



# THE POINT SOURCE

Volume 5, No. 3

Fall 1999

## Jansky Symposium 1999

### News and Views from Charlottesville

by Michele Thornley

The Fourth Annual NRAO/UVa Jansky Symposium was held on Tuesday, October 26, 1999. Twenty speakers from the University of Virginia and both Green Bank and Charlottesville NRAO offices participated in the one-day event, giving short talks on their fields of expertise. A wide range of topics were presented, including the properties of stars at the beginning (formation) and end (pulsars) of their lives, characteristics of both the nuclei and disks of galaxies, as well as the histories of dwarf galaxies in our own local group and the cosmological properties of the universe as a whole. Approximately 50-60 astronomers attended the symposium, including colleagues who came down from the Naval Research Laboratory in Washington, D.C., to join in the festivities.

The participants found ample time for conversation and sharing of information during coffee breaks, a pizza lunch, and a barbeque dinner between the Symposium and the evening Lecture. For the barbeque dinner and the Jansky Lecture, the participants were joined by three members of the Jansky family who were eager to know more about current events in the Observatory and radio astronomy in general and some of whom recounted stories of their childhood in the first days of radio astronomy.

The 34th Annual Karl G. Jansky Lecture was held at the Charlottesville Performing Arts Center. The 1999 Jansky Lecturer was Dr. Frank Drake, the president of the SETI Institute and a professor of astronomy and astrophysics at the University of California at Santa Cruz. Dr. Drake delivered a motivating talk entitled "Progress in the Search for Extraterrestrial Intelligence" to an audience of approximately 400 people, which presented the contributions of radio astronomy to the search for extraterrestrial intelligence. In particular, Dr. Drake described a new project being developed called the One Hectare Telescope, which would consist of an array of several hundred satellite dishes in northern California.

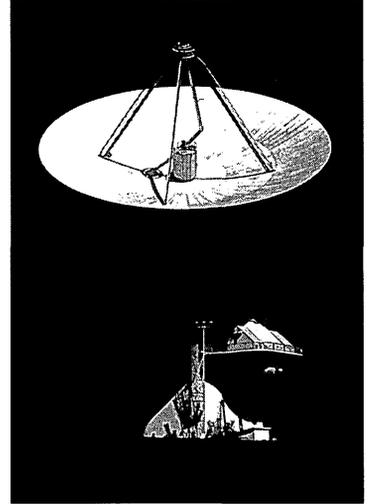
(continued page 2)

## An Old Friend Retires by Carl Bignell

It is not unusual to have mixed emotions and even feel sad when an old friend decides to retire. Such an event usually stimulates good memories of past associations along with best wishes for a happy retirement. Many of us at NRAO have fond memories of an old friend who has been with the Observatory more than 34 years and are sad to see it retire. Over the

years we have learned to live with its personality and idiosyncratic behavior. Even though it has suffered physical set backs, it has always bounced back and has had a very distinguished career with many accomplishments that have enriched the lives of many of us at NRAO as well as other visitors. I am of course referring to our dear friend, the 140 Foot Telescope in Green Bank.

The 140 Foot retired from service on July 22, 1999, with its last astronomical observations. The career began in 1955 when design studies of the 140 Foot started. The decision to build was made in March 1956, bids were solicited for fabrication and construction in August 1957, and actual construction began about a year later in 1958. There was a pause in the construction schedule in 1961 when the shaft, yoke, and some auxiliary components were redesigned. Construction re-started in early 1962. The design, size, and weight of the 140 Foot presented several challenges and some interesting "moments" during assembly over the next few years (M.M. Small, "The New 140-foot Radio Telescope," *Sky & Telescope*, November 1965 edition). Major construction was completed in February 1965 and shortly after in March first observations (lunar occultations at 234 to 405 MHz) were conducted. The long and prosperous career officially began at the dedication on October 13, 1965.



(continued page 2)

## **News and Views from CV (continued)**

Several members of the audience stayed after the lecture to ask Dr. Drake more questions about his work, as well as to ask for an autograph of the man for whom the Drake Equation, which estimates the number of intelligent civilizations we might be able to contact in our Galaxy, was named. The Jansky Lecture was followed by a well-appointed, friendly reception held in the NRAO auditorium at Edgemont Road that went on until late into the evening.

The organizers of this year's NRAO/UVa Jansky Symposium (Michele Thornley, Lynn Matthews, Jack Gallimore, and Richard de Grijs) would like to express their thanks to Billie Rodriguez and Sheila Marks for their assistance in making the Symposium run smoothly. This year's symposium was enjoyed by all, and we look forward to another lively one next year.

## **Jansky Lecture 1999**

### **News and Views from Tucson by Dale Webb**

This year's Jansky Lecturer was a tremendous hit in this "astronomy town." To many here at NRAO and the University of Arizona it was like a reunion. During the day prior to his presentation, Frank Drake had lunch with about 20 scientists, many of whom were his old friends. For example, Frank Low and Frank Drake worked together in the 1960's in Green Bank and were cohorts in obtaining the 12 Meter Telescope (then known as the 36 Foot Telescope). Drake said that he remembers writing that proposal to the National Science Foundation in less than one day and on less than one page, with the scientific justification built on Frank Low's science program (Frank Low is now Professor Emeritus at the University of Arizona).

Originally, Drake's lecture was going to be held in a standard lecture hall, like the past Jansky lectures in Tucson. However, the interest for this talk was so great that Jennifer Neighbours decided it needed to go in the largest venue available. This was the University of Arizona's Centennial Hall, where major theater and opera performances are held. As it turned out, that was a wise decision. According to the ushers, somewhere between six and eight hundred people attended the event. We swiftly ran out of the 400 introductory leaflets printed for the lecture. Drake stayed for about an hour after the formal lecture, giving autographs and answering questions. The evening ended at Eric's Ice Cream Parlor, as have other Jansky lectures. Everyone regarded this event as a huge success and we hope that Drake was as pleased with his visit as we were.

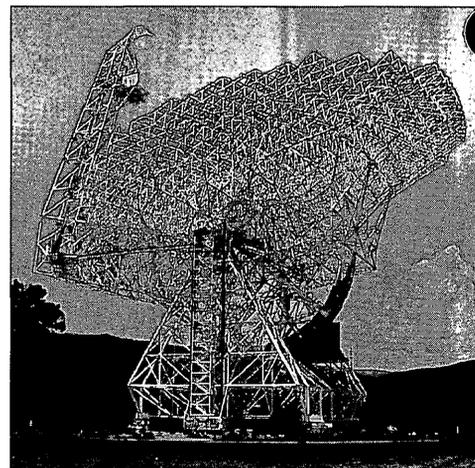
## **An Old Friend Retires (continued)**

Although the 140 Foot construction may have been somewhat checkered by problems and challenges, it was in contrast to, and not an indication of, the success that it would achieve over the next 34 years. The 140 Foot's distinguished science career included many accomplishments. In July 1965, the first unambiguous detection of radio recombination lines was made with the

140 Foot. In 1969, the first polyatomic molecule was detected in the interstellar medium and about half of all known molecules today which have transitions at centimeter wavelengths were detected using the 140 Foot. Other notable goals achieved using the 140 Foot include the first detection of Zeeman splitting of the 21 cm line of hydrogen in space in 1968, the first detection of HI absorption arising from within another galaxy in 1970, highest redshift CO detection reported up to 1994, pioneering Very Long Baseline Interferometry (VLBI) observations in March 1967, and the first transcontinental and transatlantic VLBI observations in 1967 and 1968, respectively. Other 140 Foot observations made significant contributions to cosmology, the study of pulsars, SETI observations, and many other different fields of astrophysics. All of the many contributions made by the 140 Foot were recognized at the thirtieth anniversary celebration held on September 30, 1995.

