



# NRAO NEWSLETTER

1 October 1991

No. 49

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## GREEN BANK

### GREEN BANK TELESCOPE CONSTRUCTION PROGRESS

During the period since the last Newsletter, the Green Bank Telescope (GBT) project has moved from a pure design phase to a mix of design and active construction. Foundation construction has begun, targeted to be finished late in 1991 so that the concrete can be completely cured before steel erection begins.

In June 1991 the Green Bank Telescope's prime contractor, Radiation Systems, Inc., (RSI) selected Vecellio and Grogan as subcontractors for the foundation. Onsite work began almost immediately thereafter. The first major steps were to excavate a hole for the pintle bearing and a ring for the azimuth track foundation. These excavations went to a hard shale layer at a depth greater than 20 ft. Tests of bearing strength of the rock layer showed it to be greater than the soil core tests had predicted, a plus for the GBT.

Following excavation, forms were erected, reinforcing steel installed, and concrete poured. As of September 26, 1991, roughly 2,000 cubic yards of concrete is in place. Another 2,000 yards remain to be poured. The concrete in place for pintle bearing support consists of a base in the form of a disk 5 ft thick and 60 ft in diameter. This base supports a hollow tower 15 ft in diameter and, so far, about 20 ft high but eventually 31 ft high. Tower wall thickness is about 2 ft. The tower is stabilized by eight radial vanes, four of which are 2 ft thick by 9 ft high by 22 ft long and four of which will be 2 ft thick by 30 ft high by 22 ft long.

Radial concrete beams will connect these taller vanes with the azimuth track. Dirt is being compacted in place about the tower and the vanes at the time of this writing.

All but one 30 degree segment of the azimuth track foundation are in place, one being left out for now to provide vehicle and equipment access to the pintle bearing. The foundation so far consists of a pad 210 ft in diameter by 12 ft wide by 3 ft thick. Upon this pad a vertical wall 4 ft thick and 19 ft tall will be constructed. The base of the wall will be stabilized against shear by adding a concrete band 1 ft thick and 5 ft high. These vertical walls and the grade beams connecting them to the pintle beam's vanes make up the remaining 2,000 yards to be poured before the onset of severe winter.

Those who have read this far through a tedious description of a hole in the ground being filled with reinforced concrete will be delighted to know that there is an important point to be made: the 4,000 yards, or 8,000 tons, of concrete will be sufficient, according to detailed calculations, to make no significant contribution to the GBT's pointing error budget (i.e., a contribution  $<< 1$  arcsec).

From now until late 1994, we anticipate few, if any, pauses in the construction activity in Green Bank.

G. A. SEIELSTAD

### NATIONAL RADIO QUIET ZONE

A case involving applicants to the Federal Communications Commission for a license to operate a television transmitter in Channel 64 (770-776 MHz) has passed another stage in the legal process. The Commissioners themselves, by unanimous action, denied both applications, one to locate inside and one outside the National Radio Quiet Zone. They did so to protect the National Radio Astronomy Observatory in Green Bank against harmful interference.

The case has been heard twice by an Administrative Law Judge and twice by a Review Board. The Commission itself is the last chance for appeal within the administrative framework. Any further appeals will have to be filed in the Civil Courts, specifically, with the Circuit Court of Appeals.

G. A. SEIELSTAD

## VLBA

### VLBA SELECTED CONSTRUCTION ITEMS

#### STATIONS STILL UNDER CONSTRUCTION

Hancock, NH - Antenna erection was completed in July 1991. Electronic outfitting is underway and scheduled for completion in December 1991.

St. Croix, VI - Antenna erection is essentially complete. Outfitting is scheduled to start in October 1991. Operability is scheduled for April 1992.

Mauna Kea, HI - The antenna foundation is complete, and the control building is scheduled for completion in October 1991. Antenna erection is scheduled to start in October 1991, and outfitting should be complete before the end of 1992.

