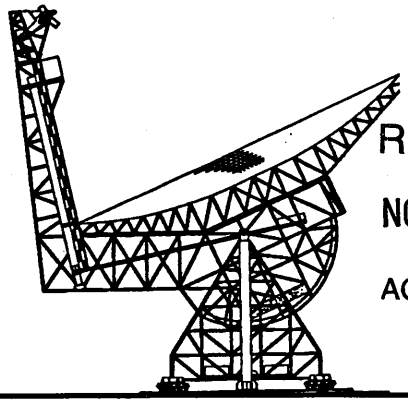


The Green Bank Tattler

You better read it, we could be talking about you!

Volume 1, Number 3 November, 1993

New 20-meter Telescope Under Construction

Frank Ghigo and Lou Macknik

Construction has begun across the road from the Tatel Telescope on a new 20-meter (65 foot) antenna. This telescope is being built by RSI for the U.S Naval Observatory's Earth Orientation program. Completion of the foundation and pedestal building is scheduled for early December of this year. The steel Components have already been made in RSI's plant in Texas and are currently being painted. The antenna parts will be shipped to Green Bank in December and January. Assembly on site is expected to start in the spring after a scheduled winter shut-down, with completion by Spetember of 1994. A dual frequency (S and X bands), dual-polarization prime focus receiver system is being built at Green Bank for installation on the new antenna.

The new 20-meter antenna is a replacement for 85-3, the 85 foot telescope near the Interferometer Control building. USNO has used 85-3 for Earth Orientation measurements for the last four years. The observations require three to five antennas, configured as a very long baseline interferometer (VLBI) array, to measure polar motion (the direction of the Earth's pole and its rate of rotation) and plate tectonics (apparent movements of the continents). Observations of very distant celestial objects, such as radio galaxies and quasars, allow small wobbles in the Earth's pole and changes in the length of the day to be measured with great accuracy. These measurements are done every week and are used to calibrate navigation and accurate timing systems. Humans tell time by the position of the Sun, which is really the rotation of the Earth. Our timing systems (clocks) are run from very stable sources, however. Because the speed of rotation of the Earth is constantly decreasing, our accurate clocks get out of synchronization with the rotation of the Earth. The difference accumulates to about one second of time every eighteen months. For that reason, the length of day is measured by various means (VLBI being one) and a "leap second" is inserted into our very accurate clocks every eighteen months or so. If this weren't done, the synchronization of the Sun (earth's rotation) with our clocks would continually deteriorate until, about four thousand years from now, the Sun would rise at about six p.m. instead of six a.m.

The observing program is a joint project of USNO and NOAA. Other antennas in the array are on the island of Kauai in Hawaii and near Fairbanks, Alaska. Observatories in Algonquin (cCanada), Wettzell (Germany), and Matera (Italy) also participate.

Although the new antenna has a smaller dish than 85-3, it will have a more accurate surface which means better efficiency at x-band. It will slew at 2 degrees per second, about 4 times faster than 85-3, and is thereby better able to move quickly between widely spaced sources. The Alt-Az mounting will allow observing at low elevations in all directions around the sky. It will be the third antenna of this particular design built by RSI. The first was built on Kauai and is part of the USNO/ NOAA array. The second was built in Norway on the island of Spitzbergen in the arctic Ocean. RSI believes that the Green Bank 20-meter will be finished on time or perhaps early, with no problems, because of the experience gained with the other two antennas. NRAO staff were in charge of acceptance tests of the Kauai antenna. Several defects were found which led to delays in in final acceptance of that antenna while those problems were fixed.

continued on page 2

Volunteers Needed for After School Science Program

Sue Ann Heatherly

It is time for Hands on Science! I would like to invite you to participate! I am looking for class leaders for the program. The commitment to the program involves participation in a 3 hour training session, as well as leading 8 sessions of the class. Right now, I'm thinking of offering a session right after Christmas.

Here is some general infromation about the program:

The Hands On Science (HOS) program was originally created by the Montgomery County PTO in Maryland. It has since grown to become a national program. The purpose of HOS is to provide an opportunity for kids to experience science in an alternative setting to the classroom. The program helps to foster attitudinal changes about "who can be scientists", to improve general science literacy and to dispel fears that science is too difficult for most people. It encourages children to observe the world in a relaxed, playful, but guided framework.