We are sorry to see the 140 Foot retire but we know that it has made a rich contribution to NRAO and to astronomy during its distinguished life. Following the last astronomical observations, the process to mothball it began and was completed about the middle of October. This state of hibernation allows it to return to service, just as some retired NRAO employees have done after retiring! It is a tribute to NRAO and all the employees and the astronomers who have used the telescope that the 140 Foot has had such a successful career in radio astronomy. In retirement it will stand as a reminder to us all of a glorious past. It is entirely fitting that its larger and

more imposing brother, the 100 meter Green Bank Telescope, will tower over it. Thousands of tourists and passers-by will catch the two of them in the same camera lens. What a memorable symbol of the past and future of radio astronomy!



*The Green Bank Telescope (GBT)*

## **Surface Panel Installation on the GBT by Fred Schwab**

This past summer, with the erection and assembly of the vertical feed arm having been completed, all of the major structural components of the Green Bank Telescope were finally in place. Installation of the 2004 aluminum surface panels—which make up the main "dish"—is the only major assembly task that remains. The main dish, which is parabolic in shape—which you can think of as a curved mirror designed to reflect the radio waves toward a single focal point sixty meters

*(continued page 3)*

## Surface Panel Installation (continued)



*Approximately one-half of the panels have been installed*

(197 feet) up from the base of the feed arm—is one of the three principal optical components of this telescope. The other two components are another mirror, the eight-meter (26 foot) diameter ellipsoidal “subreflector,” and the corrugated waveguide feedhorn (or “feed”) which is connected to the radio receiver. (Actually, the telescope is being equipped with a variety of feeds and receivers, and in operation the desired set will be selectable by rotating, into proper position, a large turret which is located at the top of the receiver room. The correct positioning of the subreflector is accomplished by means of six motorized actuators.)

The surface panels of the main reflector and of the subreflector are similar in construction: They consist of aircraft-grade aluminum alloy “skins” of 0.063 inch thickness molded to the desired shape and epoxied and riveted onto aluminum frames with Z-section reinforcement. The aluminum surfaces of the panels are manufactured to an accuracy of about 50 micrometers (0.002 inches) in the case of the subreflector, and 75 micrometers (0.003 inches) in the case of the main surface panels. In the end, gravity, thermal distortion, and misalignment in panel setting will contribute additional errors. Taking these factors into account, the overall accuracy of the subreflector surface should be better than 100 micrometers (0.004 inches); and that of the main reflector, ultimately, assuming active surface control using the laser metrology system, around 125-150 micrometers (0.005-0.006 inches).

While the subreflector surface is comprised of a mere forty panels, 2004 panels will be installed to make up the main reflector. The total area of the main surface will be 8893 square meters (the equivalent in area of 1.66 football fields—including end zones). The main surface panels are grouped into tiers or rows; inside individual tiers, the panels are identical in design. A typical panel is about 1.8 x 2.4 meters (6 x 8 feet), and the frame thickness is about 5 inches.

(Now, as you all probably know, assembly of the subreflector was completed more than two years ago. More, three major rounds of panel-setting adjustments were required, in conjunction with a series of photogrammetric surveys. The desired panel-setting accuracy was achieved during the 1998-1999 winter season.)

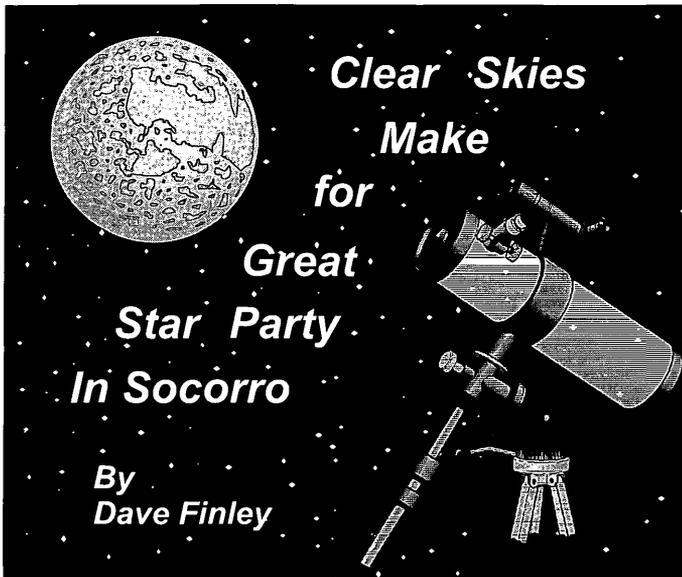
Back to the main dish: At the manufacturing plant in Sterling, Virginia, each panel is measured on a very accurate (robotic) coordinate measuring machine (CMM) to insure that it meets specifications. An NRAO quality-control team (consisting of Greg Morris, Fred Schwab, and Lee King) has been monitoring all aspects of GBT panel production over the years. During inspection tours, the re-measurement of a number of panels from each tier is witnessed by NRAO before that tier of panels can be accepted, and all panels are subjected to at least a cursory visual inspection by the NRAO team.

The final step in panel production is painting: First there is a thorough cleansing in a solvent, followed by application of a primer coat. Then a white paint, specially formulated for its properties of durability and diffusing bright sunlight (so that objects near the focal points will not burn up!), is applied to the panels. The paint is applied to the front of the panel surface using a computer-controlled robotic spray-nozzle device; the rear support structure of the panel is sprayed by hand. The paint thickness on the front of the panels is very important—the coating must neither be too thick, nor vary too much in thickness—otherwise the incoming radio waves would suffer excessive losses or “phase distortion,” arising from a particular property of the paint (called its “dielectric constant”). For the main-surface panels, the paint thickness is required to lie in the range 0.0028-0.0040 inches. This tolerance can be checked by means of an electronic paint-thickness gauge. The manufacturer's quality-control group is required to measure paint thickness on each panel, over an appropriate grid of points. Since last spring, Greg Morris has traveled twice a week to inspect painted panels. He carefully spot-checks a number of panels on each visit, using the NRAO's own paint-thickness gauge.

The panels are shipped from Sterling to Green Bank by motor freight, in specially equipped sea containers—about 20 panels per container. In order to avoid damage during shipment, the panels are packed vertically, supported from above by spring-loaded straps, and below by styrofoam padding; spacer bars are used to keep them from bumping against one another. The contractor has equipped 20 sea containers in order to meet the required delivery schedule.

Installation of the main-surface panels on the GBT began this summer, mid August. As of the end of October, 844—just over 40 percent—of the main-surface panels had been installed. (See the accompanying picture.) Altogether, more than 1800 panels have been manufactured, and the fabrication of the remainder should be completed by the end of November. The paint shop in Sterling, Virginia, is attempting to maintain a through-put of close to 100 panels per week. A total of nearly 1400 painted panels have been approved by the NRAO, and the rest should be finished by the end of the year.

During panel installation, two teams of workers will adjust the panel heights, with respect to the top of the motorized actuators, in order to achieve correct relative height adjustments of adjacent panels. An innovative panel-setting tool developed by NRAO will be the focus of an upcoming Point Source article, so stay tuned.



The Saturday night dark-dark-sky night at the Pound Ranch southwest of Socorro was the highlight of the star party, and the registered participants were joined at the ranch by local residents and nearly 20 volunteers who helped run the event. A chuck-wagon dinner prepared by the Pound family was accompanied by state champion fiddler Karla Patterson and her accompanists, and followed by ancient Southwestern sky stories told by Chaco Canyon ranger G.B. Cornucopia.