ELECTRONICS - Construction of all currently planned electronic receiving system hardware for the VLBA will be completed in 1992. Front ends for all frequency bands except 2.3, 14, and 43 GHz are scheduled to be constructed by the end of 1991. The last 2.3 GHz front end should be completed early in 1992. The 14 GHz front ends will be the last to be completed and will take until about mid-year 1992.

DATA RECORDING - VLBA recorders through serial #21, including two parts kits assembled at the AOC, have been shipped from Haystack Observatory. Deliveries from the third production run of eleven, through serial #32, are

expected to start in November 1991, with shipment intervals of approximately two weeks. Tests of thin tape are continuing at Haystack Observatory.

MONITOR AND CONTROL - The on-line software system for the VLBA stations is now in a moderately mature state, although significant enhancements remain to be added. These include: automatic control of observe file distribution, automatic tape reversal/track allocation, major improvements to the monitor data logging system (especially for logging calibration data), and better active diagnostic routines for checking the hardware.

CORRELATOR - Nearly all major hard- and software modules in the correlator and its playback interface are complete, and system integration is well advanced. System-level checkout of the hardware components has started, and will continue at least through the end of 1991. Progress in the hardware integration and checkout is expected to permit joint checkout with the control software to start by the beginning of October 1991. The principal construction task remaining thereafter is verification of performance in its many functional modes, which is expected to last through the first quarter of 1992. At that point the correlator will be moved to the AOC and integrated into the operational VLBA environment.

K. J. STETTEN

### NEW VLBA PROPOSAL COVER SHEET

A new VLBA proposal cover sheet is attached. It supersedes all previous VLBA cover sheets and must accompany proposals for the use of operational VLBA antennas outside of VLBI Network runs. The 1 July 1991 NRAO Newsletter outlines proposal guidelines and describes how to obtain VLBA documents useful to proposers. Since that Newsletter item, one aspect of the

proposal process has changed: for approved VLBA projects, B. Clark, the VLBA scheduler, will coordinate processing approval with the correlator indicated on the proposal cover sheet. This change is reflected in the new cover sheet.

J. M. WROBEL



# VLBA

## Interim Observing Application

Do not use after February 1, 1992

Received:
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**DEADLINES:** 1st of Feb., June, or Oct.

**SEND TO:** Director, NRAO, Edgemont Rd., Charlottesville, VA 22903-2475

**1. Date Prepared:**

**2. Title of Proposal:**

3.	Authors	Institution	Grad Student?	Ph.D Thesis obs?

**4. Contact Author for Scheduling:**  
Address:

**5. Telephone:**  
Twx:  
E-Mail:  
(network)

**6. Antennas Requested:** (Observer must coordinate with non-VLBA stations.)

VLBA:  SC  HN  NL  FD  LA  PT  KP  OV  BR

Non VLBA:

**7. Wavelengths:** (See announcements for availability.)

90 50 20 (18 to 21) 13 6 4 3 2 1 cm 7 mm

**8. Number of Baseband Converters per Station:**

**9. Time Requested:**

11. Type of Observation:  Single Dish,  Interferometry,  Monitor,  Spectral Line,  Continuum,  
 (Check all that apply.)  Linear Polarization,  Circular Polarization

12. Scientific Category: (e.g., Solar, Maser, Pulsar, Quasar, Geodesy, Etc.)

13. Related Proposal: (Previous or current.)

14. Observing Style:  Will be present  Will prepare observing files  Request NRAO to prepare files

15. Help Required:  None  Consultation  Friend (extensive help)  Staff collaborator

16. Recording Requirements:

System to be used:  MkII,  MkIII (Mode ),  VLBA,  Other

Number of tapes required/antenna:

17. Processing Requirements

18. Fringe Finder List:

Where will tapes be processed?:  
 How much time will be needed?:

19. If you request non-NRAO telescopes, explain why this proposal was not submitted to existing VLBI networks.

**FLUX DENSITY**

20. Source List (Add page if necessary.)	Coordinates		GST range requested	Total (Jy)	Mean Correlated Long baseline (mJy)	Image RMS needed (mJy/beam)	Image dynamic range needed (peak/RMS)
	Epoch 1950 RA (hh mm)	Dec (xx° .x)					

21. Special Hardware, Software, or Operating Requirements: (Indicate operator of non-VLBA hardware.)

22. Preferred Range of Dates for Scheduling:

23. Dates Which are not Acceptable:

24. Please attach a self-contained Scientific Justification not in excess of 1000 words. (Preprints or reprints will not be forwarded to referees.)

**VLA****VLA CONFIGURATION SCHEDULE**

Configuration	Starting Date	Ending Date	Proposal Deadline
BnA	05 Oct 1991	23 Oct 1991	15 Jun 1991
B	01 Nov 1991	20 Jan 1992	15 Jun 1991
CnB	31 Jan 1992	17 Feb 1992	15 Jun 1991
C	21 Feb 1992	18 May 1992	15 Oct 1991
DnC	29 May 1992	15 Jun 1992	15 Oct 1991
D	19 Jun 1992	14 Sep 1992	1 Feb 1992
A	02 Oct 1992	28 Dec 1992	1 Jun 1992

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).

Dates given above are about three weeks later than in previous newsletters. Additional time had to be allocated

to the A-B reconfigurations because only one transporter was functioning at that time, and we decided to slip the schedule rather than to cut into the length of time we spend in the B configuration.

Note, also, that beginning in February next year, the proposal deadline is being changed to the first of the month to align with US and European VLBI network proposal deadlines.

**Approximate Long-Term Schedule**

	<u>Q1</u>	<u>Q2</u>	<u>Q3</u>	<u>Q4</u>
1991	C,D	D	A	B
1992	B,C	C	D	A
1993	B	B,C	C	D
1994	A	B	B,C	C
1995	D	A	B	B,C

Observers should note that in these years of sunspot maximum, daytime observations at 327 MHz are unlikely to be successful in the smaller configurations because of solar interference and in the larger configurations because of a disturbed ionosphere. In particular, only the most

urgent C configuration observations near 01<sup>h</sup> RA should be considered. D configuration observations near 09<sup>h</sup> RA will also be difficult.

B. G. CLARK

## USING SPECTRAL LINE MODE FOR CONTINUUM OBSERVATIONS

Although most continuum observations are taken care of by the VLA in its standard continuum mode, some may benefit from using the digital correlator in spectral line mode, especially since the 4IF mode has become available. There are several reasons for this. At wavelengths of 6 cm or longer bandwidth smearing can become important. Depending on how large a field of view is required, you reduce the total bandwidth from 50 MHz per IF to 25 or 12.5 MHz and observe in continuum mode, or select a bandwidth of, e.g., 25 MHz and observe in spectral line mode, using 3.125 MHz wide channels.

A second situation in which spectral line mode is preferred is when trying to achieve very high dynamic range maps (larger than about 5,000:1 at P-band and of order 100,000:1 at other wavelengths). The closure errors are significantly reduced and can be calibrated out by observing in spectral mode (see e.g., the discussion in Chapter 16 of "Synthesis Imaging in Radio Astronomy," eds. R. A. Perley *et al.*, A. S. P. Conf. Ser. Vol 6 (1989)).

Lastly, at wavelengths of 20 cm or longer spectral line mode may be preferred over continuum mode because of strong interference. One strategy which has been successful at P-band, where interference is mainly found at multiples of 5 MHz and 1 MHz, is to observe in 4IF mode. In this case a 6.25 MHz wide total bandwidth is selected for each IF pair, and the AC & BD IFs are centered at 320 MHz and 330 MHz, i.e., on the strong interference spikes. In the calibration stage, discard the continuum channel (also known as "Channel 0" data) and create a new continuum by selecting only those channels which are interference free.