Children participating in the HOS program meet for an hour after school, each week during an 8 week session. There are 3 sessions per school year: fall, winter, spring. The program is prepared on three age/ability levels: K-1, 2-3, and 4-6 grades. Classes are formed with 10-11 children. Small classes ensure full interaction and participation between teacher and students and among the children themselves.

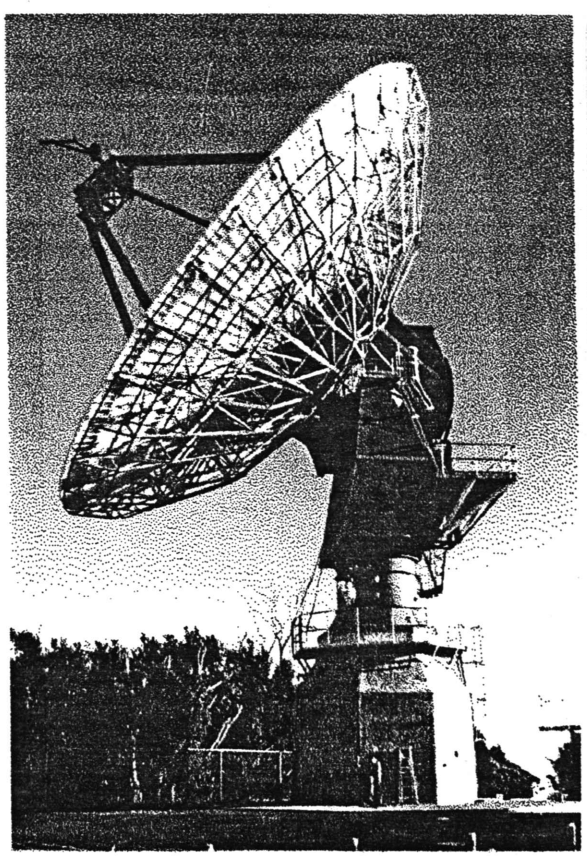
The HOS office in Maryland provides all of the materials needed to teach each class. This includes lesson guides, and kits of materials. All manipulative materials go home with the children for display, re-use and family discussion.

Leaders need no prior teaching experience to participate.

Please consider leading a HOS class this year. If you would like more information drop me a line or give me a call at x209. Thanks!

New Telescope continued from page 1:

For the construction phase of the 20-meter antenna project, Lou Macknok is the Project Manager and Len Howell is the NRAO lead for antenna construction. Mike Holstine will insure that utilities are installed and the site is properly prepared (other than the foundation and pedestal). The receiver is being built by Steve White, Jim Oliver and Bill Shank. Frank Ghigo will supervise the installation of the control computer and its interfaces with the receiver, antenna, and back-end electronics. Maintenance and operation of the telescope after installation will be our responsibility and is being planned for ahead of time. An operator (Pete Chestnut) and an elctronics technician (Herb Winchell) will attend the factory buy-off of the antenna servo system, along with other members of the construction project team. We are fortunate that there are many similarities between RSI control systems of this antenna and the GBT. those similarities may afford us a head start on portions of the GBT maintenance and operation. We look forward to the smooth installation of this new instrument.



The Antenna Behind the 140-ft

Rick Fisher

The Yagi antenna on the pole behind the 140-ft telescope is a little experiment that Mark McKinnon, Vicky Kaspi from Princeton, and I are doing at 29 MHz. At the URSI meeting in Japan one of the Japanese scientists claimed to have discovered a strong pulsing radio source in the direction of the galactic center. This object should be easily detected on recent low frequency radio maps of the sky, but nothing in that direction has been seen. For this and other reasons the discovery seems very unlikely. Nevertheless, the claim deserves a verification attempt at another observatory.

Because the observation requires very small bandwidths and reasonably good time resolution, our spectral processor is uniquely suited to the task. After we finish the conversion of this instrument to a new control computer, we will try to duplicate the Japanese experiment as closely as possible. If you don't hear us mention this experiment again, you'll know that we didn't see anything.

Over the next year or so, Mark, Bill Erickson and I would like to set up a few more low frequency antennas. These will be used to measure the intensity of Cas A below 100 MHz. An old observation of Bill's and Rick Perley's showed that Cas A had an strange increase in intensity at about 40 MHz, and this result was verified at Cambridge, England. Some recent observations of theirs indicate that Cas A still has a peculiar intensity at low frequencies. None of these results have a good explanation. That makes the experiment especially interesting.

