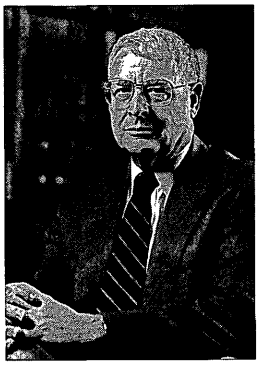
THE POINT SOURCE

Volume 6, No. 1 *Winter 2000*

AUI President Receives Honorary Degree



On the 22nd of January, Dr. Riccardo Giacconi, President of AUI, was awarded an Honorary Doctorate by the faculty of Technology and Science at the University of Uppsala in Sweden. The University, the oldest in all of Scandinavia, was founded in 1477 and has a long tradition of research. Originally organized for the training of Catholic priests, other subjects, including astronomy, were taught not long thereafter. During the 1520's teaching practically ceased at Uppsala because of conflicts within Sweden. The University was reestablished in 1595, and the first documented conferment ceremony was held on January 22, 1600. The Jubilee Conferment Ceremony in which Dr. Giacconi participated celebrated the 400th anniversary of this event.

Dr. Giacconi was honored for his research in astrophysics, particularly X-ray astronomy. As a pioneer in this field he was responsible for the first x-ray satellite mission (Uhura) and had a principal role in several successive missions, all of which led to many discoveries. He is an active observer with the current Chandra mission.

The University of Uppsala has evolved over time to gain international acclaim for its research and education programs. Its faculty has received eight Nobel prizes since 1911, and the University currently claims more than 36,000 students. "I am delighted to be honored by this distinguished university," Dr. Giacconi said.

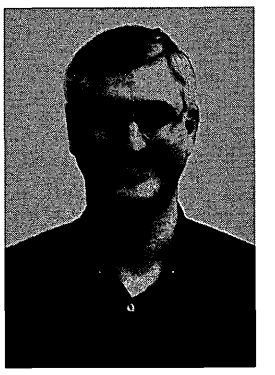
Commemorative Stamp to Feature VLA

The U.S. Postal Service has announced a souvenir sheet of six commemorative stamps, "Space Achievement and Exploration," to be issued next year. One of the stamps will feature the Very Large Array. The other observatories in the set are: Hubble Space Telescope, Keck Observatory, Cerro Tololo Observatory, Mt. Wilson Observatory, and Arecibo Observatory. The 60¢ stamps cover the first class international rate for the first fi ounce. The set was developed with assistance from the National Air and Space Museum. The first day of issue will be July 10 at the World Stamp Expo 2000 in Anaheim, California. The issuance of these commemorative stamps is the successful culmination of the efforts of many individuals over many years to have ground based astronomical telescopes recognized in a U.S. stamp series.

P. A. Vanden Bout

ALMA Project: Long Strides in a Leap Year

The ALMA Project is sharing in the full measure of excitement highlighted by the y2k opening of a new century. At the NRAO, ALMA has a new Project Manager and a signed contract for the first of what we hope will be 64 ALMA antennas. In an international setting, the US and European groups are preparing to use 2000 to negotiate ALMA construction and operations.



Dr. Marc D. Rafal is the new NRAO Project Manager for ALMA. Marc comes to the NRAO from the Space Telescope Science Institute where he was Project Manager and Systems Engineer assigned to the Wide Field Camera Three Project for Hubble Space Telescope. This is a project being done in concert by 3 NASA centers and two industrial contractors and thus it has many similarities to the very distributed ALMA Project. Prior to that, Marc had industrial experience with PMI, Inc., with Avnet Development Laboratories, and with Ledco, Inc. Marc is a graduate of Duke University with a Ph.D in Electrical Engineering, later supplemented with a M.S. in Technical Management from the Johns Hopkins University. We are very fortunate to have a person with Marc's experience now guiding the ALMA Project at the NRAO.

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The National Radio Astronomy Observatory is a facility of the National Science Foundation operated under cooperative agreement by Associated Universities, Inc.

Marc formally joined the NRAO on February 7th. Just two weeks later, on February 22nd, the contract was signed for the ALMA prototype antenna. While it would be flattering to conclude from this that "Marc sure works fast!", in fact the credit for the successful antenna contracting goes to the ALMA antenna group–Peter Napier, Jeff Kingsley, Jingquan Cheng and Victor Gasho–who were very ably assisted by Bill Porter and Carolyn White, both from the ALMA administrative group, and by Patricia Smiley from NRAO-graphics.

The ALMA prototype antenna is 12 meters in diameter that is of a design conceptually similar to the VLA antennas, although of course it is much smaller. The ALMA antenna will have a very precisely shaped surface that will maintain its figure by means of a back structure constructed from carbon fiber reinforced plastic (CFRP). The CFRP will not expand or contract appreciably as the temperature changes. The requirement for surface accuracy is that the surface be within 20 micro-meters of the shape specified by the engineers. The antenna will also point exceptionally well–the specification is six-tenths of an arcsecond when the antenna is exposed to the environment of the Chile site.

The ALMA prototype will be constructed by Vertex Antenna Systems, LLC. Vertex is a company formed from the merger of Vertex Communications of Kilgore, TX, TIW Inc. of Santa Clara, CA and the antenna design group formally part of the German firm Krupp. Together, these divisions built many of the millimeter and submillimeter telescopes operational around the world including the IRAM antennas, the Berkeley-Illinois-Maryland Association antennas, the Heinrich Herty Telescope and the Kosma telescope.

In November 2001 the ALMA prototype antenna will be erected at the VLA site. A second ALMA prototype antenna, this one procured by the European ALMA Project will also be erected at the VLA at the same time as the US prototype. The Europeans have contracted with an Italian firm, European Industrial Engineering, for their ALMA antenna prototype. Once accepted by the Project, the two antennas will be competitively evaluated by a joint US-European technical team. The intention is for the ALMA Project to select the superior antenna and contract for a production run of 64 such antennas for the array in Chile.

