NRAO NEWSLETTER

1 April 1993 No. 55

GREEN BANK

GREEN BANK TELESCOPE CONSTRUCTION

Structure - Grouting of the track to the concrete foundation is now complete, as work was carried out in heated tents throughout the winter. The strength of the in-place grout averages 13,500 psi, substantially in excess of the specified 10,000 psi. Each segment of the track is level to within 0.003 inches and the maximum run out in the total 660 foot circle of track is 0.008 inches. These values exceed the specifications of 0.005 and 0.020 inches, respectively.

The derrick crane, which will be used for most major lifts on the antenna, is in place on its 180 foot tower. The derrick has a 250 foot boom and is capable of lifting 135 tons while fully extended. Erection of the structure will also require two 15-ton fork lifts and a 165-ton crawler/crane.

Fabrication and trial assembly of the alidade have been completed at the RSI plant in Mexia, Texas. Most of the alidade steel has been shipped to the site where it awaits erection. Twelve of the sixteen azimuth wheel assemblies have been delivered to the site and the remainder should arrive in a few weeks. Eight wheels have been placed on the track along with their whiffle tree beams and await connection to the corner weldments. The erection has now progressed to the second alidade level, some 40 feet above the ground. The accompanying two figures show the state of the telescope as of the last week in March. Construction should proceed rapidly now that good weather is here, and the alidade erection should be complete by September.

The final design of the tipping structure, i.e., that part of the telescope that is connected to the elevation axis, has been received from RSI. It is now being analyzed extensively to insure conformance to specifications. Several consulting engineers have been hired to examine the individual structural members for wind vibrations and potential fatigue problems. An aerodynamic consultant is investigating wind response of the GBT substructures, such as the cantilever arm, the counterweight, and the reflector backup structure.

It is now apparent that because of delays in delivery of the final structural model by RSI, the delivery date for the antenna will be no earlier than mid 1995. This situation was not completely unexpected, for it was long recognized that the unique configuration of the GBT created unique structural challenge. This is in addition to the normal problems in designing a structure of this size and complexity. We are taking advantage of the delay to develop new techniques for surface panel setting which may eliminate the need for extra adjustments after the initial installation of the panels.

Electronics - Construction of the receivers is proceeding as outlined in GBT memos 66 and 69. The first prime-focus box is under construction. It will cover 290-920 MHz in four bands. The K-band gregorian receiver is assembled and being tested.

A spectrometer is under design that is based on a high-speed correlator chip being developed by the NASA Space Engineering Research Center. The spectrometer can be configured to provide up to 16 independent 1024 channel spectra each covering 1 GHz, 64 independent 4096 channel spectra each covering 62.5 MHz, and many intermediate arrangements. The design is now being refined to match detailed scientific requirements. A full description of the proposed device will appear in a forthcoming GBT memo which should be studied carefully by all interested parties so that any changes can be incorporated before construction begins. As of this writing, the development schedule is uncertain because the NASA chip has not yet been fabricated and because the software effort required is not fully determined.

Monitor and Control - At the suggestion of the GBT advisory committee, the 140 Foot Telescope will be used as a test bed for subsystems as they are developed. Many of the systems, e.g., the prime focus front end and the local oscillator, can be physically taken to the 140 Foot prior to their installation on the GBT. Use of the 140 Foot will allow us to exercise the software monitor and control system in the rigorous atmosphere of a working telescope. It is planned to have a skeleton system on the 140 Foot Telescope in the autumn.