The Pound Ranch site is one of the darkest star-party locations anywhere in the U.S. Some of the folks who come here from huge, light-polluted urban concrete canyons are almost shocked at how clear and dark the sky is and how many stars they can see..

The Seventh Annual Enchanted Skies Star Party is scheduled for September 28 to October 1, 2000. "Many of our participants already have their calendars marked," said Spargo.

In addition to NRAO, the Enchanted Skies Star Party is sponsored by the New Mexico Tech Astronomy Club, the Socorro County Chamber of Commerce, the City of Socorro and the Bureau of Land Management. This year, some speaker support was provided by the New Mexico Endowment for the Humanities.

## **The VLA-Pie Town Link**

**by Jim Ulvestad and Mark Claussen**

An instrument like the VLA is an interferometer, which can make images (or radio "pictures") by combining the data from the individual radio telescopes. The fine detail, or "resolution," that can be seen in these images depends on the separation of the telescopes--the farther apart they are, the more detail can be seen in the image.

When the VLA was built a main goal was to image astronomical radio sources with a resolution equal to or better than the best optical telescopes on the ground, roughly 1 second of arc, or something the size of a basketball at the Array Operations Center as seen from the VLA 50 miles away. Since that time, the VLA has made a number of fundamental astronomical discoveries by virtue of its high-resolution imaging capability.

Now as we enter the 21st century, both technology and science have advanced since the construction of the VLA in the late 1970s. In order to keep the VLA operating at the scientific frontier, new technologies must be employed to give it both higher resolution and more sensitivity to faint radio sources.

For higher resolution, we need telescopes spread further apart, and for higher sensitivity, we need to gather more data in a given period of time (i.e., we need a higher radio "bandwidth.") The VLA -Pie Town link is a project meant

*(continued page 5)*

Nearly perfect weather provided a great window on the heavens for more than 150 amateur astronomers from 23 states who came to Socorro for the Sixth Annual Enchanted Skies Star Party October 7th-10th.

"All our guests got a great demonstration of just why New Mexico is such an excellent place for astronomy," said Dave Finley, co-organizer of the event. "We had a good mix of first-timers and repeat customers, some of whom have been here for three or four of the Star Party's six years," he added.

A number of NRAO staff members were heavily involved in the star party. Finley and Jon Spargo, the other co-organizer, are joined on the steering committee by Paul Harden and Jason Wurnig. Wurnig, Ketan Desai, Aaron Cohen, and Cornelia Lang presented lectures at the event.

The only change in plan was the cancellation of the scheduled keynote speaker, Sid Gutierrez, former Space Shuttle astronaut and current New Mexico Tech regent, due to a death in his family. In place of Gutierrez, the Friday-night keynote lecture was presented by Dr. Michael Zeilik of the University of New Mexico.

Zeilik, an astronomy professor and veteran author and lecturer, is one of the world's leading experts on ancient astronomy in the Southwest and presented a fascinating slide show on how our state's native peoples used the sky to guide their lives a thousand years ago.

At NM Tech's Etsorn Campus Observatory, participants set up their own telescopes or used the telescopes owned by the observatory. This year, they received a demonstration of the observatory's new, state-of-the-art electronic control and imaging systems. "Electronic imaging is becoming very popular among amateur astronomers, and there was tremendous interest in seeing our system work," Spargo said.

## **The VLA-Pie Town Link (continued)**

to demonstrate the capability of achieving both higher resolution and higher bandwidth by connecting a more distant antenna to the VLA using fiber optics, which can carry much more data than traditional cables or waveguides. In this project, we are connecting the VLBA Pie Town antenna, about 40 miles (65 kilometers) west of the VLA site, to the VLA. This is being done by means of a commercial fiber optic line installed by Western New Mexico Telephone Company, and under the engineering leadership of Ron Beresford, on leave from the Australia Telescope National Facility. The project has been funded under a Major Research Instrumentation grant from the National Science Foundation, with additional funding contributed by NRAO's parent organization, Associated Universities, Inc.

The use of the Pie Town antenna with the VLBA requires making Pie Town "look like" a VLA antenna in as many ways as possible. The actual telescope at Pie Town observes the same radio source as the VLA, in the same radio band, under control of the VLBA array operator in Socorro. Then, the radio signal from Pie Town is sent into a special rack of equipment, which selects the right frequencies and modulates them onto a high-power laser carrier. This laser transmits the signal over 65 miles (105 kilometers) of phone-company fiber, by a somewhat indirect route, from Pie Town to the VLA. At the VLA, the radio signal is demodulated from the laser and fed into the standard VLA electronics and correlator, where it is processed in conjunction with the data from the "real" VLA antennas.

In order to make all of this work, the VLA Correlator had to be modified to permit the signals from every VLA antenna to be delayed by up to 5 times their normal amount, to make-up for the delay in Pie Town's signal caused mostly by the long transmission down the fiber. Also, on-line software at the VLA was modified by Ken Sowinski in order to provide a capability for commanding a special rack of equipment at Pie Town, and for monitoring that rack and parts of the telescope at Pie Town.

In December 1998, the first successful observations were made with Pie Town and four VLA antennas, incorporating one of the four intermediate-frequency channels of the VLA. Then, in August 1999, Pie Town was successfully combined with the entire VLA, using two of the four VLA frequency channels. The first image of an astronomical source was then made using the real-time link. A few scientific observations of distant gravitational lenses and galaxies as well as the Orion star-forming region in our own Galaxy were scheduled in August and September, while the VLA was in its most extended ("A") configuration.

In the process of developing the VLA-Pie Town link, NRAO has gained considerable experience in the transmission of wideband signals over long distances by fiber optics, and in the modifications to the VLA that are

necessary to accommodate the use of fiber optics. Such signal transmission is the modern way to transmit huge quantities of data from large arrays of antennas to central processing facilities, and will be critical both for the expanded VLA and for the Atacama Large Millimeter Array (formerly known as the MMA).

Although there are a number of bugs and operational procedures remaining to be worked out, we anticipate that the VLA-Pie Town link will be fully operational for the next A configuration, scheduled to begin in October 2000. The plan is to announce its availability to the general scientific community in early 2000, and accept proposals at the June 1 proposal deadline. In 2001, a significant number of images with the "extended VLA" should become available, having twice the resolution of the "stand-alone VLA," providing significant new scientific results.

The implementation of the VLA-Pie Town link has depended on significant contributions from a number of individuals in NRAO; among them are Nelson Atencio, Ron Beresford, Chuck Broadwell, Eric Carlowe, Barry Clark, Ray Ferraro, Kelly Gattin, Wayne Koski, Rob Long, Mike Revnell, Bill Sahr, Ken Sowinski, Mario Torres, Bob Treacy, and all the VLA and VLBA telescope operators.



## **Risk Management (A Learning Tool)**

**by Jody Bolyard**

Think of the fast food restaurant, Jack-in-the-Box. What do you recall? What if you think about Exxon? Although Jack-in-the-Box is probably one of the cleanest restaurants around, the public remembers its E.coli contamination problem. Think of Exxon and the Valdez incident pops into your head. The likelihood of an undesired event such as these is considered RISK.

The potential for risk is determined by evaluating the likelihood or probability of the undesired event together with the consequence or impact of the event. The factor that is difficult to determine in evaluating risk is perception or public emotions associated with the event. Again, think of Exxon. These public perceptions are difficult to erase.

The agents that cause injury are readily broken down into the following major groupings. Some risk may involve more than one potential causative agent:

<i>Biological</i>	<i>Radiation</i>	<i>Acoustic</i>
<i>Chemical</i>	<i>Kinetic</i>	<i>Electrical</i>
<i>Thermal</i>		

If we use the Exxon example, there was a chemical agent (oil), kinetic agent (the collision), and a biological agent (dead animals). In the end, this event hurt the Exxon business far beyond the cleanup cost. Some people even today refuse to do business with Exxon.