Finally, the year 2000 is also the year that the U.S. and European groups will negotiate an agreement for construction and operation of ALMA. As input to this process the funding agencies on both sides of the Atlantic require knowledge of the ALMA scientific requirements, the technical scope of the joint Project and the Project cost. Al Wootten, as the U.S. Project Scientist has been working with his European counterparts through the ALMA Science Advisory Committee to establish an agreed set of science requirements; Darrel Emerson and Larry D'Addario have worked to translate those requirements into a technical *baseline* for the array that was proposed to the European group in February; and Richard Simon has constructed an extremely thorough framework into which costs for producing all elements of the technical baseline are being accumulated. We anticipate with some confidence that the culmination of this enormous effort will be an ALMA Project that agency officials will agree to fund with confidence and enthusiasm. If so, it will have been a very good year indeed, and a start full of hope for the NRAO in the new century.

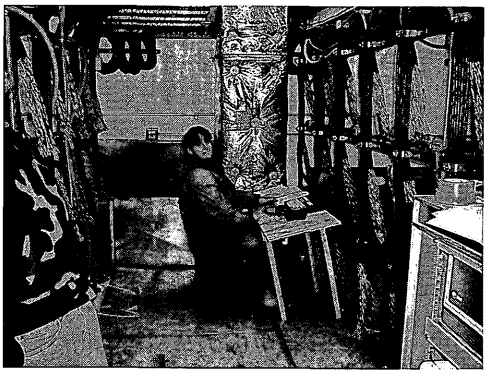
R. L. Brown

Getting Wired, Part II

COMSAT and the NRAO are continuing the actuator cabling work begun back in the summer of 1998. In an earlier Point Source article (Volume 5, No. 1), Rich Lacasse described the running of the actuator cables into the Actuator Room on the Green Bank Telescope. Now, we have the daunting task of testing each cable and actuator (for a total of 2209).

The work started on January 19, 2000 with five members of the Electronics Division testing cables in the room and four COMSAT iron workers connecting the cables to the actuators on the dish. Those Green Bank employees now participating in the cable testing are Thomas Bailey, Brian Ellison, Mike Fowler, Rich Lacasse, J. D. Nelson, Dwayne Schiebel, Amy Shelton and Jerry Turner. On an average day, we are testing about 70 actuators per day; our record for one day is 102 actuators checked.

The work in the room is tricky for the NRAO folks since the floor of the room is inclined at a 12 degree angle. Luckily our group is well suited to working in the Actuator Room since each of us has one short leg from our time running actuator cables into the Actuator Room in 1998! The most common malfunction we see is moisture in the connectors; despite covering the connectors with a rubber boot and electrical tape, moisture has entered the connectors. Now the NRAO and COMSAT are brainstorming to find the most efficient method of removing the moisture. So far we've tried spraying the connectors with nitrogen gas, heating the connectors with heat guns, laying the connectors in the sun and sucking out the moisture using a specially made vacuum–but none seem to have the desired effect. With some dry spring weather approaching we are hoping for natural drying to take place.



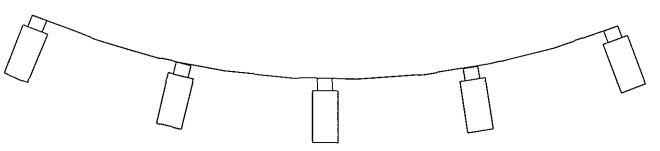
Amy Shelton testing cables.

Amy Shelton

GBT: Setting of the Panels; Another Critical Step

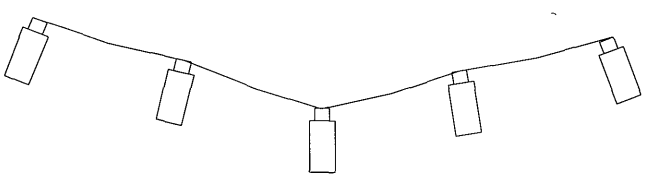
In the last issue of the Point Source, Fred Schwab addressed the installation of the surface panels on the GBT. Specifically, about the how the panels were made and installed, the number of panels, their composition, size, surface accuracy, and the paint thickness. This article will address the precision installation that must be achieved to meet the extremely high demands to be placed on the Green Bank telescope.

Here is the problem. If all panels were perfectly manufactured and the corners at each actuator (the computer directed motorized leveling device) were perfectly aligned relative to each other, then all we would need to do is move the supporting actuators up or down by the required amount and we would have a perfect parabolic dish. Unfortunately, all the panels are not manufactured perfectly. To overcome this obstacle, Dave Parker and I have coordinated a broad number of NRAO personnel and material resources to design and produce the GBT panel measurement and setting tools. These unique tools give GBT corner setting crews the ability to measure and set each panel corner to precise specifications. As a secondary result, this tool and the procedures developed for its use have added cost savings benefits, in reducing the average time required to set each corner and reducing paneltopanel gap errors. To follow is an explanation of these unique tools and the efforts of the team members during this phase of the GBT construction.



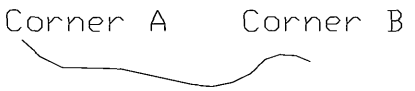
4 Panels on 5 aligned actuators.

This figure illustrates the side view of 4 panels of a perfect parabolic dish.



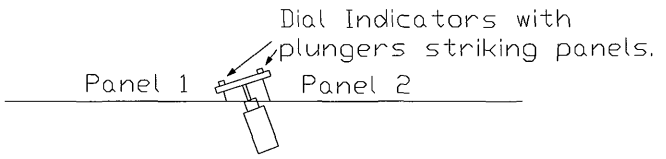
4 Panels on 5 unaligned actuators

Since the actuators, which these panels are attached to, were not perfectly aligned before the panels were installed, we get the effect shown above. (Later in the program the surface will be surveyed using photogrammetry, holography, and metrology laser tools and techniques, and the actuators will be moved to give us a more perfect parabolic dish.)