F. J. LOCKMAN

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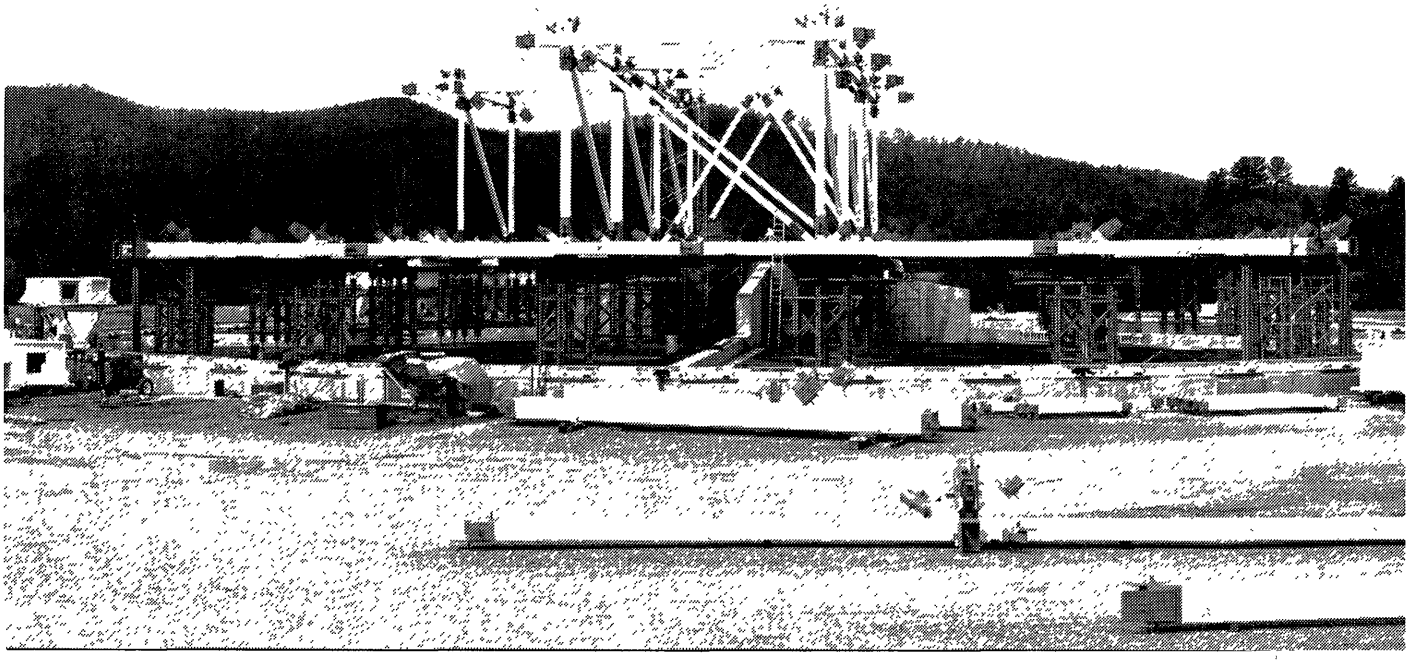
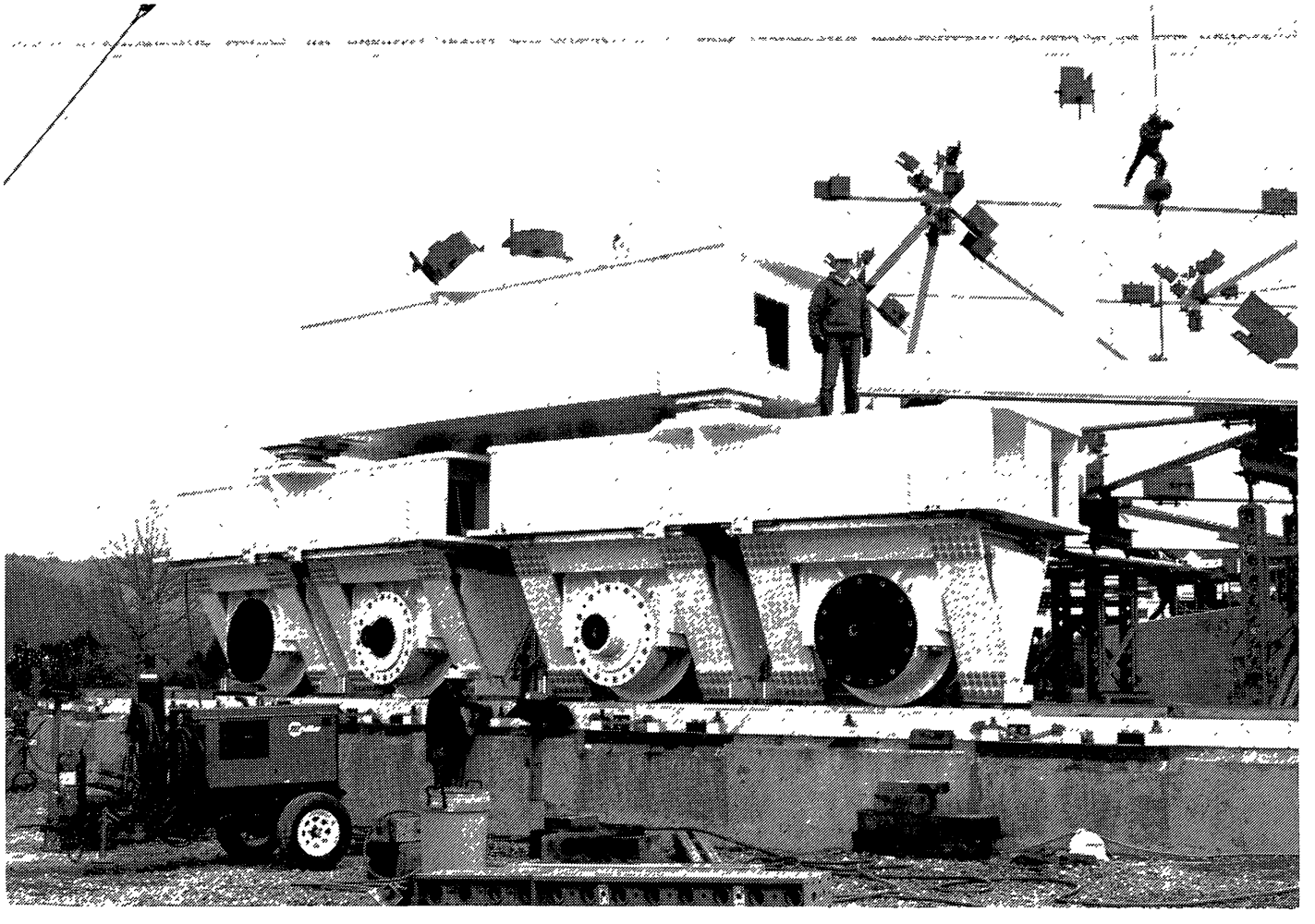




VLBA/VLBI

VLBA PROJECT

In 1992 NRAO received the last funds from the National Science Foundation for construction of the VLBA. The construction cost total was $84M. Peter Napier will remain VLBA (construction) Project Manager until the middle of this year to close out that phase of the Project. I want to thank him for the outstanding job he did in leading the Observatory team that built this complex, new facility.