## **Risk Management (continued)**

There are levels of risk that we, the NRAO, should be aware of. This is best posed as an answer to the question "What is going to hurt our business the most?" The highest risk for the NRAO is any situation that could harm the entire organization. The next risk category is anything that could harm a site or facility. Then follows harm to non-employees, and next, harm to employees. A final risk consideration is regulatory in nature.

The role of safety at the NRAO is clearly to aid in risk management, however every manager, supervisor, and employee is essential in reducing risk for the NRAO. We should all be ever wary of the potential for injury to employees or damage to facilities. There are "minor" problems such as the frayed extension cord being used in your office, the rags stored by the hot water heater, as well as the obvious failure to follow proper fall protection requirements or use chemicals properly. I would like to challenge each person reading this article to identify one item with potential for damage to the NRAO, our visitors, or employees to help in reducing risk in your workplace. Tell your supervisor, the business manager, or the safety officer what you have observed and offer your help in fixing the problem if it is determined that it is indeed a problem. Your help in reducing risk at the Observatory can contribute to a safe and healthy workplace.



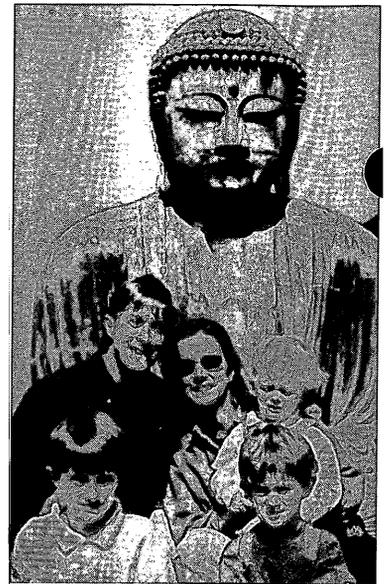
## **Culture Shock – One Family's Experience by Glen Langston**

My wife, Katherine, my three sons, and I recently spent six months in Sagami-hara, Japan while I was on sabbatical leave working at the Japanese Institute for Space and Astronautical Science (ISAS). Upon my return I was asked to share a few anecdotes about the cultural differences between our countries.

My two oldest sons, Grant (8) and Morgan (5), attended the Japanese elementary school conveniently located just across the street. They seemed to adjust fairly well to the new school and didn't complain much when they had to attend classes on Saturday mornings. The schools were very different in Japan—more kid centered than teacher directed. The parents never helped out in the classroom. Group cooperation is one of the main focuses of the system; kids are always helping each other with their academics and traveling in groups. One day Grant's class took a field trip to a nearby high school. The goal of the activity was to teach the kids to purchase a ticket and ride the train without the help of an adult, only with that of their peers. The students walked to the train station and actually made it to the high school and back in one piece, much to the amazement of some very concerned parents who couldn't believe the school could allow such a thing.

Katherine heard that Japanese mothers took a great deal of care in preparing beautifully arranged lunches when

the children went on school outings. Unfortunately, she did not have all the required items to create a "bento-box" for Grant. She eventually decided to buy an elaborately decorated "peach beverage" to go with Grant's lunch. When Grant got out his lunch all the children started laughing. Eventually they convinced him not to drink the peach SAKE (rice wine) with his lunch. At least no one noticed that Grant's lunch fell a little short of artistic standards.



Loud, boisterous activity is central to a healthy learning environment in Japan and class size is somewhere between 30 and 40. (Yikes!) The teachers always seemed to be very positive, energetic and playful with their students. Grant and Morgan spent their days singing (as best as they could), exercising, doing art projects, academics and cleaning the school. Yes, Japanese children keep their rooms clean.

It was always interesting to hear what they had for lunch. Morgan especially liked the days when they served some kind of octopus soup (called Ta-Co in Japanese), which was eaten with chop-sticks. Both boys learned some Japanese, but most of all they seemed to enjoy playing with kids their age and learning some of the Japanese customs.

Katherine made a good number of friends among the other mothers in the parks near ISAS, and also with Bidesha, the wife of a scientist from India. Katherine and our youngest son, Nathaniel (2), learned Japanese in a free class given at the international center in Sagami-hara. Katherine also picked up quite a few Japanese phrases while shopping, on the train, or simply conversing with the other mothers.

The giant Buddha shown in the accompanying picture was cast in bronze during 1252 AD. This Buddha is the second largest in Japan and sits 34 feet tall. The statue is located in the coastal town of Kamakura, which was the capital of Japan from 1183 to 1333 AD. The great Buddha resided in a temple until sometime in the 14th century, when a great wave "tsunami" washed the building away, leaving nothing but the Buddha.

## **Tips for Effective E-mail**

Here are ten tips that will help you deliver effective e-mail:

- ◆ Never send (or forward) racist, sexual or pornographic materials.
- ◆ Never assume that e-mail is confidential.
- ◆ Never assume that e-mail is permanently deleted. It rarely is!

(continued page 7)

### **Tips for Effective E-mail (continued)**

- ◆ Do not send spam or chain letters via e-mail. It can be illegal.
- ◆ Do not gossip or criticize others in an e-mail. It may come back to haunt you in the form of defamation or libel charges.
- ◆ When responding to an e-mail, make sure you reply only to the sender, and not everyone on the cc: list, unless that's your specific intention.
- ◆ Refrain from sending angry e-mail. It may embarrass you later.
- ◆ Do not write in all caps. It's the online equivalent of SHOUTING.
- ◆ Avoid misspellings that can make you look careless or sloppy. Not all e-mails have spell-checkers, so you might consider composing your mail in another text-editing program, and then cut and pasting it into e-mail.

Remember that e-mail is international. When sending e-mails to another country, always use a polite address and avoid using acronyms and idioms that may be particular to American culture.



## **Scoping the Sites**

### **Gloom, Sadness, Settle on GB/CV Golfers - Soon Replaced by Spirit of Joy and Celebration** by Bill Porter

As the light waned over the Hawthorne Valley in West Virginia on the evening of October 13, 1999, a feeling of gloom and sadness settled into the hearts and minds of the 23 tournament golfers from Green Bank and Charlottesville. When the last foursome reached the clubhouse in dusk too deep to see a golf ball at 50 yards (much less the average 275 yard drive), a stark realization crept through the group of men and women, that they had just participated in not only the last GB/CV tournament of the year, but . . . the last tournament of the century . . . yea, verily, The Final Tournament of the *Millennium!* The somber mood was matched by a cold drizzle which had begun falling in the deepening darkness over the glorious autumn colors of what has to be West Virginia's most beautiful (and challenging) golf venue, Hawthorne Valley Golf Course. After a respectful silence in honor of past great shots and good times, Sid Smith, CTO (Chief Tournament Organizer) quietly began to turn the players emotions by pronouncing the immortal words, "Well, let's go get some pizza and beer." Spirits were as whispered "Yeah, and spicy wings, too!" were heard rustling through the golfing crowd.