Real Panel overlaid on ideal panel.

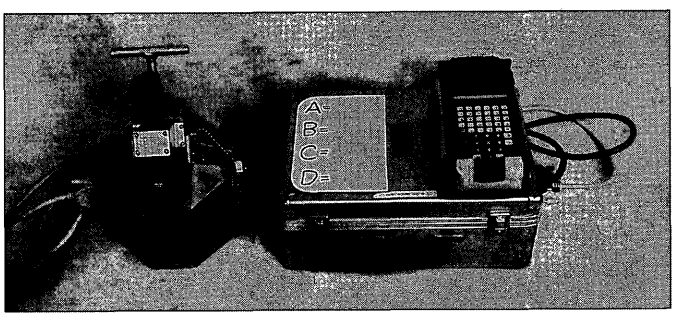
The Illustration above shows an ideal panel behind a real panel. To install the real panel on the telescope, corner A would need to be offset by a small but precise amount upwards from the reference point and corner B would need to be offset by a small but precise amount downwards from the reference point. By precise we mean to an accuracy of better than ± 0.002".



Supporting actuator shown mounted
1 degree out of alignment (exaggerated).

Understanding that the corners cannot simply be aligned to ± 0.002", because of manufacturing flaws, one cannot simply install a tool on the actuator and measure all four corners and adjust accordingly. If the actuator is not exactly perpendicular to the panels then the tool will not be able to measure the corners, to this precision, relative to each other. The actual actuators are installed at ± 0.2 degrees relative to their perfect orientation. An orientation error of 0.1 degrees would cause our measurements to be off by over 0.008 inches!

The tools that we have developed are presently being used to measure and set panel corners to ± 0.002". The measurement tool is pictured in Photo 1 and the setting tool is pictured in Photo 2.



The measurement tool is comprised of 4 dial indicators and 2 inclinometers, mounted on a precision fi" stainless steel base, an electronics suitcase, and a weatherproof handheld computer. This tool is able to measure the four corners attached to an actuator to better than 0.001" over ± 25-degree inclinations relative to the local gravity plane.
Once the corner positions have been measured we need the ability to adjust them swiftly and accurately. The setting tool is designed to allow an ironworker to loosen, adjust, and re-tighten the hardware from the topside of the dish. (Most, if not all, other radio telescopes in the world require this kind of adjustment to be made from the back of the

(continued page 4)

dish.) We have been successful in standing on the panels, loosening the corners, adjusting them, and re-tightening them to within +/- 0.002" for four corners (one actuator) in less than 10 minutes.

One other problem, which we have had to solve, is maintaining the proper gaps between the panels. Depending upon the temperature of the aluminum panels and the steel backup structure, the gap specification ranges from 0.032" to 0.125". Since the panels are installed on a parabolic backup structure, some of the panels are installed at angles up to over 20 degrees. Many panels were also installed "under pressure" laterally to obtain acceptable gaps. When the panel corners are loosened to adjust them vertically there is lateral movement of the panel and/or anchoring stud. A solution was found where all panels under adjustment are gapped with precision wedges at each corner, to coerce the panel gaps to either acceptable values or "better" values.

At the beginning of the workday NRAO will calibrate the measurement tool to better than ± 0.0005" on a level surface. The calibrated tools are then "flown" up to the surface on a crane. One iron worker per crew will be responsible for installing the precision wedges to gap the panels. The other iron worker will install the measurement tool on an actuator and align it to the vertex of the GBT. The NRAO person enters the panel corner barcodes and actuator number into the computer and inspects for proper installation of the measurement tool. Once this is verified the NRAO person tells the iron worker how much to adjust a particular corner. After the corner is adjusted the iron worker steps off the panels being adjusted and the NRAO person reads the corner positions again. This procedure is continued until all corners on the actuator are set to ± 0.002". (Remember that the computer adds the appropriate offsets to set the panels to the mathematical best-fit position.) When each corner is within specification the NRAO person freezes the data, inspects the measurement tool setup, verifying proper setup, and then initials the data. The crew then moves on to the next actuator.

When then corners are accepted as calibrated, the NRAO measurement computer stores all the relevant data associated with that measurement into a dated file. If any one parameter later were to be found faulty then the calculations could be redone in the office if necessary. The year, month, day, hour, minute, second, and NRAO operator name, with necessary comments for that set of adjustments, are also stored in each file.

In late 1999 about 400 corners on 100 actuators were adjusted to within ± 0.002". The remaining corners will be set in the spring of 2000 with three crews. Each crew will consist of two employees from the telescope contractor and one NRAO employee.

I would like to extend thanks to the many people involved in making this project a success. John Payne originally conceived the measurement tool, Dave Seaman originally conceived the adjustment tool, the Metrology group who did the prototype measurement tool, Dave Parker and Fred Schwab who were very helpful with the mathematics, and the Machine Shop which did the precision work.

Tim Weadon

Diversity 2000

From the Director

Challenged by on-going budget constraints, NRAO employees continue to show creativity and resourcefulness in finding more efficient means to accomplish the tasks at hand. One of the factors contributing to this success is the diversity of our workforce. Diversity at NRAO exists in our functional roles within the organization, the clients that we serve, length of service, the geographic locations from which we come, educational background, age, sex, race, gender, and ethnicity. We value the diversity of our employees and the unique perspective each brings to NRAO, and by doing so we can all demonstrate our commitment to valuing the contributions of all employees.

During the past year NRAO began several initiatives designed to enhance the benefits of our diversity. The Personnel Office has redrafted NRAO's policy on Non-Discrimination and Harassment. We have begun to analyze our workforce diversity by reviewing our policies, procedures, and their relationship to affirmative action employment. We continue to examine work life issues that address today's family needs and values, such as telecommuting and alternative work schedules where practical. All of NRAO's employment policies are available for review in the libraries at each site, or by contacting your supervisor or the Personnel Office. To profit from the uniqueness of our workforce we encourage our employees, clients, and friends to share with us employment candidates that will add qualities that enhance our diversity and ultimately NRAO's value.