With the end of the official VLBA construction phase, responsibility for the buildup of VLBA activities into full operations lies with the Array Operations Center management and the VLBA operations team. To simplify coordination during this transition phase, Tim Cornwell has been given responsibility for overseeing all the relevant activities. He will also act as the prime point of contact for inquiries concerning the status of the developing VLBA.

P. A. VANDEN BOUT

VLBA STATUS

The eight continental VLBA stations are now largely complete. The St. Croix antenna is awaiting completion of the Internet connection and some minor fixes but is being used for astronomical observations. Outfitting of the Mauna Kea antenna is now nearing completion. First radio signals were received there on 27 February 1993, and the first observing run to determine instrumental parameters was made on March 22. Test observations are continuing in Hawaii at the time of this writing. The completion of outfitting and the initiation of full-time observing is expected at the end of April. At that point, all 10 antennas of the VLBA will be complete and in operation.

The first batch of 200 thin tapes has been delivered and is now being transferred to glass self-packing reels prior to observing. The full complement of approximately 1000 thin tapes is expected to be in place by October 1993. The conversion of the station recorders and correlator playback drives to thin recording tapes is expected to be complete by the end of June.

Work on the VLBA correlator continues, with the immediate goal of passing a data set through the now-complete correlator to produce the first scientific image. This effort has been underway since December 1992, and has revealed a number of serious residual bugs, split evenly between hardware and software. These have since been fixed, and currently the key obstacles to satisfactory correlation are in controlling the playback drives. Data from a single pass of the tape drives (about 13 minutes in all) have been passed all the way through to AIPS to make a rudimentary image. A more complete "first science" effort is underway now with the goal of making two images, one continuum and one spectral line. After this milestone is passed, debugging of the large number of correlator modes is expected to take several months. The priorities are first continuum and wideband spectroscopy, followed by the polarization and narrow-band spectroscopy, astrometric observations, extraction of the pulse calibration signal, and pulsar modes. As each one of these modes becomes available, correlation of existing tapes will start. The VLBA is currently observing those projects for which correlation at other locations is possible. As the VLBA correlator comes on-line, VLBA observing of projects destined for the VLBA correlator will increase. For correlation of projects observed during the VLBI network runs, NRAO has contracted with Haystack Observatory for continued operation of the Haystack correlator through December 1993. Assignment of a project to one correlator or the other will be done by NRAO so as to optimize the use of both. An important element of the testing of the VLBA correlator will be comparison of the results with those from the MkIII correlator.

Debugging of the entire VLBA will continue for some time. For example, although some of the AIPS tasks required for VLBA processing have been present in the system for some time and have been used for MkII and MkIII to format VLBI data, the data path from the VLBA correlator has not been tested. In addition, many instrumental tests such as of polarization properties of the antennas are currently awaiting the turn on of observing and correlation. Continuing work is needed to improve a number of aspects of the array: general reliability, high-frequency sensitivity, the performance of the dual 13 cm/4 cm quasi-optic dichroic reflector system, radio frequency interference, and temperature control of the antenna vertex room.

T. J. CORNWELL

VLBI HARDWARE CHANGES AT THE VLA

At the end of the VLBI Network session in June 1993, the VLA staff will replace the MkIII VLBI hardware and controlling computer with a VLBA Data Acquisition Rack (DAR), and an interface designed to allow either analog sum or single antenna signals to be input to the DAR. The VLA will thereafter look much more like a VLBA site (although with less flexibility), and software will control much of the hardware setup which now requires VLA operator intervention. This will improve the reliability of VLBI at the VLA by reducing the chance of human error. VLBA electronics setup files will be prepared by the staff for standard VLBI observations which the VLA front-ends can accommodate; we also will gain VLBA capabilities for 2-bit sampling, and the full versatility of the VLBA recording modes (up to 256 Mbps). Dual polarization observations and MkII recording will still be supported at the VLA.

One result of this change is that VLBI at the VLA will no longer be compatible with MkIII stations using MkIII mode A (14 video converters x 2 sidebands x 2 MHz = 56 MHz total bandwidth). However, those stations with 4 MHz MkIII video converter filters can achieve bandwidth compatible with the VLA (and VLBA) by using MkIII mode B, double speed (7 channels x 2 sidebands x 4 MHz = 56 MHz). Mark IV systems with 8 MHz bandwidths and 2-bit samples will become available over the next few years. They will allow for compatible modes with the full 256 Mbps that can be recorded with the VLBA.

We expect the hardware changeover work to continue until about 1 July 1993, and thereafter fringe checks to VLBA sites will be made. Training for the VLA operators and data analysts also will be necessary to introduce them to the new hardware. If all goes well, we expect the VLA to be returned to active VLBI observing by mid-July.

M. CLAUSSEN

VLBI NETWORK CALL FOR PROPOSALS

Proposals for VLBI network observing are handled by the NRAO. The network sessions for 1993 are expected to be:

Session	Dates	Bands	Proposal Deadline
2	27 May to 17 Jun	1.3, 6, 18	1 Feb 1993
3	08 Sep to 29 Sep	1.3, 3.6/13, 6	1 Jun 1993
4	03 Nov to 24 Nov	3.6/13, 18, 90	1 Jun 1993

The first two sessions suggested (but not firmly scheduled) for 1994 are:

1	16 Feb to 09 Mar	1.3, 6, 18	1 Oct 1993
2	18 May to 08 Jun	3.6, 6, 50 or 90	1 Feb 1994

The Caltech Mark II processor will end routine correlation for the astronomical community at the end of 1993. In order to have an orderly shutdown of this facility, proposals for Mark II observation will not be scheduled after session 2, 1993, without assurances from the manager of a Mark II correlator that the observations can be processed.

