Swan for beauty. The Trifid's thick patch of glowing gas contains a multiple star system while the Lagoon's harbors a lustrous open cluster. The entire constellation of Sagittarius shelters millions of stars. While some compare its shape to that of a teapot, it reminds me of a small house equipped with a chimney. Just north of its gamma star is the door which is decorated with a cloud of stars, gas and dust. This is the porthole to the center of our Galaxy. Because of the dark absorbing interstellar dust that resides there, we will probably never see this nucleus.

With the brightest part of the Milky Way penetrating Sagittarius, the Swan nebula is indeed a fine sight. She floats on a snowy river, a sort of star webbed cascade. It's as though she has taken a seldom traveled streamlet--a journey by star light--a dream in twilight. Perhaps she stopped along the way to rest on the oasis of a globular cluster or even drank from the nearby Lagoon.

Jean Sibelius tells us in his tone poem that the Swan of Tuonela floats eternally on the black river surrounding the kingdom of Death. The Swan of the Milky Way also floats forever. The river is a dazzlement from the stars and the kingdom is the night sky before our eyes.

PROFILES IN COURAGE

by Bud Rosser

(with apologies to JFK)

I confess. I look forward to those third Fridays. I really do. It's still a minor delight to match up the voices from the darkness of Villa Rica with the smiling faces under the white light at the Bradley Observatory. It's neat to watch David, Liz, and Don try not to show their latest photo-efforts to everyone. I particularly enjoy watching George not asking for a cigarette or Jim not looking harried under the weight of a national presidency. Nonetheless, I usually arrive early (out of necessity these days), and plan to stay late (with or without a board meeting).

Don't misunderstand me; it's not as if I've never been north of Alpharetta, or I've never been drunk, or never witnessed childbirth, or worn long pants, or such. It's just that the meetings are a lot of fun. We have an intelligent, exuberant membership with wildly divergent interests. Yet when we meet on those third Fridays, we share, learn, and socialize around a common bond. We, in a Sagan-esque sense, span the vast bounds of time and space and we abound with a unique sense of family. And if you doubt that, just observe (good word, eh?) the intricate formations and reformations of the sub-groups at any AAC meeting. If you aren't reminded of the last large family reunion you attended ("homecoming" for you Baptists), I'll nosh on your Nagler. I defy anyone outside the highway design engineering section at 85 and 285 to attempt a sociogram of our club meetings!

Okay, already. We are a family. So where's the "courage?" Well...the courage part doesn't have much to do with the "family" part. Except...as a family often takes its relatives for granted (or too harshly to task), we sometimes shirk our common responsibilities or, conversely, expect excessive doses of it from others. When that happens, it takes courage to face the family, and not everyone has as good a time (and I'm foremost for having a good time). So, if having a happy Treasurer is important (a happy Treasurer dedicates his life to timely Sky & Telescope renewals), consider the courage and the message in the following scenarios:

1) Arriving at Bradley to find the auditorium is set up for class, not the AAC meeting. It takes some courage to give up a few minutes of socializing time and move the chairs.

2) It's 96 degrees (hot) inside the auditorium and a certain group insists on crowding the auditorium door, thereby testing the courage of the membership to resist claustrophobia.

3) Being the featured speaker in the above scenario.

4) Being the person who arranged for the guest speaker.

5) Attending the AAC meeting if you are the member who tried to reset the dec circle on the 20" by loosening the clutch screws will require courage, but should only require humility. We forgive, just ask next time.

6) Appropriate courage is noted in the new member who tried four times at the last meeting to give me his money and sign up (he finally did it by mail).

7) Bushels of courage are acknowledged for any new or prospective member who attends a second meeting after having been all but abandoned by anyone but their sponsor (Hey, we were <u>all</u> Nerds till we got to know each other!).

8) You want to listen to the program but, instead, are forced to exercise the auditory discrimination of a bat and listen to four other conversations all at the same time.

Okay again, already! So I'm being unduly harsh. I don't mean to berate or make us feel like Thiokol engineers, or any other kind of pond slime. I'd just like for all of us to pay a bit more attention to our manners. I guess that's what families do...sometimes...if they care about each other...

For the Beginner: Star Names

by Bill Washburn

Almost everyone has enjoyed looking at the sky on a dark, clear night, making up pictures and stories out of the patterns of the stars. People have been doing this for thousands of years and nearly every culture has its star pictures and legends. The star pictures are the constellations, meaning "stars-together".