It should be noted, however, that there is a price to pay. The amount of data is increased by an order of magnitude. Secondly, in a standard continuum run the two IF pairs (AC and BD) are put at different central frequencies so as to cover a total of 100 MHz. In spectral line mode the widest band which can be usefully employed is 25 MHz. After discarding the "edge" channels, choosing the band centers again in such a way that they cover different frequencies, a total bandwidth of about 35 MHz can be synthesized. This corresponds to a drop in sensitivity of  $\sqrt{3}$ .

Moreover, when using this set-up the cross terms, which provide information on the linear polarization, are lost. When full polarization information is essential, choose the PA (or PB) spectral line mode which essentially employs one IF pair (either AC or BD) and provides all four Stokes parameters. In that case the effective bandwidth is reduced to about 18 MHz which, in order to achieve the same signal to noise as in a standard continuum run, would require a six-fold increase in observing time.

In short, observing in spectral line mode can be a great way to reduce instrumental effects such as bandwidth smearing, to increase the dynamic range, or to avoid interference, but there are some penalties. Before sending in the OBSERVE file, check the pros and cons, especially the sacrifice in sensitivity caused by the smaller total bandwidth and the increased complexity and volume of the data.

E. BRINKS

## VLA AZIMUTH BEARING AND TRANSPORTER PROBLEMS

The task of replacing the azimuth bearing in antenna 21 is proceeding. The concrete foundation for the yoke stand has been completed and the concrete floor slab in the work area was poured during the last week of September. After a curing period the rail track will be reinstalled and the yoke support structure will be erected in the AAB. The current plan calls for antenna 21 to enter the AAB on October 28. The antenna should be back in the array by early December unless some unexpected difficulties arise.

Compounding the problems for the Engineering Services Division, one of the axles on VLA transporter #2 fractured while moving an antenna out of the AAB last July. There

are three axles on each of four trucks that support the transporter. Two of these trucks have been disassembled; an inspection of the remaining five axles showed incipient cracks at the same place where the fracture occurred in July. In mid-September transporter #1 also suffered an axle failure. Thirteen axles are now being fabricated with final delivery expected in December. We expect to have transporter #1 operating for the B reconfiguration in October. The loss of the transporter has resulted in longer times for the A/B and B reconfigurations plus increased jeopardy with no transporter backup.

R. A. SRAMEK

## COMPUTING AT NRAO-NM

A visualization project was recently begun which will allow observers to monitor their data on a workstation at the VLA site in near-real time. A SPARC station-2 was purchased for this purpose, and initial development has already started. The recent installation of TCP/IP and a C compiler on the Modcomps will allow the SPARC station to obtain data directly over the network. A small team of programmers and scientists has been formed to design and produce this much-requested facility, which we anticipate will take nearly a year to implement fully. A partial system should be in use by the spring of 1992.

This past summer all NRAO sites had a brush with hackers in Tucson. Although no real damage was done, it brought home the fact that an open environment on Internet is also a very vulnerable one. As a result, security has been tightened somewhat. In the future the password for the AIPS account at the AOC will be changed more frequently. We may also have to take the precautionary step of disabling visitors' personal accounts when they have left the AOC. This has already been done for those who had not used their account in over a month. These can be re-enabled very easily on request. We have every intention of keeping the working environment here as friendly as possible.

Those of you on SPAN or BITNET networks should read the article elsewhere in this Newsletter which describes the upcoming disconnection of the NRAO VAX in Charlottesville from these networks. There is ample time now to uncover problems and find workarounds before this actually happens, and we will need to know if you have difficulty reaching us through Internet.

The shortage of computing resources for data reduction at the AOC continues to make itself felt. This has been somewhat alleviated by the installation earlier this year of three workstations which visitors can reserve. All are equipped with at least 1 gigabyte of data storage. Work has been underway during the past several months on the VLBA Computing Procurement, which should result in a number of new computers being installed at the AOC early in 1992. This will provide a substantial infusion of new computing power and disk space and will allow reduction of VLBA as well as VLA data in a much more comfortable and productive environment.