We recommend that proposers use a standard coversheet for VLBI proposals. Fill-in-the-blanks ASCII forms and fill-in-the-blanks TEX files (for those who have TEX support on their home computers) are available by anonymous FTP from zia.aoc.nrao.edu, directory u/ftp/pub/vlbicover. Printed forms, for filling in by typewriter, are available on request from Meri Stanley, AOC, Socorro.

Any proposal requesting two or more antennas in the European VLBI Network (EVN) constitutes a global proposal. Global proposals MUST reach both networks' schedulers on or before the proposal deadline; allow plenty of time for mailing. In general, fax submissions of global proposals will not be accepted.

For global proposals, or those to the EVN alone, send to:

R. Schwartz
Max Planck Institut für Radioastronomie
Auf dem Hugel 69
D 5300 Bonn 1, Germany

For proposals to the US network, the VLBA only, or global proposals, send to:

Director
National Radio Astronomy Observatory
520 Edgemont Road
Charlottesville, VA 22903-2475 USA

B. G. CLARK

PROPOSING TO USE THE VLBA

REQUESTING JUST THE VLBA: The VLBA has conducted observing projects outside of VLBI Network sessions since 1990. The NRAO handles the proposing, refereeing, and scheduling processes for such VLBA-only projects. Proposal deadlines are February 1, June 1, and October 1. Observing periods are identical to those for the VLA regularly advertised in the NRAO Newsletter. Observing time is allocated by the VLA/VLBA Scheduling Committee. All proposals must be submitted to the NRAO with a VLBI Proposal Cover Sheet, which is available as described below. This cover sheet can be used to augment the VLBA request by a single VLA antenna or the phased VLA, without needing to submit a separate VLA proposal. Approved VLBA projects are scheduled by B. Clark.

REQUESTING THE VLBA IN A VLBI NETWORK PROPOSAL: The VLBA has participated in VLBI Network projects since 1987. The NRAO is involved in the proposing, refereeing, and scheduling processes for such projects. VLBA antennas may be requested during a VLBI Network session by submitting a VLBA proposal to the NRAO. Global VLBI observations require proposals both to the NRAO and to the European VLBI Network (EVN), as well as to any unaffiliated antennas. For more information, consult the VLBI Network Call for Proposals regularly advertised in the NRAO Newsletter and the EVN Call for Proposals.

REQUESTING THE VLBA AND THE EFFELSBERG 100 M: About 20 days of time per year, outside of VLBI Network sessions, has been reserved for joint VLBI projects involving the VLBA and the 100 m. Submit proposals both to the NRAO and to the Max-Planck-Institut für Radioastronomie.

VLBA DOCUMENTATION: Documents useful to proposers are listed below. These ASCII documents are updated regularly and are available via anonymous-guest FTP under the associated file names in directory "pub" on host "zia.aoc.nrao.edu" [146.88.1.4]. A guide to the FTP facility, as well as paper copies of these documents, can be requested from the undersigned.

Document Title	File Name
VLBA Astronomical Readiness	astro.vlba
VLBA Specifications Summary	specs.vlba
VLBA Construction Status	status.vlba
VLBA Observational Status Summary	obssum.vlba
Proposing to Use the VLBA	prop.vlba
Basic VLBA Observing Modes	bas_modes.vlba[1]
Standard VLBA Observing Modes	std_modes.vlba[1]
Setup Files for SCHED	setup_names.vlba[1]

Note: [1] Mainly of use to VLBA format proposers.

VLBI PROPOSAL COVER SHEET: This cover sheet can be used for VLBA or for global VLBI proposals. TEX or ASCII versions authored by B. Clark are available via anonymous-guest FTP on host "zia.aoc.nrao.edu" [146.88.1.4] in directory /u/ftp/pub/vlbicover. Be sure to read the README file in that directory. Printed cover sheets can be requested from the undersigned.

RECORDING FORMATS AND CORRELATION: The VLBA can record data in Mark II, Mark III, and VLBA formats. With the impending end of Mark II operation at the Caltech Block II correlator, Mark II observations are expected to be rare in the future and Mark II proposers must have made prior arrangement for access to correlation facilities. Mark II recording capability will continue to be supported at SC, HN, NL, PT, OV, BR, and MK while there is demand. Mark III projects can be correlated at Bonn and, to a limited extent, at Haystack. The VLBA correlator is now in the late stages of debugging. It should soon take over correlation of nearly all VLBA projects done either during or outside of VLBI Network sessions.

J. M. WROBEL and R. C. WALKER

SUMMER SCHOOL ON VLBI TECHNIQUES AND THE VLBA

The VLBI/VLBA Summer School will be held in Socorro June 23-30, 1993. The school is aimed at students and researchers who already have a basic background in radio interferometry. It will cover concepts of VLBI and the capabilities of the VLBA. Lectures and demonstrations will be given by NRAO staff and experts from the VLBI community. We are planning to publish proceedings.