Most of the major constellations that we use today came from ancient Mesopotamia by way of the Greeks. During the 17th century, astronomers carved constellations out of the remaining uncharted parts of the sky. Originally, the figures themselves make up the constellations and were shown in the atlases. The constellations had no boundaries; some stars were assigned to more than one. During the 19th century, various astronomers drew boundaries for 88 official constellations. Because the modern science of astronomy values its several thousand years of history and tradition, these boundaries were drawn so as to preserve the original star pictures as much as possible.

Many of the brighter stars have individual proper names which are corruptions of Arabic descriptions. During the "Dark Ages" it was the Islamic scholars who preserved the Greek traditions. They described the stars by their positions in the constellations. Later these descriptions were transliterated as names when they were brought back to Europe. Thus we have inherited wonderful jaw breakers for star names like Betelgeuse, Fomalhaut, Dschubba, and Zubeneschamali!

Actually, most of the proper names have fallen into disuse except for the brightest stars. It is much more convenient to sue some sort of brief designation of letters and numbers for each star.

The bright stars in each constellation are marked by a system introduced by Bayer in 1603. It uses the letters of the Greek alphabet, generally starting with alpha for the brightest, beta for the second brightest and so on; but there are notable exceptions to this rule. When the Greek alphabet was used up, in some constellations small Roman letters (a, b, c...) and then capital Roman letters (A, B, C...) were used. The star best known by its Bayer letter designation is Alpha Centauri, our nearest neighbor.

Another system of designations is the Flamsteed numbers. Within each constellation the stars are numbered from west to east. The numbers cover all but the faintest stars visible to the eye. The most famous star known by this type of designation is 61 Cygni. This star has a rapid motion across the sky relative to the background stars; it was the first star to have its distance successfully measured by trigonometric methods.

Variable stars, which change in brightness, have their own designations. Within each constellation they are assigned letters as they are discovered to be variable, beginning with R since the others were already used in the Bayer system. After the rest of the alphabet, various two-letter combinations are used, then finally the letter V with a number. Thus R Leonis was the first variable in the constellation of Leo the lion. It has a pretty, fiery-scarlet color and goes from bright to dim to bright again in al little less than a year. At its brightest it can be seen with the eye and is easy in binoculars.

For dimmer stars, various designations are used. Most are either some sort of map coordinates or the abbreviated name of a catalog plus the reference within the catalog. Thus the brightest star in the constellation of the lyre is known variously as Vega, Alpha Lyrae, 3 Lyrae, 18369+3847, HD172167, and so forth!

Since so few of the thousands of catalogued stars have names, several organizations have found a way to make easy money. They swindle the public by offering to send an "official chart showing that the star has been named for you". The chart might be official, the name is not! One such star registry recently submitted a list of 100,000 names (bilked at $25 to $35 each!) to the Library of Congress for copyright. Their copyright application was rejected. Only the International Astronomical Union can name astronomical object and it does not name stars for individuals.

If you are a newcomer to astronomy, a handy device to use when you are first learning the stars is the planisphere. This is a small circular chart of the night sky with a horizon mask that can be positioned for the current date and time. Be sure to choose one that is appropriate for your geographical latitude. There are also a number of good charts and constellation books available as well.

On your first star-gazing trip, choose a dark spot with a good view of the night sky. Position your lawn chair with the foot towards the south. Dress warmly for the night; it is easy to get a chill sitting still. Put your reference materials (and binoculars if you have them) where they are easy to reach. Allow your eyes to adjust to the dark; use a flashlight with a dark red plastic mask over it. You might want to keep a log. You -- and your companions -- can spend many enjoyable evenings learning the stars and watching the majestic movements of the heavens over the course of the year.

Preserve the Night Sky

by Tom Buchanan

The night sky is a natural resource as beautiful and inspirational as the Great Smoky Mountains, the Grand Canyon, or Niagara Falls. The Chattahoochee National Recreational Area has been preserved for Georgians to enjoy and study nature. The night sky likewise needs to be preserved. At Atlanta's latitude, astronomical twilight averages about 1hr 30min. At Villa Rica, the Milky Way begins to appear about 55 minutes after sunset, and the sky is as dark as it ever gets 1hr 15min after sunset. According to the stars I can see by naked eye from my residence in Buckhead, the Atlanta sky never gets darker than it is at Villa Rica 45 minutes after sunset. In other words, Atlantans have half-twilight all night long. The Milky Way is not visible in Atlanta. Sagittarius can barely be discerned in Atlanta, and only three stars in Ursa Minor are visible. I observe that the limiting naked eye visibility in Atlanta is about 3.8 and at Villa Rica the limiting magnitude is 6.5.