M. R. MILNER

## VLA OBSERVE (3.1.0)

A new version of VLA OBSERVE (3.1.0) was released on October 1, 1991. This version contains many bug fixes. Observers should use this latest version in preparing their observe files. With the demise of CVAX in Charlottesville and NRAO dropping its SPAN node, SPAN users may obtain the current VMS version of OBSERVE via anonymous ftp from uvax1.aoc.nrao.edu or by contacting Theresa McBride (tmcbride@nrao.edu) at the AOC.

making generic VLBI observing files (in particular VLBA antenna control files and VLA observe files). A preliminary design document should be available via anonymous ftp from zia.aoc.nrao.edu soon. We encourage and welcome comments and suggestions from users outside of NRAO.

W. K. YOUNG

Design and prototyping has begun on a VLBA OBSERVE. VLBA OBSERVE will be a general purpose tool for

## UNCALIBRATED DATA ON FITS TAPES

While it is possible for NRAO to provide remote users with FITS format tape copies of uncalibrated VLA data, it is time consuming and requires disk space for the analysts to FILLM the data before writing the FITS tape. It is far easier for NRAO to prepare a copy of the archive tape(s) for the remote observer, who then can load the data into AIPS using FILLM. For the few cases where an observer cannot read an archive tape copy, a FITS tape will be

provided; all others will be sent archive tape copies. Since a FITS tape requires a special effort by the NRAO staff, requests for FITS copy must be cleared by Miller Goss. Requests for copies of archive tapes may be sent to Peggy Perley and Dave Wunker at analysts@nrao or (505) 835-7359.

P. PERLEY

## MACINTOSH TOOLS FOR VLA OBSERVERS

The response to the previous newsletter announcement of Macintosh software tools for VLA observers has been good. For those of you who missed the first announcement, the tools are described briefly below. You can obtain them from Doug Wood at (505) 835-7398 or by e-mail to [dwood@nrao.edu](mailto:dwood@nrao.edu).

**VLA PLANNER:** These EXCEL worksheets help you prepare for VLA observations. Similar to Alan Bridle's VLAPLAN, VLA PLANNER predicts the outcome of a particular observation and alerts you to potential problems given the array, correlator configuration, and the properties of your source. VLA PLANNER supports both continuum and spectral line observations and is easily updated as receiver systems improve. You must already have a copy of Microsoft Excel 1.5 or later to use these files.

**VLA CALIBRATOR CATALOG:** Choosing calibrators by staring at pages of coordinates and calibrator properties can be a mind numbing experience. With this HyperCard stack you can pick calibrators graphically from a map of the sky. Enter the coordinates of your source and its position is plotted on an all-sky map of the calibrators. Click on a nearby calibrator and its properties are quickly displayed along with its distance from your source. You can also search for calibrators by name, sort the catalog by flux at a given wavelength, and add notes to the data base for future reference. The calibrator catalog includes the most recent calibrator data, including the new P band calibrators. You need HyperCard (v2.0 is recommended) to use these stacks.

D. O. WOOD

## THE VLA OBSERVERS PREFLIGHT CHECKLIST

I have prepared a "preflight" checklist to help you check your observe file before you submit it to the operators at the VLA. The list asks a number of questions about your OBSERVE file and about your observing strategy to help you avoid some common problems. You can obtain an electronic copy via anonymous ftp from [zia.aoc.nrao.edu](ftp://zia.aoc.nrao.edu)

(192.43.204.7; cd pub/observe, and get the README file) or by sending e-mail to [dwood@nrao.edu](mailto:dwood@nrao.edu). Contact Theresa McBride, (505) 853-7220, if you would like a hard copy version.