A small number of additional participants can be accommodated. For further information, please contact Terry Romero at NRAO, P. O. Box O, Socorro, NM 87801; e-mail tromero@nrao.edu; phone (505) 835-7315; fax (505) 835-7027.

A. ZENSUS

VLBA OPEN HOUSE

The official opening of the VLBA is scheduled for August 20, 1993 at the Array Operations Center (AOC). The ceremony will include tours and demonstrations of VLBA operations and of the correlator.

T. ROMERO

VLA

VLA CONFIGURATION SCHEDULE

Configuration	Starting date	Ending date	Proposal Deadline
B	19 Feb 1993	10 May 1993	01 Oct 1992
CnB	21 May 1993	07 Jun 1993	01 Feb 1993
C	11 Jun 1993	30 Aug 1993	01 Feb 1993
DnC	10 Sep 1993	11 Oct 1993	01 Jun 1993
D	15 Oct 1993	24 Jan 1994	01 Jun 1993
A	18 Feb 1994	25 Apr 1994	01 Oct 1993
BnA	06 May 1994	23 May 1994	01 Feb 1994

The maximum antenna separations for the four VLA configurations are: A-36 km, B-11 km, C-3 km, D-1 km. The BnA, CnB, and DnC configurations are the hybrid configurations with the long north arm, which produce a round beam for southern sources (south of about -15 degrees declination).

APPROXIMATE LONG-TERM SCHEDULE

	Q1	Q2	Q3	Q4
1993	B	B,C	C	D
1994	A	B	B,C	C
1995	D	A	B	B,C
1996	C	D	A	B
1997	B,C	C	D	A

Observers should note that some types of observations are significantly more difficult in daytime than at night. These include observations at 327 MHz (solar and other interference; disturbed ionosphere, especially at dawn), line observations at 18 and 21 cm (solar interference), polarization measurements at L band (uncertainty in ionospheric rotation measure), and observations at 2 cm and shorter wavelengths in B and A configurations (tropospheric phase variations, especially in summer). Observers should defer such observations for a configuration cycle to avoid such problems. The B configuration daytime will occur at about 23^h RA, and the C configuration daytime will be about 8^h RA.

Time will be allocated for the VLBA on intervals approximately corresponding to the VLA configurations from those proposals in hand at the corresponding VLA proposal deadline.

B. G. CLARK

COMPUTING AT NRAO-NM

As announced in earlier newsletters, two of the oldest NRAO-NM computers were turned off during the past few months: OUTBAX, the 11/750 at the VLA site, was shut down on February 25; and Cholla, one of our two Convex C1s, was turned off on March 15. All critical functions these systems performed were moved to other computers prior to the shutdowns. We still have one VMS system, the VLBA MicroVAX-II, which we expect to keep running for at least the next couple of years, and one Convex (Yucca), which will most likely continue to operate for at least another six months.

A significant change that visiting observers will notice is that we are now duplicating VLA data from the Modcomp 9-track tape onto Exabyte 8 mm cartridges, and sending the Exabytes to the AOC. This is a change for the better in a number of ways: the duplication process is easier for the VLA array operators, there are more loading devices at the AOC (all reservable public workstations at the AOC are equipped with Exabyte drives, so observers can load directly on their own reserved system), and FILLM runs considerably faster on Suns and IBMs (regardless of whether the Exabyte drive is local or remote) than from the Convexes with 9-track drives. The change appears to have been quite successful.

Like the 9-track duplicates, each Exabyte contains the data from a single original tape (the tapes will be recycled once the data has been permanently archived), and they are located in a cabinet in the tape vault off the AOC computer room. Tapes should be signed out and signed back in when you are finished with them. There is only a single copy of the data at the AOC, so it is critical that the tape be returned as soon as loading has completed, since other observers may need data from it as well.

The archive tape project has now begun actively copying tapes at the AOC. Initially we will be recovering some of the most recent tapes for recycling purposes. After that, we will begin copying older tapes. Current data will be archived periodically, when enough has been collected to fill an 8 mm tape (approximately 15, 9-track tapes). During the translation process, the header information is extracted and built into a database, which astronomers will in the future be able to use to find archival data of scientific interest to them.

Installation of an Uninterruptible Power Supply (UPS) in the AOC computer room is almost complete. This will provide continuous power primarily for VLBA monitor and control operations at the AOC, and will also support the general-purpose Solbourne (zia) and the high-performance NFS server which provides software to the Sun workstations. While this will not prevent power loss to the workstations distributed around the AOC, it will mean that their recovery from power failures should be quicker, since it will not be necessary to wait for the motor-generator in the basement to be reset.

R. MILNER

REFERENCE POINTING

A new on-line system function, called "reference pointing," is currently under development at the VLA. Reference pointing allows one to correct primary beam pointing errors on program sources by observing a nearby pointing calibrator. Initial tests at 1.3 cm suggest that reference pointing can improve fringe amplitudes by as much as 30 percent. A new version of OBSERVE is being prepared to allow remote observers to add reference pointing scans to their observations. If you would like to try reference pointing in your observations, contact Doug Wood for more information.