Sincerely,

Paul A. Vanden Bout

Eye On Safety

Fire Prevention and You

The best defense against fire is to prevent it from starting in the first place. Because of the deadly danger of fire, it is to your benefit to know how to size up a fire and how to respond in a fire emergency.

The importance of good housekeeping ties closely to fire prevention. As debris or flammable materials accumulate, the risk of starting a fire increases. Fire prevention is part of everybody's job. Everyone must help to keep work areas clutter-free and safe from fire hazards.

You also need to know what to do in the case of a fire emergency. If a fire starts, think first of your safety and the safety of others. Alert the fire department. Try to put out the fire only if you have been trained to use extinguishers, and the fire is small and tame enough to be extinguished by a hand-held extinguisher.

When the fire is out of control, the combustible material is unknown, or you have not been trained in the proper use of extinguishers, leave the fire fighting to professionals with the proper equipment. In this case, the responsible action is to remain calm, assess the extent of the blaze, and call the fire department to contain or extinguish the blaze. Know the location of fire alarms and extinguishers. Know your nearest fire exit and proceed to it in an orderly fashion.

If you are trapped inside a building that is in flames, shut all doors within your reach. If you can make your way to an exit, get to your hands and knees and crawl. This is important because smoke and heat rise rapidly and you will inhale less smoke near the floor. Once outside, get away from the direction of the flames and smoke to avoid inhaling smoke and fumes. In any fire situation inside a building, anything you can use – any type of shield, heavy blankets or tarps – will help you get out of the building with less risk of injury. A wet cloth or handkerchief over your nose will help cut down the smoke intake.

Prevention is the key to eliminating the hazards of any kind of fire where you work. Preparation is the key to controlling the consequences of a fire:

- Keep work areas clean and clutter-free.

- Know how to handle and store chemicals.

- Know what you are expected to do in case of a fire emergency.

- Call for professional help immediately. Don't let a fire get out of control.

- Know what chemicals you work with – you might have to advise fire fighters on the scene of a chemical fire concerning the type of hazardous substances involved.

Jody Bolyard

Year 2000 Ushered In; Y2K Problems Ushered Out

We said a fond farewell to 1999 as several dedicated NRAO employees quietly ushered in the Year 2000 at the office New Year's evening. While many of us were toasting the Year, they were on call to ensure that NRAO systems were working correctly for the rest of us. NRAO Director, Dr. Vanden Bout, summed it up well in his Y2K memorandum to staff for a job well done saying, "The timely electronic deposit of [our] paychecks for January is proof enough for me. So I would like to thank everyone who contributed to the Y2K effort at the Observatory." For a more complete review of Y2K results visit the Early 2000 results page at:

http://www.cv.nrao.edu/y2k/internal/y2k1999q4.htm.

There was much to celebrate as the calendar — and our computers — rolled over to 2000. Many NRAO employees participated in Observatory-wide inventories, investigations and tests of our systems and those of our business partners to guarantee a successful transition. Literally hundreds of man-hours and untold thousands of dollars were invested in this project. Due to their diligence, we entered the New Year with confidence. Alan Bridle reported, " At one time or another, I think everyone in the computer division did some remediation, investigative work, or both."

To demonstrate the complexity of the Y2K issue, here are some of the major areas of focus in 1999. The Fiscal division (the accounting and payroll group to the layman) had to test AS/400 system. The VLBA, VLA, and the GB interferometer staff were involved in the complex systems and subsystems of those interconnected telescopes. Computing staff at each site had to inventory all of the computer hardware and software throughout the organization and certify Y2k compliance. This activity was one of the most time consuming as so many machines and programs had to be upgraded or replaced. Even divisions that wouldn't normally be thought to be Y2K sensitive such as the Personnel office had to certify that business partners were prepared for the transition. Not much could be worse than to have employee insurance and retirement benefit systems go down.

Once all of the above work was done, it came time to test our success. Alan Bridle said, " [We] basically rang (tested) all of the alarm bells in all of the divisions, then coordinated all of this work and reported it to the AUI auditors, insurers, and the NSF." After that, the only thing left to do was let the clock roll. Several staff members worked New Year's eve to assure the Intranet connection was main-

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tained, that there was no power-up or power-down problems, and to protect against any hacker attacks.

It can be questioned by the skeptics now as to whether all of the time and effort was necessary. But not those that put so much of the valuable time in to NRAO's protection. Can you imagine if we had overlooked just one of the many critical functions at NRAO. Thank heaven we will never know and thank you for a job well done.

Roy Norville

Scoping the Sites . . .

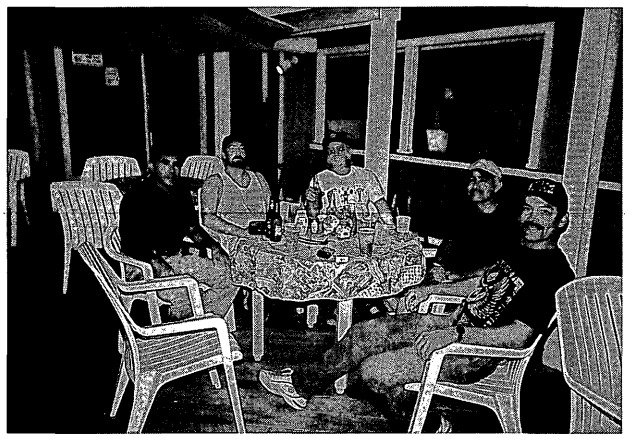
Wrong Way Lenny

The weather report on November 12, 1999, said something about a tropical storm off the coast of Venezuela. "Hmm, pretty late in the season for a hurricane," Paul Rhodes thought to himself. Paul is in charge of Field Operations for the 10 VLBA antenna stations. In any case, the VLBA antenna station on St. Croix was well east of the storm and these storms "never go east." The next day the storm had increased to a modest Category 1 hurricane strength, but the Hurricane Forecasting Center in Miami reported the storm was not expected to amount to anything and would decrease in strength. Indeed the storm, now dubbed Hurricane Lenny, dropped back to a tropical storm for awhile; but the cell of whirling winds ominously continued its easterly direction toward "America's Paradise" as the license plates proclaim on the small semi-arid island of St. Croix in the American Virgin Islands.