The players reconvened at The Inn at Snowshoe and a joyous wake ensued to celebrate what has become a

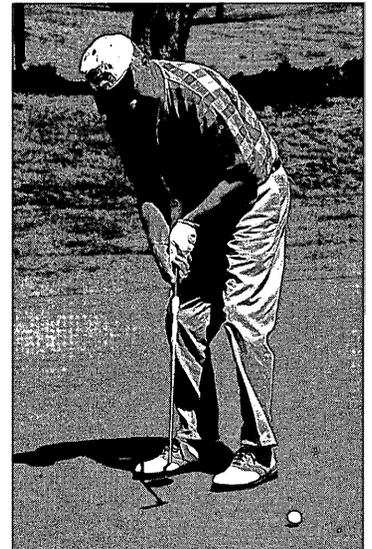
### **News from AUI** by Carol Whitley

At the October meeting of the Board of Trustees of Associated Universities, Inc., the Board re-elected three Trustees for three-year terms (Claude Canizares, MIT; Paul Martin, Harvard; Robert Williams, STScl) and elected three new Trustees for three-year terms (Charles Cantor, Boston University, currently on leave at Sequenom of San Diego and Germany; Robert Kirshner, Harvard University Center for Astrophysics; and Roald Sagdeev, University of Maryland).

Retiring Trustees recognized for their contributions were Morton Lippmann (NYU) and Robert Pound (Harvard). In 23 years as a Trustee, Dr. Pound, a strong supporter of NRAO, missed only one meeting of the Board.

The service of Martha Haynes, who was AUI Interim President for a fifteen-month period from April 1998 until the arrival of Dr. Giacconi as President on July 1, 1999, was celebrated with short remarks by a number of Trustees and others and with the presentation of a gift on behalf of the Board and the entire AUI family. As many of you may remember, Martha was a postdoctoral research associate at NRAO and served as the Green Bank Site Director from 1981 to 1983. She is a frequent user of NRAO facilities and has been a Trustee of AUI since 1993.

periodic (dare we say "frequent"?) rite of competition between a growing cadre of employees, retirees, sons, daughters, and friends. The exultation became dizzying for the shooters when they realized that the continuation of GB/CV golf into the 21<sup>st</sup> century is virtually guaranteed as every golfer's bag was checked, and every club certified Y2K compliant! Oh, where could we be today if computer programmers had had the striking "fore"sight of the Spauldings, the Pings, the Titleists, and the Berthas! Whatever.



*Ray Hanshew sinks the putt in Lewisburg, VA*

Anyway, finally, it was time to reward the winners for the conclusive time in the 20<sup>th</sup> century. Appropriately, Mr. Smith had set the format for this one to be a classic golf tournament, i.e., individual scores, no teams--every shooter for himself. Raw scores ranged from a low of 86 to a high of 125, but the application of the Calloway

*(continued page 8)*

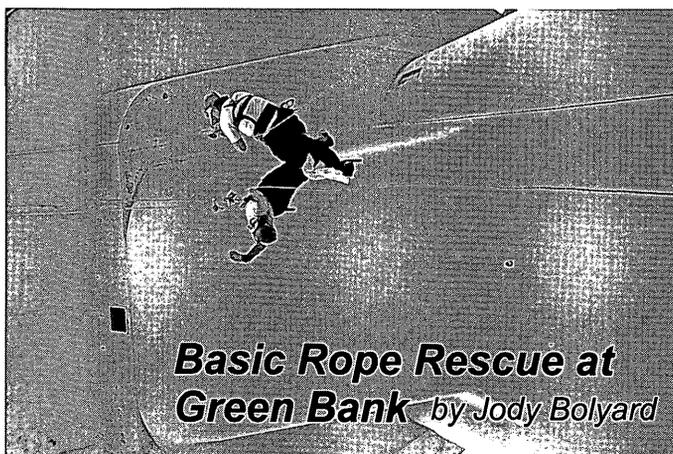
## **GB/CV Golf (continued)**

handicap system brought the final tournament scores down to a respectable range of 73 to 79. Prizes were given to the eight best scores, which belonged to, in order, Wendell Monk, Brian Ellison, Sidney Smith, Bob Vance, Tony Beasley, John Ralston, Bill Porter, and June Hunter.

A number of coveted skill prizes were also awarded for individual great shots such as longest drive, closest to the pin on par 3s, longest putt, closest to the pin in 2 on the par 5s, and so on. Skill prize winners were Tony Beasley (5), Tony Minter (2), Sidney Smith (2), Jim Gibb (2), Scott Gibb, Wendell Monk, Russ Poling, Brian Ellison, Bob Vance, Ray Hanshew, and Monroe Petty.

Prior to the Hawthorne Valley tournament, the GB/CV contestants had played a round at the Lewisburg Elks Country Club on September 10. The format at Lewisburg was a four-man team scramble. The competition was close and the final scores of the five teams were 69, 69, 69, 70, and 74. The winning team was decided by consideration of team scores on the number one and two handicap holes, giving the first place nod to the team of Bob Vance, Monroe Petty, Greg Monk, and Robert Mann. Second place went to Russ Poling, Scott Gibb, Bill Porter, and Harold Crist. The third place team was made up of John Ralston, Wendell Monk, Brian Ellison, and June Hunter. Skill prizes were awarded to Wendell Monk (4), Monroe Petty (2), Sidney Smith (2), Greg Monk (2), Russ Poling (2), Steve White (2), Ted Riffe, Harold Crist, June Hunter, Robert Mann, Brian Ellison, Bill Porter, and John Ralston (yes, it's more than 18, but some holes had two prizes).

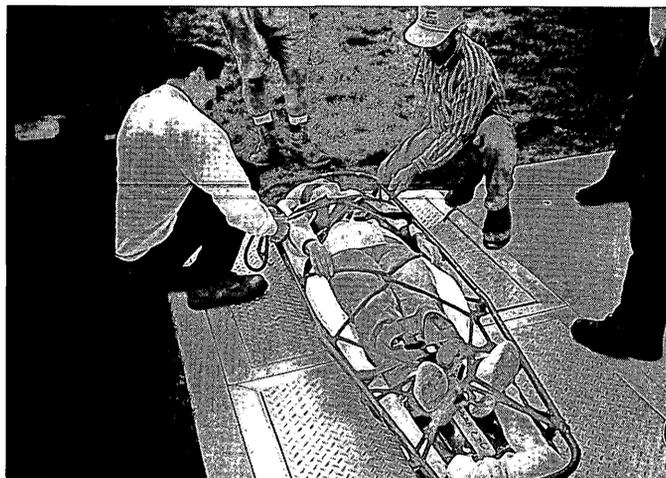
That's it from the golf desk for this century. Have a nice millennium!



*Mike Gray and Bob Simon perform a rope rescue technique.*

Different perspectives provide insight. To the astronomer, the GBT is a promise of incredible science. To the engineer, it is a technological marvel. The safety officer sees the instrument as a safety challenge. A challenge to maintain the safety of all persons wanting to access the heights whether to sightsee, repair equipment, or verify the construction progress.

One of the concerns over the safe use of the GBT is the height at which our staff must work. What if the unthinkable happens and someone requires rescue from height on the GBT? Can we provide rescue to the individual? Toward that end, management at Green Bank authorized the training of our local fire and rescue services, the Bartow, Frank, Durbin Volunteer Fire Department (BFD). In addition, Observatory management opened the training to any employee wishing to participate. On Saturday and Sunday August 21-22, 1999, a complement of BFD staff and four NRAO Green Bank employees received training in Basic Rope Rescue. The Green Bank employees included Bob Simon, electronics technician, Byron Bertrand, GBT operator, Galen Watts, electronics engineer, and Jody Bolyard, safety officer.



*Bob Simon and Jody Bolyard demonstrate the use of a Stokes basket.*

The training included rope care, use of knots, Stokes basket use, self-rescue, rappelling, hauling and lowering. The training was conducted on site at the 140' Telescope. This provided an excellent surface for rappelling and rope work. In the attached photograph, Bob Simon and Jody Bolyard prepare a "patient" for raising or lowering in a Stokes basket. The second photo shows instructor Mike Gray and Bob Simon suspended from the deck of the 140 Foot Telescope by a 5/8 inch climbing rope. Bob is upside down performing a self-rescue. The training has proven to be very popular. Since the class, several other employees have expressed an interest in the training.