D. WOOD and K. SOWINSKI

VLA ARCHIVE DATA UPDATE

The VLASORS program data files have been updated to include all the 1992 archive data and program information. In addition, the VLA calibrator files have been updated to the most current set. The program and data are available from either anonymous ftp on the NRAO computer "zia" in the public subdirectory named /pub/vlasors or on high density 3.5" and 5.25" floppy diskettes. Requests for the diskettes should be made to Meri Stanley by e-mail (mstanley@nrao.edu) or by U.S. mail (M. Stanley, P. O. Box O, Socorro, NM 87801). Please be sure to include your mailing address and diskette size.

R. C. BIGNELL

VLA CAFETERIA

The cafeteria at the VLA site was closed in February. One of the rooms formerly used for lodging in the Visiting Scientist Quarters at the VLA site is being converted to a lounge and kitchenette for use by visiting astronomers. This project will be completed by May.

T. ROMERO

TRANSPORT OPTIONS TO/FROM THE ALBUQUERQUE AIRPORT

1) The Socorro Roadrunner Shuttle service operates on a schedule as listed below and the rate is $25 each way. *(See note.)

   *Note: Avoid a long wait at the Albuquerque airport. Review the schedule below and make your travel plans accordingly.

2) Dollar-Rent-A-Car rental agency has agreed to provide NRAO with Government rates of $26/day or $136.50/week as long as the reservation is made through the NRAO reservation system.

SOCORRO ROADRUNNER SHUTTLE SERVICE SCHEDULE

(Travel time ~ 1 hour and 30 minutes each way)

Albuquerque Airport to Socorro	Socorro to Albuquerque Airport
0900	0600
1400	1100
1900	1600
2400	2100

T. ROMERO

12-METER

260 - 300 GHz SIS RECEIVER SET COMPLETED

The 260-300 GHz, dual-polarization SIS mixer pair was completed and installed in the 1 mm cryostat earlier this year. The completion of this receiver set is the culmination of a program to construct state-of-the-art SIS receivers covering all the atmospheric pass bands between 68 and 300 GHz. The 12 Meter has five receiver bands covering 70-90 GHz, 90-116 GHz, 130-170 GHz, 200-260 GHz, and now 260-300 GHz, all with dual polarizations. At times this year, all ten mixers have been simultaneously cold to 4 K and available for use on the telescope. These receivers each have closed-cycle cryogenics, and each can be tuned single sideband with > 20 dB image rejection. Image rejection is achieved through backshort tuning with the 2 mm and 3 mm receivers, and quasi-optically with the 1 mm receivers. The receiver development project is a collaboration between the Central Development Laboratory and the Tucson staff. The high frequency receiver will next be scheduled in the late autumn.

TUCSON RECEIVER GROUP

DISH SURFACE IMPROVEMENTS

In mid-March, the 12 Meter Telescope staff reset the antenna surface panels and produced a significant improvement in dish surface accuracy. The aperture efficiency at 230 GHz was increased to 30 percent, and a significant increase in the antenna temperature of small-diameter sources was immediately apparent. This resetting successfully removed some aberrations in the dish surface that had been introduced a few years ago during some unavoidable repair work to the antenna backup structure. An error-correcting subreflector had been in use in the interim which partially corrected the distortions. We believe that the primary surface of the dish is now significantly better than at any time in the past.

The success of this resetting project derives from a number of improvements in our techniques of surface measurement and adjustment. The process involves several steps. Holography data is taken from a 38 GHz signal provided by the LES8 satellite. Several improvements have been made to the holography receiver to make it more sensitive and more stable. Data-acquisition has also been improved immensely. We can now obtain a 4 degree-square, continuously scanned, 129 by 129 point holography map in about 1 hour 45 minutes; in previous years a map one-quarter this size took nearly a week to obtain! The holography map can be reduced within minutes and the data supplied to a panel-fitting program that fits for optimum screw settings. This program makes use of a finite-element analysis of the behavior of the panels under screw tension at various points of the panels. A mechanical sensor jig is then placed in the dish, supported on ball bearings at the center and at the edge of the dish. Armed with the predictions of the panel-fitting program, the "screw-turners" use a real-time computer display that differences the setting goals for each panel and the current readouts from the sensors to achieve best adjustment of each panel. A full iteration of holography, fit predictions, and panel adjustments can be made in 24 hours now. This project is a team effort involving most of the Tucson staff.

Analysis of the remaining residuals in the surface fits suggest that there is yet more room for improvement. We plan to have another iteration during our summer shutdown period.

THE TUCSON STAFF

IN GENERAL

MILLIMETER ARRAY

In March we met with representatives of the NSF Division of Mathematics and Physical Sciences to discuss the work to be done in the development phase of the MMA project. You will recall that in September we gave to the Foundation, at their request, the Millimeter Array Design and Development Plan that summarizes our schedule and cost to design and prototype the major hardware components of the MMA. In addition, the Plan includes funding to support development of manufacturing and fabrication techniques that will allow us to produce nearly identical copies of the receiver system and other components in a routine fashion. We had hoped to begin the major development work with sufficient funding in 1994.

Programs seeking funding in excess of $1.5M per year at the NSF must receive the approval of the National Science Board, the body given oversight responsibility for the NSF. Unfortunately the MMA Design and Development Plan was not presented to the NSB in time for them to consider its funding implications for FY 1994. This means that whatever work is done in 1994 will be funded at a level less than $1.5M. However, even with this amount of money it will be possible for us to establish some working relations with those industrial concerns that have expressed an interest in MMA antenna design issues, and we will be able to accelerate our work on SIS device fabrication and to test millimeter-wave HFET amplifiers. Meanwhile, in 1993 we are continuing to work on the site studies and on receiver and antenna design.