The VLBA antennae are designed to withstand 150 mph winds when stowed pointed straight up. At St. Croix, the telescope has survived at least eight hurricanes so far. The "eye" of three storms has passed over the St. Croix VLBA Station since 1993, when construction was completed. In 1989, Hurricane Hugo wiped the antenna site clean, but fortunately the antenna was not yet installed and all that was lost was a few pieces of plywood and some survey markers.

Back to Lenny, on December 16th, the wrong-way hurricane was back up to Category 1, and still headed east, but still no big deal. Just in case, John Williams and Herb Winchell, station technicians at St. Croix, strung up the rig that holds the subreflector in place during storms, performed the hurricane shutdown procedure, and left work to prepare their homes for the coming storm. Power was left on so that lost observing time would be minimized. The Hurricane Center in Miami still predicted a weak storm passing west of St. Croix. Suddenly, the storm began to increase in size. Like Isaac Bruce of the St. Louis Rams, the storm broke through the weather forecasters' defenses, churned into a maxi Category 4 storm with winds of 130 mph and raced toward the goal–St. Croix. Authorities called a twenty four hour curfew on the island so the Site Technicians could not return to the station to finish the shutdown procedures. Paul Rhodes and Peter Napier anxiously watched the antenna weather station as the storm approached. The anemometer reached 99.9+ MPH but that is as high as the monitor system will report; then the generator power and/or telephone lines failed.

The St. Croix antenna sits only a few hundred yards from the beach but is on the north side of the east end of the island. To the south are low hills which provide some protection. Otherwise, the damage could have been more extensive when Lenny's "eye" passed, yes, over the eastern end of the island. Part of the roof was blown off the station building, debris damaged the radiator on the electrical generator, but the antenna remained intact.



The VLBA Crew (left to right): R. Molina, P. Sanchez, T. Fros R. Guittierez, J. Rodriguez

Many power lines were knocked down and without the generator the station had no power. The all-critical maser which provides the time and extremely stable frequencies for the site had been previously shutdown. Without power for the air conditioners, outside air, like the "Andromeda strain" virus, began a quiet, inexorable invasion into the station building and the electronic equipment. The salty sea air carried water droplets which condensed on circuit boards in the lower part of the D-Rack leaving a white deposit. It was as if the Jurassic Park electric fence had failed and the tyrannosaurs were free to destroy everything man-made. It took a week to get repair parts for the generator and another 3 days before power and air-conditioning was restored.

But the salty deposit on the circuit boards continued its quiet destruction. On January 6th, a baseband converter (BBC) module failed and Herb Winchell returned it to Paul Harden at the AOC for repair. Paul Harden, the LO/IF technician in charge of BBC repairs, found a hole burned through a PC board in the enormously complicated and expensive module. Apparently, the salt had created a conductive path between resistors and current through the short had burned the board. Alarmed, Paul called He who inspected all other modules. Several modules in the bottom three bins of the D-Rack were found to have the residue. Two of the modules failed just from the inspection.

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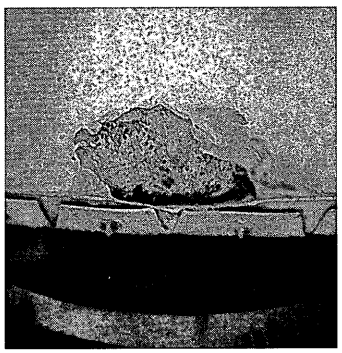
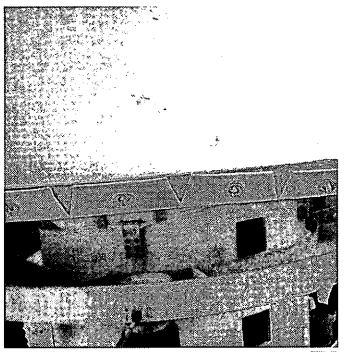
Paul Harden raced to send additional modules to the station and he wondered what other damage would surface. A chemical analysis at NM Tech revealed sulfides along with the salt; sulfides accelerate corrosion. Terry Cotter, Group Leader for LO/IF, remembering how the military always uses a "conformal" protective coating for electronic boards exposed to harsh conditions, has ordered materials to similarly coat the St.Croix modules.





Left photo shows damaged area on subreflector. Right image shows repaired subreflector.

During the ES Division maintenance visit the end of January, the crew led by Jon Thunborg and Ramon Gutierrez fixed the radiator on the generator, but discovered an 8" gash in the subreflector. The damage, now repaired with Bondo, is thought to have been caused by Lenny. The crew also replaced a rubber hardstop on the subreflector "FRM" assembly because the rubber was soft. Ramon says he has seen rubber get gooey over night in the St. Croix air. Chemists tell us only sulfides will do that; sound familiar? Have we told you about the volcano? John Williams, Herb Winchell, and Paul Rhodes vow never to trust the weather forecasts again and next time to follow the Hurricane Plan to the letter by shutting down the site completely when a storm is anywhere within the prescribed distance limits.

Paul Rhodes and Clint Janes

Catching the Wave Public Education Program

In Fall 1998, the NRAO received a grant from NSF Informal Science Program! Over the next three years, our project, called Catching the Wave, will result in interactive exhibits, and programs for K-12 students and the general public. We are excited to have the opportunity to enhance the public's experience while visiting the NRAO in Green Bank.