First Grotto Meeting

December 7 at 7:00 pm
Mike Masterman's House

Anyone interested in Caving is welcome to attend. For more information, contact Mike or Sue Ann.

Site News

Richard Fleming

Fire and Rescue

The Pocahontas County Commission (PCC), Bartow, Frank, Durbin (BFD) Fire and Rescue Company, and NRAO has signed an agreement that provides emergency services to the Green Bank/Arbovale area, as well as to the NRAO site, from a new fire and rescue building across from NRAO. NRAO will donate its ambulance and two fire trucks to the county, who will in turn transfer title to BFD. BFD Fire and Rescue Department has established a sub-station building across the highway from NRAO and will be able to provide fire and rescue services to NRAO and the surrounding area.

The transfer of the emergency equipment to PCC/BFD and the assumption of emergency services by BFD for the Green Bank/Arbovale area takes effect on November 20. 1993.

On or after November 20, emergency service (fire and ambulance) will be available by dialing 9-911 from the NRAO site buildings and telescopes and 911 from off-site and from NRAO housing.

Rec. Area Improvements

Associated Universities Inc. (AUI) and your recreation association (NRAOERA) have gone together to pay for some improvements at the recreation area. The picnic shelter will be doubled in size and restrooms built as part of the picnic shelter. Sorry, no more cold, stinky outhouses. Since Sears catalogs are no longer available, we had to do something.

We also plan to repair some of the play ground equipment before next summer.

Notes from Jay:

Heeschen to give Jansky Lecture November 11

Dr. David Heeschen, former director of NRAO, will give this year's Jansky Lecture at 7PM in the Tour center on November 11. The lecture, to which the public is cordially invited, is entitled "The Development of Radio Astronomy in the United States". Dave Heeschen was one of the first employees of the NRAO and participated in the early site evaluations of Green Bank. He was director of NRAO from 1962 to 1978 and oversaw a era of rapid growth which culminated in construction of the VLA. He will describe the history of radio astronomy in the United States from the perspective of an active and influential participant. After the lecture employees and friends are invited to a reception in the cafeteria.

SETI PROJECT CANCELLED

A program to monitor the sky for possible radio signals from extraterrestrial civilizations was cancelled by the Congress a few weeks ago. The NASA-funded project, called the High Resolution Microwave Survey, would have used telescopes in Australia and Puerto Rico for the initial search, then moved to the 140 foot in 1996. The move was to take place when the GBT was completed and the 140 foot no longer used for astronomical research. The program has now been terminated.

This action will not effect the Observatory in the immediate future, for we are committed to maintaining the 140 foot telescope in good condition until it is replaced by the GBT. It is quite possible that another use will develop for the 140 foot in the next few years. It is a shame though that the NASA project was cancelled, for the search for extraterrestrial intelligenceis of great interest to the general public, and most of the questions that we get from visiting tourists are about life elsewhere in the universe.

Sunday Lunch at the Cafeteria

Every Sunday from noon until 1:30, the Cafeteria is open to NRAO employees and friends for a special luncheon. November and December menus are:

November 14: Golden Lemon Chicken

November 21: Thanksgiving Feast!! Turkey and trimmings. Lots of goodies!

November 28: Meatloaf w/ Tomato Sauce

December 5: Pork Chop w/ Apple Sauce

December 12: Pepper Steak

December 19: Baked Chicken

December 26: Country Style Steak

GROTE REBER TO VISIT GREEN BANK

Grote Reber, the pioneer radio astronomer, plans to donate to the Observatory much of the original equipment and documents from his work in the 1930s, and to visit Green Bank this coming summer to help us set up an exhibit. Reber, who built built the first version of his telescope in 1937, was at that time a young engineer who was intrigued with Karl Jansky's discovery of radio waves from space. Working largely alone, he designed and built the telescope and electronics and operated it in his backyard at Wheaton Illinois. His all-sky maps of radio emission clearly showed the Milky Way and other radio sources, and stimulated much interest among astronomers.

His telescope was moved here to the Observatory in 1959 where it now sits by the main entrance.