## **Green Bank ERA Hosts Hay Ride** *by Annamarie Wester*

On Saturday, September 18, the Employee Recreation Association hosted a family hay ride at the NRAO recreation area. The hay wagon and tractor were provided by NRAO friend, Jimmy Ryder, and his devoted steed, "Buddy," of nearby Deer Creek Farm. The hay wagon was filled with kids of all ages on each trip through the woods and fields during the beautiful autumn day.

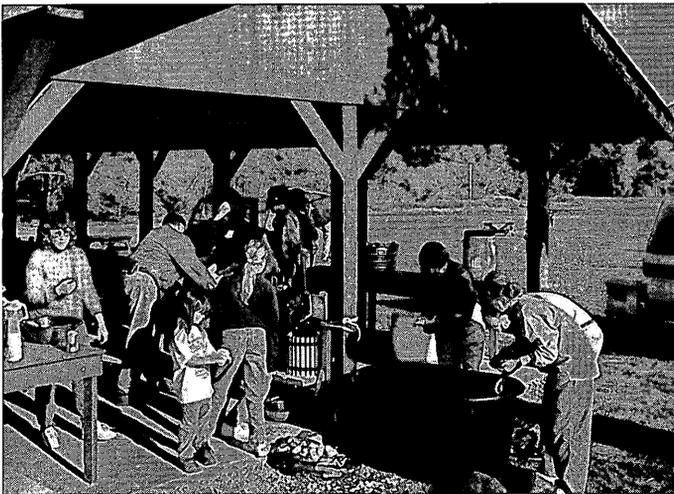
*(continued page 9)*

## ***ERA Hosts Hay Ride (continued)***



As a special treat, a single-tub apple cider press was set up by Jim Wester. Just about everyone pitched in to press four bushels of apples, yielding about 8 gallons of cider. The cider was made from a mixture of three apple varieties and was delicious! It was an enjoyable addition to the fall evening.

All employees joined in for a hot dog cookout and shared a potluck dinner. As the hay rides ended and the moon rose high on the chilly evening everyone gathered around a blazing bonfire to listen to relaxing Gaelic music wafting through the air. It was hard to imagine a finer Appalachian evening.



## ***Partnership Picnic, Always Fun for Everyone*** by Rich Lacasse

Hamburgers! Hot dogs! Hardly a cloud in the sky! Horseshoes! Huge assortment of covered dishes! It's the annual NRAO/PCHS business partnership picnic! The what??

NRAO and Pocahontas County High School have been business partners for the past three years. This basically means that the two institutions cooperate and attempt to

benefit one another, using their individual strengths. The goal is to help local youth learn while providing valuable service to the Observatory. For example, when NRAO needed some unsightly brush and trees cleared between the new lab wing and the air strip, the PCHS forestry class came to the rescue, gaining some hands-on experience in land management. When NRAO needed new picnic tables and had materials but no time, the PCHS carpentry class followed our blue-prints and produced a large number of well-constructed tables. When PCHS needed a new press box, NRAO provided engineering to assure that it would stand up to severe weather, and later installed siding on the building using its newly acquired manlift. The partnership has been a significant benefit to both institutions. In fact, it has been recognized by the Education Alliance, which awarded the partnership one of five "outstanding partnerships" awards statewide last year. The Education Alliance is a highly respected organization that recognizes the leaders of corporate-school partnerships in West Virginia.

Back to the picnic... to get to know one another's needs, it helps to get to know one another. This was the driver for the first picnic a few years ago. It still is a driver, but so is fellowship and assorted fun activities. This year's picnic was no exception. It was held on a beautiful early fall day, September 12. In addition to the food, there were horseshoes, volleyball, putt-putt, the now traditional all-comers softball game, and, of course, a good time had by all.



## ***Closest to the Pin?*** by Skip Lagoyda

*–What must a golfer shoot to assure tournament victory?–The rest of the players.*

The annual Socorro NRAO Golf Tournament was held on a beautiful Saturday morning in September at New Mexico Tech Golf Course. There was a great turnout this year with 36 entries, providing for nine teams. In addition to NRAO related players, NRAO vendors such as First State Bank, SMPC Architects, Graybar Electric, NMT/Information Services Division, Socorro Electric Cooperative, and Socorro Office Supply also sent participants. The FSB team smoked everyone, taking first place with a score of 63.

Dennis Walsh of the first place team won the men's long drive award. Thankfully, an NRAO team placed second with a score of 70. Florence Foster, a member of this team and a former NRAO employee from VLA construction days, won the ladies' long drive award. Her team members were Jim Oty, Don Welty, and Gary Guillen, (Graybar). Third place was decided by a score card playoff since two teams tied with a score of 71.

*(continued page 10)*

## Closest to the Pin? (continued)



*Jim Oty and Don Welty, members of the 1st place team.*

Third place honors went to the team of Ramon Molina, Jr., Antonio Molina, and Lori Martinez. Lori received the Closest to the Pin award despite missing the green entirely. Fourth place team members were Skip Lagoyda, Mark Reynolds, (ISD), Joel Dean, (ISD), and Amy Horne Guillen, (Graybar). Jon Spargo won the men's Closest to the Pin award. Jon did hit the green! Everyone seemed to have fun which was the "mission" of this event. NRAO is always looking for more golfers. We saw some new faces out there this year. Hopefully next year there will be even more!



## **Tucson Hosts AUI Trustees Meeting** by Dale Webb

On October 22-23, NRAO Tucson hosted the AUI Board of Trustees. The meetings were held at the beautiful Westward Look Resort located in the scenic Santa Catalina Mountains of Tucson. After a full day of meetings on Friday, the participants toured the Arizona Sonora Desert Museum. The attendees were served dinner in the Agave and Boojum Terraces overlooking the beautiful desert with the sky backlit by a full moon and bright stars.

Saturday, following the meeting, the trustees met at the NRAO facilities at the Steward Observatory on the campus of the University of Arizona. They toured the photonics laser lab and cryogenic receiver development labs before being taken by bus to Kitt Peak for lunch at the Kitt Peak cafeteria and a tour of the 12 Meter telescope, its labs and buildings, and then a tour of the VLBA telescope. At the time of the visit, the VLBA telescope was in use as part of a VLBI experiment. Darrel Emerson described the equipment located at the 12 Meter lab and Ken Kellermann discussed some of the science being done with the VLBA antenna.

## **Tucson Picnic Included Zoo Visit, Lots of Fun!** by Dale Webb

On Saturday, October 2, the Arizona Operations group held their annual picnic at Ried Park. NRAO provided admission to the Ried Park Zoo for employees and their families to highlight this year's event. The younger children also enjoyed playing in the jumping castle for several hours.

Although Dale Webb was the main coordinator, others participated in making the cook-out a success. John Fitzner, Ricardo Martinez, and Graham Moorey manned the grill and Dale's wife, Judy, made several pots of delicious baked beans. The group decided that ice cream in the desert would be a treat. Dale was elected to acquire it, you can imagine how fast it had to be eaten in the 92 degree heat.



## **Construction News** by Dale Webb

Construction has started on the addition to the NRAO Tucson Cherry Avenue office. The staff has endured the screeching sounds of saws and the pounding of sledge hammers as portions of the existing roof are being dismantled in preparation for the expansion. It has caused the street in front of the building to be closed to two-way traffic since only one lane remains open. This has created some consternation among our neighbors and vendors. But progress is coming! The steel was slow in being manufactured so the visible changes are minimal at this point.