Catching the Wave, the theme for the new exhibition, will contain interactive exhibits organized around five central questions: What are radio waves?, How do we detect radio waves?, What can radio astronomy tell us about the Universe?, What is going on at the telescopes now?, and what is the role of technology in science? For a look at some of our exhibit ideas go to the web site: http://www.gb.nrao.edu/~sheather/excerp.html. Keep in mind that these exhibit concepts are subject to change and many new exhibit ideas have been discussed with our exhibit designer, John Moser of Moser Productions. We expect to prototype at least part of the Catching the Wave exhibition during the 2000 tour season, with fabrication and installation to occur in 2001.

In addition to providing an entertaining learning experience for the public, Catching the Wave programs will focus on K-12 students in West Virginia, and surrounding states. We will develop programs—field trip experiences—that meet national science education standards and state-based science learning goals. Science-specific problem-solving scenarios are being created in which small groups of students investigate questions much as the professionals at the Observatory would. For example, one group of students might assume the role of an NRAO interference technician, discovering sources of RFI at the Observatory and reporting their results to other students. This approach is in sharp contrast with that offered at the typical science museum where students bounce from one exhibit to the next, learning virtually nothing.

In concert with Catching the Wave, we are in the process of designing a new science education center. The new facility will include an exhibit hall, auditorium and classrooms, and a rooftop optical observatory.

Sue Ann Heatherly

AOC Staffer and His Rose Recognized

When most people think of New Mexico, they have images of wide open spaces, barren earth and scrub grasses. Nothing could be farther from the truth according to Mack Stephenson and his friends. Mack sees roses, roses and more roses. That's right, Mack is nationally recognized for his love of and propensity for growing roses. Last November (1999) The American Rose Society selected Mack's "Nevada" as Rose of the Month.

"I'd estimate that I currently have three hundred and thirty different varieties of roses—although the number I've grown is significantly higher." Mack's current love is for the modern Hybrid Teas and Floribundas, but his interest is evolving toward Old Garden Roses and Species roses, the predecessors of the ones most often seen today. The Nevada rose is one such rose.

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We don't have a local Rose Society in Socorro, so through my home page, Socorro Roses http://www.aoc.nrao.edu/~mstephen/ros99.htm I display my passion. "I've met rosarians from all over the world and become good friends with the famous and non-famous alike. My passion for roses hasn't waned since the beginning, and I've never believed for a moment they were 'difficult'. Anyone can grow roses. If you can grow tomatoes, you can grow roses. If you can't grow tomatoes, you got a problem.

Mack Stephenson

AOC - NMPRA Recognizes New Board Members

Dining and dancing, with a little candid camera on the side, were the favored activities at the annual New Mexico Personnel Recreation Association sponsored holiday party. One hundred seventy-five employees and guests gathered at the Rancher's Steak-House in Socorro, on December 11, 1999, for an evening highlighted by hors d'oeuvres, cocktails, dinner, and dancing to the music of Dee-Jay Patrick Murillo. To add to the fun, the NMPRA provided one-use cameras for each table to capture those special moments. Board members for 1999 were: Rob Long, Peggy Perley, Emma Rice, Clint Janes, Linda Majors, Ken Lakies, and Jim Ulvestad. For year 2000, Rob, Peggy, and Jim will be replaced by Mary Ellen Chavez, Richard Murillo, and Allen Lewis. Based on the pictures that we can't show you, it can be said that the NRAO-NM employees enthusiastically followed the advice of the song to 'party like it's 1999'!

Picture Caption: Kevin Ryan has the "I can't believe you said that" expression as Bruce Rowen and others celebrate at the annual New Mexico Personnel Recreation Association holiday party.

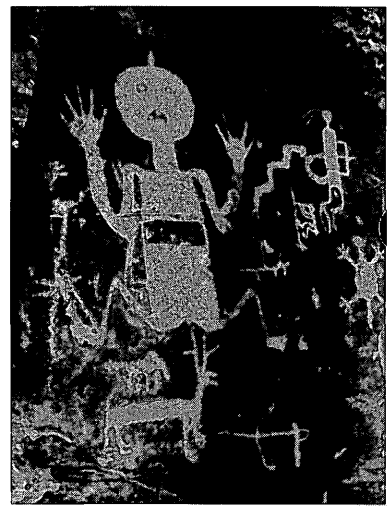
Peggy Perley

ROCK ART AMONG U.S.

For the last 20 years it's been a hobby of mine, searching for and documenting rock art of the Southwest. Found mainly in the Four Corner states, rock art is in almost every state in America. Its' proliferation in this area is due in big part by the abundance of two prime ingredients; the first being, the perfect rock! Sandstone and basalt is almost everywhere. This geology undergoes a process called patination, which is due to microscopic organisms growing on the sunbaked rock after rainshowers. The patina takes many thousands of years to grow, but a little hammering, abrading, or incising can easily expose the lighter rock surface beneath. As for the art, made by native peopl s, these designs are called petroglyphs. Painted images, also found here in great quantity, are named pictographs.

Archaeology has determined that painted images found in Utah are about 4500 years old. Pictographs such as these, have only survived the harsh elements by being sheltered in alcoves and overhangs. Petroglyphs, which are inherently more hardy, can be even older; some say as much as 10,000 years old! The tradition of art migrated the continents as humans came across the temporary land bridges from Asia to Alaska in several migrations. In Europe, Australia and Africa, art exceeds 30,000 years!

Here in the West, rock art varies from poor to exquisite, but all are valuable. Rock art is identified by regional styles and classified by the time it was thought to have been created. This art can never be fully understood because it is not a written language, as compared to the Mayan glyphs or Egyptian hieroglyphics. And since many panels are done over countless generations, it's usually not a single picture story either. The prehistoric peoples of this area, were slowly assimilated into the Zuni and Hopi Pueblos, and hence their disappearance around 1350 A.D. Thus the explanation of the individual designs were lost when the verbal record ended, with the artist who made them.