For the last few decades Reber has been in Tasmania, Australia, making radio astronomical observations at extremely low frequences. He writes us: "I still have most of the electronic equipment used on the dish. Also chart records, log books, scientific literature associated with the dish. All these things are down here. They should be saved for historical reasons".

We have scheduled his visit for next June. He should be here for a week or more, and perhaps we can get him to give a talk on his past, present and future work.

Recreation Association News

Childrens Christmas Party

Saturday, December 11th at 2:00 pm

NRAO Tour Center

featuring

A Christmas Carol performed by the Hampstead Players

also Santa Claus and Refreshments

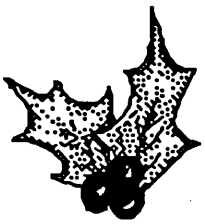
Parents: As in the past, Santa will be giving gifts to your children aged 12 and under. The NRAOERA encourages you to purchase gifts for your children (up to $30.00). We will reimburse you $15.00 when you present the gift and receipt to Steve White. Please do so by November 30, 1993. If we do not receive a gift by Nov. 30, NRAOERA will purchase a gift for your child. Check the list of children accompanying this notice. If your child is 12 or under and is not on this list, please let Sue Shears know ASAP. We don't want to forget anybody!

Christmas Bingo

*Saturday, December 18**

7:00 pm

Tour Center



20 games

$20.00 prize each game

Wassail and goodies

** note: This is a date change from the last Newsletter: Mark your calendar.*

Site Wide Meeting of the NRAO-ERA

Tuesday, Nov. 30
1:30 pm

Tour Center

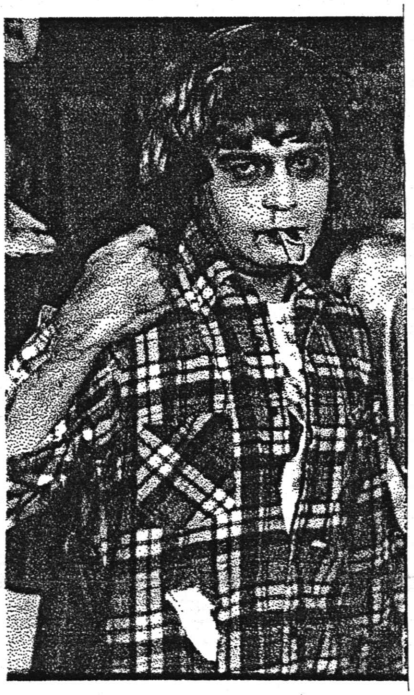
On the Agenda:

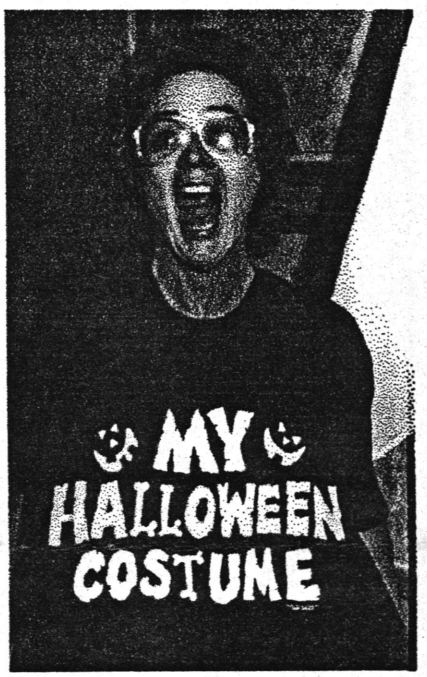
- **election of new board members.**
- **modifications to the by-laws.**
- **ways to serve you better.**