## Vera, A Man's Best Friend

by Terry Cotter

Although Richard Rupp professes to be a confirmed bachelor, he has been in a special relationship for 35 years. Richard is a Technician in the Electronics division. Richard's relationship with Vera (affectionately named) has had it ups and downs. Richard admits he has tested her limits on numerous occasions and has been down right mean at times. Even so, Vera and Richard travel every where together. He has taken her to Mexico on several trips and claims that her Spanish is better than his. Anywhere in Socorro you find Richard, you will surely find Vera near by.

Vera has actually intervened and protected Richard on a couple of occasions. She once came between Richard and a cow. Richard was OK, but Vera required some cosmetic surgery. On another occasion Vera kept Richard from devastating injury when a car ran a red light. He survived with only some broken ribs.

Vera has caused some grief for Richard too. She has required four major life extending operations and will soon need another. But Richard loves her a lot and has stuck by her through each operation. Vera will soon need another new engine. Vera is a 1964 Volkswagen Beetle. Richard purchased Vera new for around 2,000 dollars (he still has the receipt). Vera remains the only car that he has ever owned.

Richard likes to take Vera up into the mountains along some pretty rough roads. It was during one of these outings in Mexico, when he hit a cow in the middle of the night. He hammered Vera's hood back out, but the cow left the scene before he could check her out.

As for Vera speaking Spanish, it is probably due more to all the repairs with auto parts from Mexico, than the trips to Mexico. If anyone is interested, you can find Vera in the parking lot at the AOC. It is the one with the bumper sticker that reads "THIS IS NOT AN ABANDONED VEHICLE." And if your are real nice to Richard, he might even take you for a ride!

One final note, Richard will be traveling to Bolivia without Vera. He is going there to escape Y2K. He figures that Bolivia is about the most primitive country in South America. Maybe he will tell us about his trip when he gets back.



Mike Burgert, North Liberty, IA  
Gene Dunn, Los Alamos, NM  
Kelly Gatlin, Pie Town, NM  
Mark Hofmann, Brewster, WA  
Ray McFarlin, Owens Valley, CA

Jack Meadows, Kitt Peak, AZ  
John Smith, Ft. Davis, TX  
Tony Sylvester, Mauna Kea, HI  
Doug Whiton, Hancock, NH  
Herb Winchell, St. Croix, USVI

The workshop included sessions on servo motor problems and maintenance and HVAC system maintenance and parameters. The HVAC training session was held at the Pie Town VLBA station. In another session, Tom Baldwin presented an overview of the new MAINSAVER program and a review of the NRAO-NM Electrical Safety Plan. All participants were trained and certified in CPR and Basic Life Support by VLA-EMTs Pat Madigan and Garry Morris.

Some of the most enjoyable parts of the workshop, according to the participants, were science talks given by Bob Hjellming and Rick Perley, and a review of the status of ALMA and NRAO given by Peter Napier and Paul Vanden Bout.

On the final day, the group traveled to the Los Alamos VLBA Station for a visit. The return trip was designed to provide the group, most of whom were unfamiliar with the unique Southwest scenery, an opportunity to sightsee. They traveled back to Socorro through the Jemez Mountains and the beautiful scenic views of the Valle Grande and the Caldera. It gave the participants a chance to see some of New Mexico's spectacular fall scenery.



Beginning lower left hand corner, moving clockwise:  
Mike Bergert, Mark Hoffman, Herb Winchell, John Smith,  
Paul Rhodes, VLBA Field Group Leader; Bob Greschke, AOC  
VLBA Operations; Gene Dunn, Jack Meadows, Steve Troy, VLA  
HVAC, ES Division, Clint Janes, Electronics Division Head;  
Tony Sylvester.

## VLBA Station Technicians

Converge on NM by Paul Rhodes

Fully one-half of the VLBA Station Technicians were invited to attend a workshop specifically designed for them at the Array Operations Center October 18-23, 1999. VLBA Station personnel attending were:

## Personnel News . . .

### Supplemental Retirement Plan (SRA) Update

The Internal Revenue Service has increased the maximum tax deferred retirement contribution limit from \$10,000 to \$10,500, effective with the 2000 tax year. Any employee earning a salary of \$42,000 or higher who wishes to maintain his/her contribution level at the

(continued page 12)

## **Supplemental Retirement Plan (SRA) Update (continued)**

maximum amount permissible will need to execute a new salary reduction agreement. Such employees who wish to contribute the maximum amount in twelve installments should elect a monthly contribution of \$875 for the upcoming year. For employees who elect a higher monthly amount, contributions will be truncated when the \$10,500 limit is attained.

Normally contributions will be limited by law to the lesser of \$10,500 or 25% of salary. (For newly hired employees, the accessible percentage is less.) So, no action will be required by employees earning less than \$42,000.

Salary reduction agreements are available at each site. Anyone wishing to increase their SRA contribution beginning in January, 2000 must submit the revised agreement form no later than December 31, 1999.

## **Retirement Investments . . . Y2K**

This article is presented at the request of Fidelity Investments. Though, this article addresses Y2K issues from Fidelity's perspective, the thoughts put forward are consistent with other retirement investment plans. More information on Y2K can be viewed at <http://www.tiaa-cref.org/Y2K/index.html> and <http://www300.fidelity.com:80/misc/y2k.html>.



As 1999 draws to a close, we wanted to reassure you that Fidelity Investments@ is prepared for the calendar change from 1999 to 2000, and as a result, the Y2K issue should have no effect on your retirement savings account. Fidelity demonstrated leadership among the financial services community when it began preparing for Y2K more than three years ago. As a result, January 1, 2000 will be just another day at Fidelity. But if you're still wondering how you can prepare for 2000, here are a few tips from Fidelity:

**Stay the Course.** Maintain the same long-term investing focus. Investment markets advance and decline for many reasons, and the change to 2000 may - or may not - prove to be one of them. The most important thing to remember is that when you're investing for your retirement, you're investing for the long term.

**Plan Ahead ... Go Online.** The last week of this year and the first week of 2000 may be busy times for many customer service organizations, including Fidelity. If you plan to make changes to your account, you may want to do so in early December if possible, so you can avoid a potentially busier time later in the month. And if you do decide to check your account early in 2000, the most convenient way to do so is to visit Fidelity's Web site. You

can also access your account through [http://netbenefits.non\\_profits.com](http://netbenefits.non_profits.com) where you'll find a wealth of information about your account right at your fingertips, including your up-to-date account balance and 90-day transaction history.

## **Benefits After Retirement**

If the Personnel Office kept statistics on the most frequently asked questions by employees, benefit coverage after retirement would certainly rank high on the list. So, by popular demand, here's a quick summary of the situation once an employee decides to hang it up and head off into the sunset.

**Medical Insurance** - This is surely the most important component of the post-retirement benefit package. At NRAO an employee is eligible for continuation of the group medical insurance if he is at least age 55, and his age plus service equal 70. Therefore, at age 65 the employee would need only 5 years of service to qualify for continuation of coverage. If the employee and spouse are under age 65 they continue the same coverage and pay the same premium until each of them turns age 65 and enrolls in Medicare. At that point, NRAO's coverage is provided at no cost to each of them. It is important to note that for retirees and dependents under age 65, the NRAO premium remains fixed at the monthly rate last paid when the employee was actively working.

**Dental Assistance** - An employee and eligible dependents can elect to remain covered by the dental assistance plan for a maximum of 18 months after termination by paying the full premium charged to the Observatory for such coverage. The current rates are \$19.18 for one person, \$38.38 for two, and \$63.31 for three or more.