In the 1970's, a tourist at Petrified Forest noticed an interesting shaft of light crossing a petroglyph of a spiral, on the day of Summer Solstice. Since then, Archaeoastronomy has become a major field of rock art research. Hundreds of sites have since been documented showing celestial events. These prehistoric cultures had to know the changing seasons accurately. The Pueblos of today, have a ceremony for every month of the year.

Rock art is to be enjoyed for it's aesthetic beauty and admired for it's ageless survival. Most sites are remote and unprotected so the visitor is responsible for saving these areas. These sites are like the shrines in our churches or our graveyards and must be protected. Visit them in respect and enjoy them for their beauty and historical teachings. Rock art is protected under the Antiquities Act of 1979.

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For more information, visit your local library for many publications on this subject. Polly Schafsma's book, Rock Art of the Southwest, is a good beginning. There are many sites close to Tucson for visitors to enjoy this relatively new aspect of archaeology.

Bill Hale

The Book Club

Many have heard of the various clubs NRAO employees participate in. Did you know there is a Book Club? Though it does not have an official name, "The Book Club", in Green Bank, WV, is presently comprised of 25 members and meets every third Wednesday of each month from October through May. The club has been meeting faithfully since 1986. The meetings are held in private homes and refreshments are voluntarily provided by the members. The books to be critiqued, the discussion leaders, and the meeting places are decided at the first meeting held in September. Themes may also be introduced in to the club meeting, such as a "Poetry Night", or "Children's Night", and local youth are invited in to take part.

The majority of members are NRAO affiliated, although there are some local members. The meetings begin at 7:00 p.m. and, depending on the intensity of the discussion, usually last until 10:00 p.m. We hope that highlighting groups gathering such as this club will stimulate opportunities for NRAO employees and families at all of our sites. Some of the books discussed this year include the following:

"High Tide in Tucson" by Barbara Kingsolver
"Maestro" by Peter Goldsworthy
"Two Wheels - A Cycling Murder Mystery" by Greg Moody
"A Lesson Before Dying" by Ernest J. Gaines
"Endurance - Shackleton's Incredible Voyage" by Alfred Lansing
"There's Nothing in the Middle of the Road but Yellow Stripes and Dead Armadillos" by Jim Hightower

Shirley Curry

Employee Investment Clubs

When was the last time you made money in the stock market? OK, that's not a fair question. Today, anyone with a retirement investment plan is probably playing the market. But when was the last time you let your entrepreneurial spirit take charge? That is what NRAO's two investment clubs are all about. If you have any curiosity about personal investing but have always been afraid to get started, or just don't want to go it alone, you are invited to attend one of the regular club meetings at the Charlottesville or Socorro sites.

The purpose of the clubs is simple; bring together a group of non-professional investors to learn and share ideas about a variety of investment options. The ultimate goal, to make group decisions based on individual equity research, and then reap the benefits. The results then become numerous. Members develop non-work relationships, expand their investing knowledge, and hopefully make some money.

The Charlottesville club, the "Interstellar Investment Club," was formed with fourteen members, many of which have moved on to other NRAO locations or elsewhere. Some of the relocated members have left their equity stake in the club for continued investment. Because the club is always accepting new members, the "IIC: continues with about the same number of members but many new faces. Annual "dues" are usually kept low so that memberships are available to as many folks as are interested. For instance, the IIC's dues are a mer $100 a year. However, a member can invest more than the minimum. The Socorro club is called " Small Potatoes Investment Club of Socorro". SPUDS is a very young club, having formed only last year, but its members have made some great equity plays.

As the Secretary of the Charlottesville IIC, I have had a unique opportunity to interact with folks from many different work areas. I have been able to know these folks through a common interest, not just our jobs. I really enjoy the annual stock game in the IIC, especially when my stock picks are on the top! To learn more about the investment clubs in Charlottesville or Socorro; or to learn how to organize one at your site, contact Don Welty, SPUDS Treasurer or Roy Norville, IIC Secretary.

Roy Norville

Winds of Change: (Upgrading the ALMA Web Site to meet the needs of an ever-expanding project)

In June 1999, when the MMA joined in a partnership with the Europeans to form the Atacama Large Millimeter Array (ALMA) it opened unprecedented opportunities for each side to share ideas and information, guiding the future of this project into a global arena.

As Web Designer and Information Services Coordinator for the ALMA Project since November 1997, my portion of this partnership was to set up the ALMA Web Site so that it could be mirrored by the Europeans, and any other entity that may decide to join the project in the future. Mirroring the ALMA web site will enable any of our partners, or future partners, to collect all the data from the web site and locate this information on their computers at their institution. This has several advantages, including safeguarding against

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the possible loss of data or device failure of a single machine. Also, having a perfect copy, a reflection if you will, of the entire web site located on a machine in Europe helps the web user on the other side of the globe receive and download data much faster than if the web site were only located in Socorro.

Since November of 1999, the majority of my time as been spent going through the over 9,000 files that make up the ALMA Web Site, and ensuring that each link on each html web page is relative, not absolute. Each of these files were then checked into a Concurrent Version System (CVS). After two and a half months, the ALMA Web Site is now ready to be mirrored. The Europeans have graciously volunteered to handle the bulk of the web mastering and I look forward to working with them in this endeavor.

Kate Weatherall

Video Conferencing

Funds from an NSF computer networking grant have been used to purchase video conferencing systems for Tucson, Socorro, Green Bank and Charlottesville. The new video conferencing system is now on-line. Video conferencing offers many new options for communicating visually between NRAO sites in ways that will help people at different sites to work together more interactively.