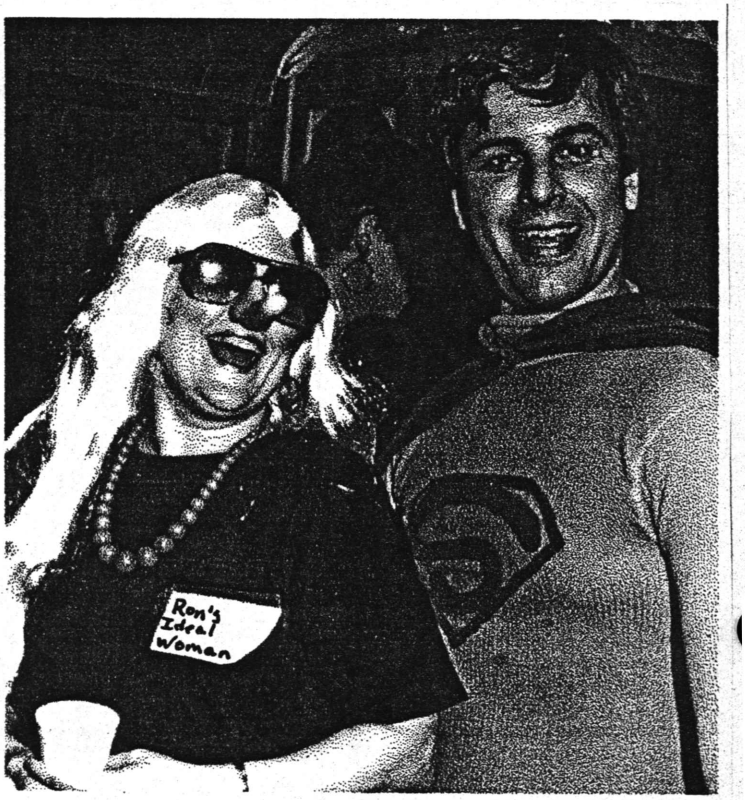
Bring your suggestions, comments and talents to this meeting.

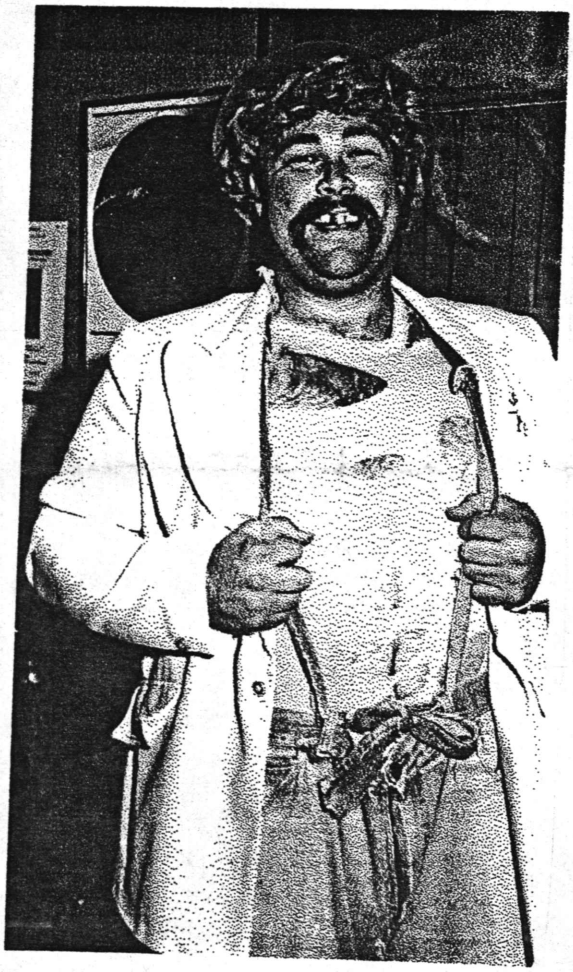
Halloween Party Photo Essay

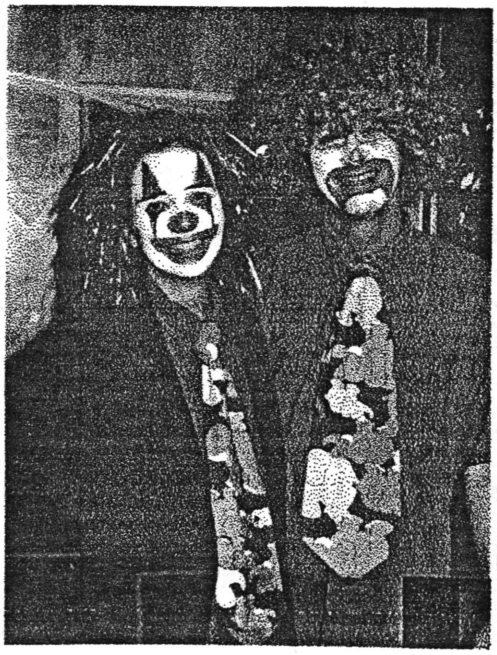
If you don't see your face among these ghouls, do not yet breathe a sigh of relief. Instead, come to the Jansky Lab, if you dare, to see the complete Rogue's Gallery. You can thank (or curse) Ron Maddalena for the photos.