D. O. WOOD

## WORLD ASTRONOMY DAYS

The VLA will be cooperating fully with the activities associated with the International Space Year (ISY) known as World Astronomy Days (WAD). During periods in the last half of 1992 and extending into 1993 there will be worldwide collaboration to gather simultaneous multi-spectral information from astrophysical sources. The European Space Agency (ESA) has taken the lead in the organization of World Astronomy Days with the full support of the IAU. Specific inquiries or suggestions for observing programs should be directed to Willem Wamsteker, ESA IUE Observatory, P. O. Box 50727, 28080 Madrid, Spain, or e-mail to [vilspa::safisy](mailto:vilspa::safisy).

All proposals to obtain VLA data for a WAD program will be peer reviewed in the customary manner for observing time allocation. The appropriate VLA Observing Application deadlines are February 1, 1992, for D configuration proposals (June to September) and June 1, 1992, for A configuration proposals (October to December). Please indicate clearly on the application that it is to be considered for WAD participation.

R. J. HAVLEN

## NEW PROPOSAL DEADLINES

Effective in 1992 new deadlines will be in force for the submission of all proposals requesting observing time on either the VLA or the Interim VLBA. All existing deadlines will be advanced earlier by two weeks such that the 1992 and later deadlines will be February 1, June 1, and October 1. All proposals received before one of these deadlines will be considered for observing time on the next available configuration following the proposal review

process (i.e., the D configuration for the February 1, 1992, deadline).

The deadline change, in anticipation of full VLBA operation in the future, will align the VLA deadlines with those of the current US and European VLBI networks.

R. J. HAVLEN

## RECENT VLA MEMORANDA

High Time Resolution Processor (HTRP) Memoranda

No. 113 - "The Origin of the 180° Phase Shift in HTRP Polarization Data," M. McKinnon (06/91)

Millimeter Array Memoranda

No. 67 - "HFET's and Receivers for the Millimeter-Wave Array," M. Pospieszalski (08/91)

Computer Memoranda

No. 183 - "IAT/UTC Clock Ver. 2.0," P. Dooley (04/91)

No. 184 - "IAT/UTC Clock Ver. 2.1," P. Dooley (09/91)

Copies of any VLA numbered memorandum or a copy of the listings of all VLA numbered memoranda are available from Meri Stanley, P. O. Box 0, Socorro, NM 87801 or (505) 835-7310.

M. A. STANLEY

## 12-METER

## NEW 3 MM SIS RECEIVER

The new 3 mm SIS receiver is now in regular use at the 12 m. This is a dual polarization receiver with two frequency sections, one covering the 68-90 GHz band and the other covering the 90-116 GHz band. The telescope operator can switch from one band to the other in minutes. The cryostat is a 4 K, closed-cycle system. The receiver can be tuned to have a single-sideband response--with typically 20 dB rejection--through the adjustment of tuning shorts in the mixer block. Typical SSB noise temperatures are ~ 80-90 K. On the  $T_r$  scale, which includes forward

scattering and spillover losses, the on-sky system temperature is typically ~ 250 K in the middle of the 3 mm band. At both the low and high ends of the band, where atmospheric  $O_2$  contributes significant noise and attenuation, the system temperatures may be > 400 K, even in good weather.

J. W. LAMB, J. G. COCHRAN,  
J. M. PAYNE, P. R. JEWELL

## CONTROL SYSTEM UPGRADE

We have finished the basic hardware and software upgrade to the 12 m control system. This summer, we removed the VAX 11/750 from all remaining functions in the control (and analysis) systems. All control functions are now executed from a VME-based Sun workstation running Unix and a family of dedicated microprocessors, mostly running the VxWorks real-time operating system. Users should find the new system faster and more efficient than the version running last year.

Although the basic upgrade is now complete, we still have many projects in mind to enhance the system. These

include making the observer and operator interfaces more flexible and powerful, allowing the observer more direct access to the control system via "passive" and "active" fields, and improvements in the performance of the servo system that will allow, among other things, more efficient mapping.