As well as letting meeting participants see each other during inter-site meetings, the new equipment gives us ways to share view graphs, computer screens, whiteboard sketches, etc. among all sites in the conference. Auxiliary "document cameras" can also be used to send high-quality video images of paper documents, 35 mm slides, or even hardware (such as chips on circuit boards) to all sites. Pictures of almost any item, large or small, that you might want to bring into an NRAO conference room as a visual aid to a discussion or presentation can be sent to the other video conferencing sites while also being shown locally.

The systems contain several cameras, microphones and monitors that can be operated from a single remote control. The video and audio signals are converted to digital format that is sent between the sites over the dedicated NRAO intranet, so there are no connection or long-distance costs for video conferences (and they are now cheaper than our usual telephone meetings). The video and audio quality for point-to-point (two-site) meetings are almost on a par with broadcast TV. For three- or four-way meetings the quality is lower, but this may improve with future adjustments to the conferencing software.

Several staff at each site are now becoming familiar with the finer points of using these systems, and a reservation system has been set up. If you can see a way in which your work group may benefit from inter-site video conferencing, please consult
http://www.nrao.edu/internal/doc/videoconf_reserve.shtml
to see who to contact to reserve the systems, or to get initial training in using them.
http://www.nrao.edu/internal/doc/video_conference.shtml
is also a quick-start guide for new users of the systems.

The equipment is proving to be easy to use for small meetings, but we hope to extend its use to a wider range of activities in future. We have had encouraging results using it to "simulcast" presentations from the Green Bank and Charlottesville auditoriums to other sites and we will explore its use for other events in the coming months.

Alan Bridle

Personnel News . . .

Attention Retirees

We would like to establish an e-mail database for retired employees who are hooked up to the internet. This will enable the Personnel Office to send out announcements and pass on newsworthy information in between issues of the POINT SOURCE. If you would like to be included in this database please send us an e-mail message so we will have your return address. Send your message to: mpetty@nrao.edu.

Articles and Other Such Stuff of Interest . . .

Since the last Point Source newsletter was published in December some interesting things have happened.

-VLA article published in the Albuquerque Journal. See it at http://www.abqjournal.com/scitech/1scitech01-01-00.htm

Robert Hjellming, NRAO Scientist in Socorro, NM collaborated with MIT associates on a most unusual Black Hole discovery. An article highlighting the findings can be found on the Space.com web page, http://www.space.com/science/astronomy/v4641_microquasar_000114.html

-Shirley Curry, Executive Secretary in Green Bank, received distinction when her poem entitled "What is a Son?" was published by poetry.com. Visit the site at: http://www.poetry.com/Publications/ then, enter "Curry".

-A "Retirement Planning" web page has been created for NRAO employees and retirees. The site is an excellent bookmark link to your personal retirement accounts with Fidelity Investments or TIAA-CREF. You must have a (PIN) personal Identification number before you can access your account. The site address is: http://www.nrao.edu/administration/personnel_office/docs/retirementplanning.shtmlCheck out the "Bulletins" link on the Personnel home page for

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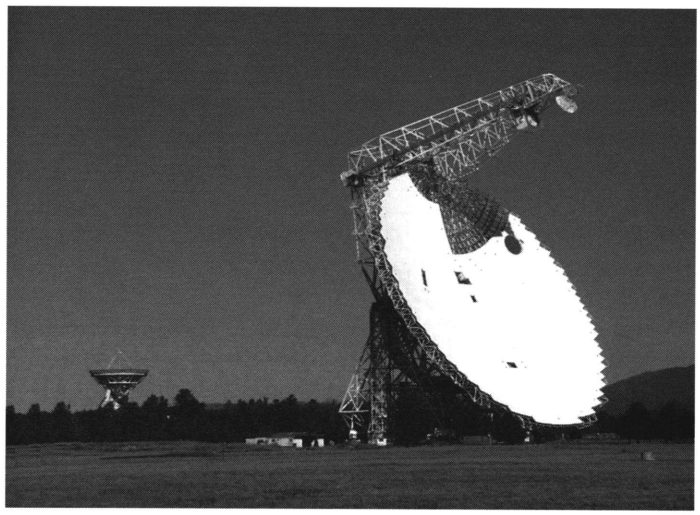
a new article describing the Fidelity, online Portfolio Planner tool.



The Green Bank Telescope achieved another milestone last month as it was tilted to a five degree angle. One observer remarked, "It seemed so close to the ground that you could reach up and touch it."

A Note from the Editor:

Articles or ideas for the Point Source newsletter are welcomed. If you Would like to submit an article, please contact the editor at phone (804) 296-0265 or by email to: rnorville@nrao.edu.

Deadline for article submission for the upcoming Spring Issue is May 1, 2000.

NRAO is an Equal Opportunity - Affirmative Action Employer.

Personnel Changes . . .

12/1/99 thru 2/29/00

Promotions

Rick Fisher to tenured Scientist, GB
Michael Goldman to Resident Engineer, GB
Bob Brown to Deputy Director, CV

New Employees

Charlottesville
Michael Lambeth, Technical Specialist II
Marc Rafal, Assistant Director/ALMA Project Manager

Green Bank
Roshi Damodaran, Visiting Assistant Scientist
Jason Ray, Jr. Engineer Associate
Michael Sumner, Jr. Engineer Associate

Socorro
Claire Chandler, Assistant Scientist
Samuel Field, Jr. Engineer Associate
Ryan Schmidt, Jr. Engineer Associate

Departures

Charlottesville
Kiriaki Xiluri

Green Bank
Daniel Pedtke
Russ Poling
Bobby Vance

Socorro
Aaron Cohen
Durgadas Bagri
Peter Barnes
Ron Beresford
Ketan Desai
John Dowling
Jolene Mares
Caminero Wang

Tucson
Henry Fagg
Matt Waddel
Jonathan Williams

Retirees

Green Bank
Ron Monk, 37 years
Sid Smith, 41 years

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Roy Norville, Editor
Patricia Smiley, Layout and Design

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