This year we are completing the second year of the two-year biological assessment of the potential MMA site in the Magdalena mountains. The work done this year is essentially a duplication of the biological work done last year; it provides a crude statistical measure of the year-to-year fluctuation of the resident biological species. In addition we are working on a direct comparison of the atmospheric temperature fluctuations measured by the NRAO 225 GHz tipping radiometer and the phase fluctuations seen by the SAO interferometer. Both instruments were on South Baldy two winters ago.

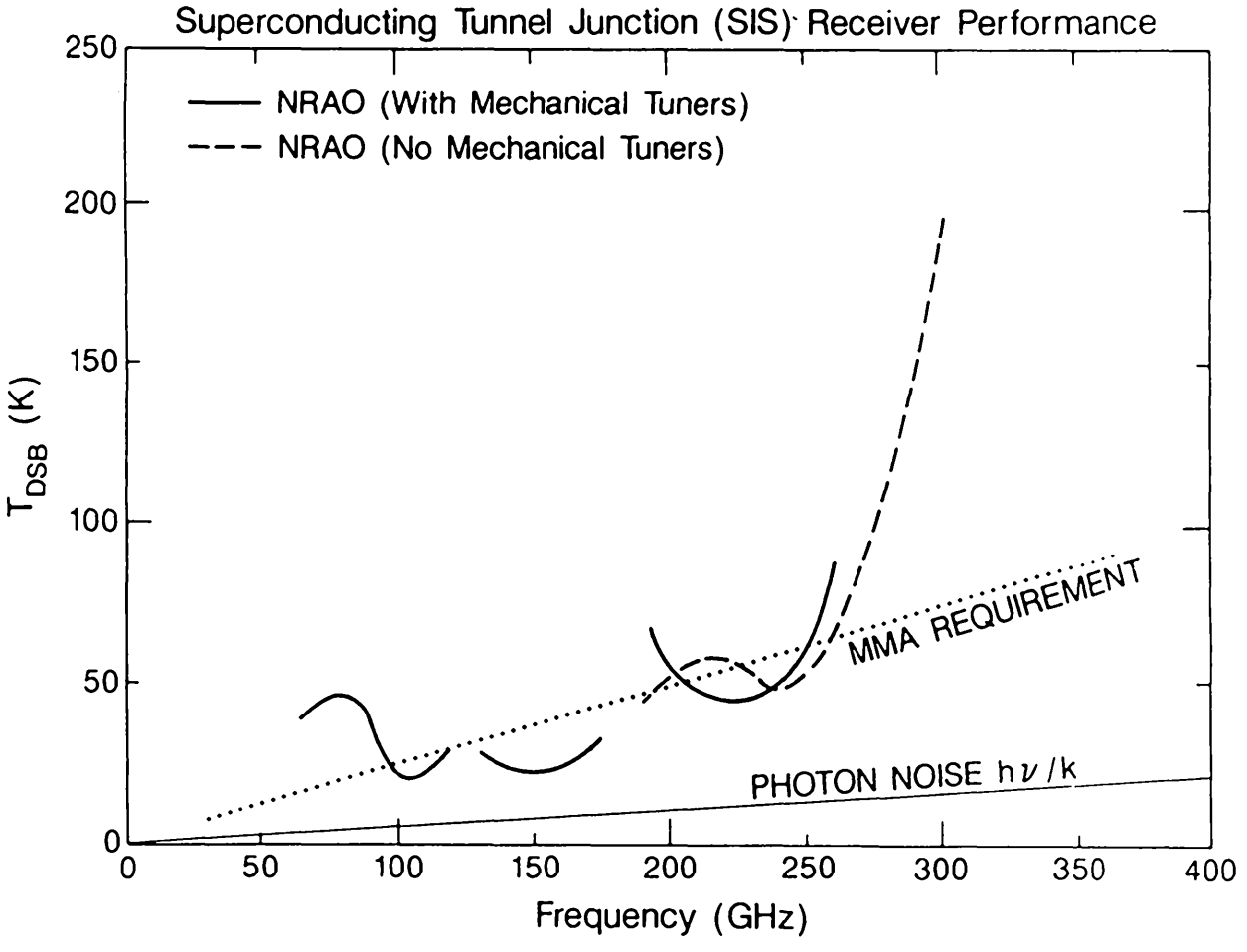
The tipping radiometer on Mauna Kea has completed three months of nearly continuous measurements of the transparency and stability of the sky at the VLBA telescope at the 12,000-foot level on the mountain near an area that may be suitable for the MMA. A preliminary comparison of the opacity measured by the tipper at the VLBA location with that from the tipper at the CSO shows the excellent correlation that one might expect and the result that the opacity at the lower elevation is approximately 20 percent greater than that at the CSO site. There is also a small, but noticeable, sidereal effect in the opacities measured at the lower elevation. Analysis of the stability measurements is pending.

The antenna design continues to progress well, with the emphasis being on the very stiff slant axis design outlined by Cheng in MMA Memo 94. Once the design is reasonably well in hand, it is our intention to use the information on real thermal gradients which we measured on the BIMA antennas as part of the Joint Development Group collaboration to guide a choice of the material to be used in the antenna backing structure and, to a lesser extent, for the surface panels.