In the past, a person needed only to drive for a few minutes outside of town to see a dark sky. It is a two hour round trip to Villa Rica, which is the maximum distance for any observing during the week. Atlanta's weather results in a low percentage of nights that are useful for observing. To further

limit observing to weekends, when a longer trip can be taken, is unacceptable. Many flood lights in the Atlanta area are aimed upward, wasting energy and destroying the view of the night sky. We cannot keep running farther out. We have to make our stand and crusade against light pollution.

Cheers to Toyota West Atlanta who did not shine their powerful search lights on September 27, after I asked them on behalf of the Atlanta Astronomy Club not to operate them. They only asked to see my AAC membership card. On the previous night the observers at Villa Rica got interference from two search lights beaming all the way across the sky into Corona Borealis, about 30 degrees above the western horizon (the search light observed halfway up the eastern sky on the 27th was a different light next to I-20 west of Six Flags).

To indicate to the "dark skies committee" just how actively the AAC members observe, please send a post card or letter to Tom Buchanan or Dave Roberts with the following information:

Name (optional).
Number of observers in your observing group.
Estimated number of times in the last 12 months you attempted to observe comets, nebulae, clusters, or galaxies.
Estimated number of times in the last 12 months you attempted to observe the sun, moon, naked eye planets, or double stars.
Average mileage traveled for each observing session.
Any additional comments you wish to make.

Please help us in this survey. It will only take a few minutes of you time and will help the light pollution committee organize its efforts.

Down Pat

an editorial by Pat Frank

We at *Ad Astra* have been quite stunned by the high praise given to us at meetings by members as well as non-members. We've received comments and suggestions from both sources on what we can and/or should be doing and believe me, we take these ideas straight back to the central offices of *Ad Astra* (John Marsh's apartment), and discuss them. The most common suggestion seems to be that we should have more "basic astronomy" articles, and I'd like to say a few words about that.

First of all, addressing the members reading this, we exist for *your* benefit. If you tell us to print more articles on basic stargazing and telescope purchasing, then that's what we'll print. But consider this: a newsletter such as ours makes an *incredible* forum. We can run articles on light pollution and other important issues in astronomy. We can run commentary and letters on what people *think* about the issues. And we can run "literary" style articles on how people *feel* about astronomy.

This is my opinion. However, let me emphasize the importance of the *other* kind of articles. By running articles on telescope building, newcomers can learn who to talk to about building a telescope. By running articles on astrophotography, deep sky viewing, and other things, we encourage people to learn more about those subjects. But all of these things are readily accessible in *Sky & Telescope*, *Astronomy*, and *Telescope Making* magazines, to name a few, and in far greater depth than we have room to explore them in *Ad Astra*. So I think that our articles should stick to either personal aspects, or new ideas not seen elsewhere.

One of the things I hear most often at meetings is "how can I fix the decliscention thingamathruster on my Qantas 380 apochromatic reflector". Well, I'm no expert on Austrian telescopes, but I can say one thing for sure: if you bring your ailing 'scopes to the meetings, more than likely they will go home fixed! Of course, if you can build a triple objective reflector, you probably don't need much help!

On a much more serious note, we've decided to make known (and solicit opinions on) the following: yours truly has introduced a motion before the board that the twenty-inch telescope be dedicated in memory of the seven astronauts killed last January in the Challenger accident. The observatory itself is dedicated to Walter Barber, Jr., and of course, there have been multitudes of of dedications to the seven already, but I cannot think of a more fitting tribute to those who gave their lives in the names of science and education. I propose to place a plaque in the observatory on the first anniversary of the event. Please let us know how you feel on this.

We have, to date, received exchange newsletters (NL's) from the following clubs/organizations: *SPACE*, from the St. Petersburg Astronomy Club (SPAC), Florida; *The Local Group* of Deep Sky Observers' NL, from Bradenton, Florida; *The Meteor*, from the Escambia club in Pensacola; *News-scope*, from the Birmingham Astronomical Society; and, of course, *New Horizons*, SERAL's NL. We have sent NL's to a number of other clubs, but have yet to hear from them. All the NL's we've received so far have been very enlightening and informative. If anyone would like to read them, see me at the next meeting.