A WINDOW TO THE INTERNET: Using a PC to Get On-Line.

Ray Creager

Until recently, if a PC user wished to check for mail or browse the USENET newsgroups, that user first had to log onto a SUN workstation. Without a doubt, this restricted access to the Internet to those few who are comfortable with UNIX.

Ironically, the existence of so many hardware and software networking products has been the problem: A programmer had to decide which one to support, or write many versions of the same program. To fix it, vendors of networking software came up with a standard interface, called Windows Sockets, that would allow any program that used it to run on any network package that provided it.

The existence of this standard has prompted programmers to write Windows versions of many of the useful UNIX utilities. There are now a proliferation of mailers, news readers, gopher clients etc available for Windows. I have collected some of the better ones and placed them in the 'pub/pc/MSWindows' directory of the local anonymous FTP site. To get to these, use the FTP client provided by your network package to log onto a Sun as 'anonymous' or 'ftp' (that is, use these names instead of your username). When prompted for a password, type your username. There is a short description of each of the files in this directory in a small text file called 'readme.lst', which, of course, you should should read first. Don't forget to transfer these programs to your PC in binary mode!

All of these programs require Microsoft Windows, and most require Windows Sockets. Unfortunately, not all network software packages support Windows Sockets. Those that do include Sun's PC-NFS version 5.0 and above, FTP Software's PC/TCP version 2.1 and above, Distinct's TCP/IP for Windows version 3.1, and Windows NT. If you have PC-NFS version 4.X, you will require an upgrade to use the Windows Sockets programs. It is important to note that the Windows Sockets module, called 'winsock.dll', does not work by itself. Rather, it works as a go between, allowing a windows socket compatible program to access the network software you are using. You must use the 'winsock.dll' that came with your software, as well. For example, using FTP Software's 'winsock.dll' with Sun's PC-NFS will not work!

A note to users of FTP software's PC/TCP: The Windows Sockets module that came with your software is flawed. You can get the latest, greatest version from FTP Software via anonymous FTP at 'vax.ftp.com', in the directory 'pub/winsockapi/ FTP Software'. Using binary transfer mode, download the file 'winsock.exe'. This is a self extracting archive file. Just run it to extract the file 'winsock.dll'. Replace your old 'winsock.dll' with this new one.

ed's note: Ray's extension is 303 if you need help.

The 45 Foot Antenna is Changing...

Larry D'Addario

As the OVLBI Earth Station progresses in its construction, observant visitors and staff may have noticed some changes in the appearance of the 45-foot antenna. In order to transmit and receive with the Earth station, a subreflector has been installed at the tip of the antenna. In the center, (or vertex) of the dish, the OVLBI team is installing a set of feeds and other microwave optics. The two feeds will opearate at 8 and 15 GHz. Other optics include a frequency selective mirror (to allow both bands to be used simultaneously), and an ellipsoidal mirror. Within a few weeks, all of the vetex optics will be enclosed in a small hexagonal structure with a radio-transparent roof.

Another change that might be noticed is that one of the inner panels of the main reflector will be removed to allow easire acess to the vertex area during construction. This is just a temporary measure.

Please watch for these changes - if you have any questions feel free to check with any of the OVLBI project staff: Dave Burgess, Larry D'Addario, Glen Langston, Bill Shillue or Doug Varney.

ODDS and ENDS

NRAO Baby Boom

During the last year several employees have added to their families. At this rate, the whole NRAO might be called the rabbit patch!

Baby List 1992-93:

Sue Shears: Sarah, born December 8, 1992
Pete Chestnut: Zachary, born January 12, 1993
Christine Plumley: Logan, born March 8, 1993
Brian Ellison: Micheal, born March 9, 1993
David Gordon: Shawn, born June 1, 1993
Carl Stone: Lindsay, born June 1, 1993
Glen Langston: Morgan born August 30, 1993
Brian Crouse: Emily, born October 27, 1993

Looking up.....