Recent progress with both the high-frequency SIS mixer receivers and millimeter-wave cryogenic HFET amplifiers is very encouraging. Presently we are running on the 12 Meter Telescope SIS receivers from 68-300 GHz whose performance meets the goals set for the MMA receivers with one exception: the present generation of receivers employs mechanical tuners. Experimental tunerless 1 mm mixers fabricated to our design at UVa have provided performance competitive with the mechanically tuned devices. Work on these devices, and similar devices at other MMA wavelength bands, will continue. The MMA receiver performance goal seems well within reach (see the accompanying figure).

Finally, we have available for distribution a collection of MMA slides and viewgraphs that summarize the essential technical and scientific aspects of the array. If you would like copies of this material to use to illustrate your talks and to inform others about the unique capabilities of the MMA, please contact me.

R. L. BROWN



USERS COMMITTEE MEETING

The NRAO Users Committee this year will meet June 3,4 in Tucson. As is customary, the Committee will have the opportunity to discuss all aspects of the Observatory operation and plans as they affect the NRAO user community. The Users meeting is meant to be genuinely informative. The Committee members are asked both to solicit issues from their colleagues to be raised at the meeting and subsequently to share the information presented with others. I hope that you will take the time to contact any member of the Users Committee (listed below) if there are Observatory issues that you would like to see raised at the meeting.

R. L. BROWN

NRAO USERS COMMITTEE - 1993-94

Dr. Mary A. Barsony
Center for Astrophysics

Dr. Franklin H. Briggs
University of Pittsburgh

Dr. Edward B. Churchwell
University of Wisconsin

Dr. James M. Cordes
Cornell University

Dr. Rachel J. Dewey
Jet Propulsion Lab

Dr. John M. Dickey
University of Minnesota

Dr. Nebojsa Duric
University of New Mexico

Dr. Debra M. Elmegreen
Vassar College Observatory

Dr. Andrew S. Fruchter
University of California

Dr. Ralph A. Gaume
Naval Research Laboratory

Dr. Carl R. Gwinn
UC, Santa Barbara

Dr. Colin J. Lonsdale
Havstack Observatory

Dr. Colin R. Masson
Center for Astrophysics

Dr. Karl M. Menten
Center for Astrophysics

Dr. Lee G. Mundy
University of Maryland

Dr. Mark J. Reid
Center for Astrophysics

Dr. F. Peter Schloerb
University of Massachusetts

Dr. Russell Taylor
University of Calgary

Dr. Jean Turner
University of California

Dr. Stephen C. Unwin
Caltech

Dr. Ann E. Wehrle
Jet Propulsion Lab

Dr. Rogier A. Windhorst
Arizona State University

Dr. David Woody
Owens Valley Radio Obs., Caltech

Dr. Lucy M. Ziurys
Arizona State University

STAFF APPOINTMENTS

It is a pleasure to announce new appointments to the scientific staff. Dale Frail will join the staff as an Assistant Scientist on 1 July 1993. He has been with the Observatory as a postdoctoral fellow since 1989.

New Jansky Fellows include Claire Chandler, moving to Socorro from Caltech in early 1994; and David Nice, moving from Princeton to Charlottesville in the summer of this year.

Best wishes to departing Jansky Fellows Chris Carilli, leaving for the Leiden University, The Netherlands; and Junhui Zhao, leaving for the Center for Astrophysics.

P. A. VANDEN BOUT

OBSERVATORY PUBLIC RELATIONS

NRAO users are urged to communicate new scientific results and images or illustrations of such results to David Finley in Socorro, e-mail (dfinley@nrao.edu), telephone (505) 835-7302. He is gathering such material for use in the NRAO display that is taken to scientific meetings and in other presentations made by the Observatory. He would be happy to assist in preparation of press releases users may want to issue.

P. A. VANDEN BOUT

BILLY L. MEREDITH, SENIOR SCIENTIFIC PROGRAMMING ANALYST

Bill's many friends in the community will be saddened to learn of his death from cancer on 18 March. Funeral services were held on 23 March in St. Albans, WV. We extend our sympathy to his wife, Norma Dean, and to members of his family. Contributions in Bill's name may be made to Socorro Home Health Care, P. O. Box 1009, Socorro, NM 87801.

A native West Virginian, Bill was one of the very early NRAO employees, employee #55. He first went to Green Bank in 1958 as a telescope operator, and soon worked closely with Dave Heeschen and with Frank Drake on Project Ozma. Although he left in 1963 to work at JPL, he returned to NRAO-Charlottesville in 1969, working first on the interferometer and then on VLBI. VLBI astronomers are especially indebted to him for his efforts in keeping the Mark II correlator running to this day. Bill served as Associate Computing Division Head from 1978 until transferring to the VLBA Project in Socorro in 1987. He also spent a summer working in Tucson, making him one of the very few NRAO employees to have worked at all four sites.

We knew that spring was finally here when Bill started riding his motorcycle to work, and winter was afoot when he started organizing ski trips. Summer, of course, brought volleyball, softball, and bicycling. Countless NRAO employees and summer students, many of whom are now themselves established scientists, have participated with him in enthusiastic sporting matches. As an avid runner, Bill also was a dedicated participant in events such as the Charlottesville 10-Miler and the Magdalena-to-Kelly race.

Bill's kindness and wonderful sense of humor livened the day for all of us who had the privilege to work with him. We will miss him.

THE EDITOR

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