I'll close with a quote from an article in the *Journal/Constitution* on the day of the eclipse in October,"'Oh, yeah. That's right,' she said,' I forgot. And all this time I've been looking up. I'm probably blind by now.'"

H. Edwin Mitchell -- A Personal Retrospective

by Jim Brown

Events and circumstances are always changing, but frequently one has to look back and remember events and people shaping one's life. Ed Mitchell had a long and steady impact upon me. We worked together for nearly ten years until his retirement. His guidance was always felt. Deeply religious, his countenance reflected his beliefs.

My two passions are astronomy and radio. Ed gave me both. He recognized in me what I had not. He pushed me where I needed to go. He brought me to the Atlanta Astronomy Club many times before I joined. He gave me issues of radio magazines. He would say, "James, why don't you borrow my telescope" or, "James, why don't you just go ahead and get your license." I did both. Now as I look upwards or pick up a microphone, I say to myself, "Thank you, Ed."

Ed passed from us on October 10, 1986. I will miss him.

The Atlanta Astronomy Club will miss him as well.

Classified

Celestron 8" S/C telescope 6 months old. Case, tripod, 2 eyepieces,more, $1000 or best offer. Richard Lavallie 996-6003.

OBSERVER'S ALMANAC

Times of Moonrise and Moonset
All times are EST

Date	Rise	Set	Date	Rise	Set	Date	Rise	Set
11-1	06:11	17:22	11-22	22:38	12:24	12-13	15:34	05:13
11-2	07:23	17:59	11-23	23:38	12:57	12-14	16:10	06:13
11-3	08:38	18:43	11-24	-----	13:27	12-15	16:53	07:11
11-4	09:54	19:37	11-25	00:38	13:53	12-16	17:41	08:07
11-5	11:04	20:39	11-26	01:39	14:20	12-17	18:34	08:58
11-6	12:07	21:48	11-27	02:42	14:47	12-18	19:31	09:44
11-7	12:59	23:00	11-28	03:47	15:17	12-19	20:30	10:23
11-8	13:41	-----	11-29	04:56	15:51	12-20	21:30	10:58
11-9	14:16	00:10	11-30	06:10	16:31	12-21	22:29	11:28
11-10	14:46	01:16	12-1	07:27	17:20	12-22	23:28	11:55
11-11	15:13	02:20	12-2	08:42	18:20	12-23	-----	12:21
11-12	15:38	03:21	12-3	09:51	19:30	12-24	00:28	12:47
11-13	16:04	04:21	12-4	10:50	20:51	12-25	01:30	13:14
11-14	16:31	05:20	12-5	11:38	21:57	12-26	02:35	13:44
11-15	17:00	06:19	12-6	12:16	23:07	12-27	03:44	14:20
11-16	17:33	07:20	12-7	12:48	-----	12-28	04:57	15:04
11-17	18:12	08:20	12-8	13:16	00:12	12-29	06:13	15:58
11-18	18:55	09:18	12-9	13:42	01:15	12-30	07:26	17:02
11-19	19:45	10:13	12-10	14:08	02:15	12-31	08:31	18:16
11-20	20:40	11:03	12-11	14:34	03:14			
11-21	21:38	11:46	12-12	15:02	04:13			

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

LUNAR PHASES

Month	New Moon	First Qtr	Full Moon	Last Qtr
Nov.	2 01:02	8 16:11	16 07:12	24 11:50
Dec.	1 11:43	8 03:01	16 02:04	24 04:17
Dec.	30 22:10			

COORDINATES FOR COMET WILSON
(all coordinates are for 7:00 PM EST on date given)

Date	RA(2000)	Dec(2000)
Nov 15	19:53.7	-04d02
Nov 20	19:52.9	-05d12
Nov 25	19:52.6	-06d18
Nov 30	19:52.8	-07d20
Dec 05	19:53.4	-08d19

Updated Elements:
Perihelion: 1987 Apr 20.7787 ET
Perihelion distance: 1.198771 A.U.
Longitude of Ascending Node: 110.9535 degrees
Argument of Perihelion: 238.3325 degrees
Inclination: 147.1280 degrees
All elements referenced to equator and ecliptic of 1950.

POSTMASTER:
If undeliverable, please return to:
AD ASTRA
c/o Mr. Pat Frank III
465 Pine Forest Rd., N.E.
Atlanta, GA 30342

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

8801

If marked with X above, your membership has expired.
Please see *Notes for Members.*