**Life Insurance** - Group life insurance coverage continues for only 31 days following termination. If an employee wants to continue coverage indefinitely both CIGNA, our carrier for the Basic life insurance, and The Hartford, our carrier for the Supplemental life insurance, offer conversion privileges which may be exercised within the 31 day carryover period. The good news about this conversion privilege is that no medical proof of insurability is required and an employee may purchase as much coverage as he desires (up to the same amount of coverage he held while in active service). Unfortunately, this coverage isn't cheap. For example, the annual premium for a 65 year old person is \$67.90 per \$1000 worth of coverage. In addition, there is an initial policy fee, which is \$150 regardless of the amount of insurance purchased. By contrast, a 65 year old pays \$13.44 per year for \$1000 worth of coverage under NRAO's supplemental life insurance program. The difference in cost is attributable to the type of life insurance which is available. The coverage under the conversion option is *ordinary life*, which builds up cash and loan value after a certain number of premium payments have been made. By contrast, NRAO's

## Benefits After Retirement (continued)

coverage is *term life*, which is life insurance coverage in its simplest form with no cash or loan value features.

Employees who are in good health should search the outside market before considering coverage under the conversion option. Many companies now offer attractive rates over the web for those who can pass the stringent medical underwriting requirements. It's important to give yourself lots of lead time so you can fall back on your conversion option if you can't obtain coverage elsewhere. Most retiring employees, after assessing the cost of coverage under the conversion option, decide not to continue their NRAO life insurance. However, for those who have not built up substantial sums in their retirement plan, or those who are in poor health when they retire, the conversion privilege is a worthwhile option. The Personnel Office will assist employees in making a decision in this regard and obtain cost quotes from the insurance carriers upon request. If you are contemplating retirement and life insurance is a concern to you, please give the Personnel Office plenty of advance notice so the necessary information can be developed.

**Long Term Disability Insurance** - Not much to say here...the coverage ends on the employee's last day of employment. There is no provision for continuing this coverage under a conversion option. Employees may want to consider *long term care insurance*, which can be purchased from most major insurance carriers, including NRAO.

Next issue we will examine the expanded array of income options which are available under the retirement plans. In the meantime, if any employee has a question concerning the benefit program after retirement please contact our office.

## Medical Insurance Open Enrollment

The open enrollment period for the Medical Insurance program begins November 22 and runs through December 21. If you are not presently enrolled in the program or if you have an eligible dependent who is not enrolled, you may apply for coverage during this 30 day period. Coverage will become effective on January 1, 2000. Employees or dependents who do not join the plan at this time will be ineligible to enroll until the next open enrollment period in late 2000.

### The premiums for the medical insurance program, effective January 1, are as follows:

	Bi-Weekly	Monthly
Employee Only	\$15.88	\$34.40
One Dependent	27.78	60.20
Family (Two or More)	39.97	86.60

If you wish to make any changes in your insurance coverage during this period, please contact the following individual for the appropriate forms:

**Charlottesville - Tavia Johnson**  
**Green Bank - Shirley Curry**  
**Socorro - Theresa McBride**  
**Tucson - Diane Miller**

## Promotions

Roger Dickenson to Technical Specialist II, GB  
Dale Frail to tenured Scientist, SO  
William Hale to Buyer, TU  
John Hibbard to Assistant Scientist, CV  
Charles Knapp to Telescope Operator II, GB  
Serna Lewis to Head/Eng Services Division, SO  
Kevin Long to Telescope Operator I, TU  
George Martin to Senior Systems Analyst, SO  
Jack Nelson to Technical Specialist III, GB  
Joe Rodriguez to Telescope Mechanic III, SO  
David Rose to Telescope Operator II, GB  
Mervel Runion to Electronics Engineer I, CV  
Phillip Sanchez to Telescope Mechanic III, SO  
Darrell Schiebel to Sr. Scientist Programming Analyst, CV  
John Shelton to Technical Specialist I, GB  
Harry Sipe to Technical Specialist II, GB  
Jon Thunborg to Deputy Head/Eng Services, SO

## New Employees

### Charlottesville

Eric Bryerton, Electronics Engineer I  
Ralph Groves, Technical Specialist II  
Tavia Johnson, Secretary A  
Eugene Lauria, Electronics Engineer I  
Michael Stogoski, Technical Specialist II  
Kiriaki Xiluri, Scientific Associate I

### Green Bank

Christine Rebinski, Research Assistant

### Socorro

Raul Armendariz, Electronics Engineer II  
Judi Berrong, Accounting Clerk A  
Aaron Cohen, Junior Research Associate  
Steven Durand, Electronics Engineer I  
Gareth Harris, Sr. Scientist Programming Analyst  
Robert Hayward, Electronics Engineer I  
Jolene Mares, Jr. Engineer Associate  
Steven Myers, Associate Scientist  
Deborah Shepherd, Assistant Scientist

### Tucson

Richard Prestage, Associate Scientist-Tucson Operations

(continued page 14)

## Departures

### Charlottesville

Dustin Bambic  
Jonathan Durbin  
Porter Mason, III  
Stephen Muckle  
Cristina Murray  
Christopher Power  
Kamaljeet Singh Saini

### Green Bank

Thomas Bania  
Cecilia Barnbaum  
Travis Burner  
Kevin Crump  
Christopher DeYoung  
Justin Elza  
Timothy Glaser  
Erik Heinemann  
Steven Hicks  
Jill Kamienski  
Michael Lacasse  
Valarie McLaughlin  
Emily Morton

Jason Ray

Steven Reeves  
Eric Ricottilli  
David Sand  
Michael Shank  
Seth Shinaberry  
Michael Sumner  
Shawn Taylor  
Angela Weadon  
Sarah Weadon  
Jeanine Wilson  
Scott Zemerick

### Socorro

Kee Apachito  
Gleason Baca  
Frank Broaddus  
Crystal Brogan  
Josette Chavez  
Teddy Cheung  
Julia Euart  
Michael Faison  
Raul Grajeda  
Philip Hardee  
Thomas Henderson  
James Herrnstein

### Socorro (cont.)

Bryan Jones  
Mackenzie Lystrup  
Jeremy Martinez  
Elizabeth McGrath  
Darrell Osgood  
Patrick Palmer  
Alison Peck  
Andreea Petric  
Niruj Mohan Ramanujam  
Elaine Romero  
Jose Sanchez  
Mary Ellen Sanchez  
Renee Saxton  
Colleen Schwartz  
Kerry Shores  
Hanna Smith  
Fernando Torres  
Peter Ulbricht  
Liese van Zee  
Jason Wallace  
Chadwick Young

### Tucson

Sean Andrews  
Tamara Helfer  
Andria Schwartz

## Retirees

### Socorro

Lawrence Beno, 20 years

### Charlottesville

George Kessler, 26 years

## Transfers

Clinton Janes from Head of Engineering Services Division to Head of Electronics Division-AOC

Hollister Meadows  
From KP to TU

**Note: Most departures represent the end of the summer student cycle.**



## In Remembrance

Gilbert "Buck" Peery 1920 - 1999  
Omar Bowyer 1926 - 1999



*Santa's beard gets a tug from Abigail Bryerton at the CV children's Christmas Party*

## 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: [rnorvill@nrao.edu](mailto:rnorvill@nrao.edu).

Deadline for article submission for the upcoming Winter issue is March 1, 2000.

NRAO is an Equal Opportunity - Affirmative Action Employer.

Happy Holidays!



**THE POINT SOURCE** is published quarterly by the Personnel office for the employees of NRAO.

Roy Norville, Editor

Patricia Smiley, Layout and Design

Printed on  
Recycled Paper