I know this is the National ***Radio*** Astronomy Observatory, but sometimes it is worth LOOKING up! For more info. on these events see Sky and Telescope or Astronomy Magazine. Both may be found in our Library.

Lunar Eclipse.....
On the night of November 28-29, there will be a total eclipse of the moon. This will be the last total eclipse of the Moon visible form North America until April of 1996.

Around midnight, the moon (providing it is not cloudy) should begin to appear brownish red as it passes through the Earth's shadow. The moon won't become black like the sun does during an eclipse - some sunlight is bent through Earth's atmosphere to fall on the Moon.

The eclipse progresses during several hours beginning around 11:40 p.m. Totality begins at1:00 am and lasts 48 minutes. As the Moon darkens, stars will become visible in the sky.

Meteor Shower.....
The Leonid Meteor Shower will peak on the morning (pre-dawn) of November 17th. Although you won't see as many meteors as during the Perseid shower last August, you could see a dozen or more per hour.

Tattle Tales.....

All stories in this section were told to the editor by several reliable sources. In order to verify these stories, go and ask the "victims" about them.

1. Maxine took a ride in the Paddy Wagon a few weeks ago while in Elkins. She was with a friend (who shall remain nameless since she told me the story) when this shameful event occurred.

Apparently, after a bingo game, the friend's car wouldn't start - and who should come to help but the police. They took both ladies to the station. Maxine rode in the back. I guess she didn't realize, never having been in the back of a patrol car before, that once in, you can't get out! I can just hear Maxine rattling the bars and telling those cops a thing or two : " honey child, you better let me outta here by morning. I have to go cook breakfast!"

2. Lou and Sally Macknik had fun at the NRAOERA Halloween Party but they had a better time the next Night...

All decked out in their halloween finery for the second time, Lou and Sally set out to a party in Hillsborough. They had a little car trouble though... So, they spent Saturday night, watching the football game in the home of strangers, while waiting for AAA to come get them. AAA never showed up. Maybe is was the description Lou gave them. (Like... look for two people dressed as dice.)

Lou says that for the duration of their ordeal he never took off his costume. So at least those kind folks won't recognize him on the street!!

3. Thanks to Ed Childers and Tim Weadon for responding to the false alarm at the Halloween Party. The band used a fogger which set off the alarm around 11:30!

SKY CALENDAR NOVEMBER 1993

An aid to enjoying the changing sky

Use this scale to measure angular distances between objects on diagrams below.

0° 10° 20°

Spectacular morning planets: The year's brightest and closest pairing of planets, Venus-Jupiter on Nov. 8th, is followed by Mercury's sudden surge upward past Venus on the 14th. For the rest of the month, Mercury gives us its best showing of 1993, conveniently located between the two brightest planets.

All the dawn planetary groupings on this month's calendar show views toward the ESE about 3/4 hour before sunrise. In the view on the 1st, Jupiter, just emerged from the Sun's glare, can be spotted 8° to Venus' lower left, while the 1st-magnitude star Spica lies to their right, 5° from both planets.

The view on the 3rd shows Venus passing within 4° N of Spica, while closing within 6° of Jupiter. At the same stage of twilight on each successive morning, Jupiter and Spica appear higher in the sky (because of Earth's revolution around the Sun), while Venus, approaching the Sun's far side, appears lower. On the 8th, the two brightest planets form their most compact pairing, only 0.5° apart, with Spica 7° to their upper right. Rising only a few minutes after dawn's first light, the duo will be quite a spectacle!

Watch the next four mornings (Nov. 9-12) as Venus and Jupiter spread apart, and two other bodies join the scene. On the 11th, the Moon hovers just upper right of the gathering, while binoculars may show 2nd-magnitude Mercury 5° to Venus' lower left. Mercury gets higher daily and brightens rapidly, so in a day or two it is visible to unaided eye. The 12th has the Moon, three planets, and a star all within 14°!

The 14th shows Mercury ascending past Venus, with these two inner members of our solar system passing only 3/4° apart and appearing to head in opposite directions as they orbit the Sun. Mercury is in the foreground, pulling away from its *transit across the Sun's disk* on November 5th. (That event is not visible in North America, but starts just before sunset in Hawaii.)

From the 18th to the 22nd, Mercury appears nearly halfway from Venus toward Jupiter. Mercury is highest on the 22nd, and for another week