J. R. HAGEN, T. W. FOLKERS, W. PETERS,  
A. V. DOWD, P. R. JEWELL

## CHANGE IN FORMAT OF THE GZFL FILE

The filter bank zero check array is now subtracted from the calibration GAINS array by the on-line system and is no longer explicitly recorded in the GZFL (Gains and Zeroes) file. In addition, we have changed the format of the GZFL file to be identical to the raw data PDFL file.

In general, only those observers processing total power mapping data, for which calibration is done off line, will be concerned with the GZFL file.

D. T. EMERSON

## SUMMER SHUTDOWN MISCELLANEOUS

We have just completed a typically busy summer shutdown period. In addition to the major projects described above, we had many other jobs on the agenda. Once again, we carefully inspected the dome door drive mechanism, which last summer was found to have major mechanical faults. This summer, the news was much better: we found only 10 broken rollers compared to more than 60 last summer. This leads us to conclude that the maintenance and lubrication schedule undertaken in the past year is proving effective. We will shortly install a "soft-start" system on the drive motors that should further reduce wear on the rollers.

We have also installed new observer dormitories on the site. At this writing, the work is near completion and we

expect the dorms to be habitable shortly. The new installation consists of seven motel-style rooms, each with its own entrance and bath. One of the rooms is equipped to accommodate physically disabled visitors. In addition, a separate building serves as a library and "common-use" facility, and contains a television and kitchenette.

Other projects include the installation of a 225 GHz "sky tipper" and an on-line, digital weather station that measures temperature, relative humidity, and barometric pressure.

P. R. JEWELL, D. A. CHASE,  
M. A. GORDON, D. A. WEBB

## UNIPOPS AT THE 12 METER TELESCOPE

Thanks to the efforts of Bob Garwood (NRAO/Charlottesville) and Ron Maddalena (NRAO/Green Bank) we now have the new NRAO single-dish data reduction system, UniPOPS, running at the 12 m. Observers can gain access to filter bank, hybrid spectrometer, and continuum digital backend data through the LINE and CONDAR programs. UniPOPS runs on a Sun Sparcstation I, now situated at the observer's console. During the transition period to UniPOPS, we will retain

the VMS-based POPS program running on the DEC VAXStation 3100(CHIMP). One can open a "window" to the VAXStation on the Sun workstation. Some applications, such as NOD2, have not been converted to the Sun workstation, and will have to be run from the VAXStation. All data files are accessible to either data reduction system.

D. T. EMERSON, P. O. HART, P. R. JEWELL

## TELEX LINE TO TUCSON DISCONTINUED

Due to the lack of use and as a cost-saving measure, we have discontinued the telex line to the NRAO/Tucson office. Anyone needing to contact us by telex can still do so by sending the telex to Charlottesville (TWX 910-997-0174), where it will then be forwarded to us by fax. We can also be reached directly via fax (602) 882-7955 or by e-mail. Staff members at Tucson, as at the other NRAO

sites have a standardized e-mail address, consisting of their first initial and up to seven letters of their last name. For example, to reach our secretary Jennifer Neighbours, a valid Internet address would be [jneighbo@nrao.edu](mailto:jneighbo@nrao.edu).

D. T. EMERSON

# IN GENERAL

## GBT USER INTERFACE

The monitor and control system for the Green Bank Telescope is now being designed. A critical part of it is the user interface: the means by which the astronomer commands the telescope to do the desired observations, and monitors the data and equipment during the observation. We have a draft specification for the user interface that is available for your comments. At this time we are most interested in developing the correct functionality of the interface, so comments on its

suitability and its look and feel would be most valuable. At a later stage we will ask for detailed suggestions on specific functions, control language syntax, displays, and so on.

If you would like an e-mail copy of the draft specification, please request one via Internet to [jlockman@nrao.edu](mailto:jlockman@nrao.edu).

J. R. FISHER, F. J. LOCKMAN

## THE MILLIMETER ARRAY

Now that the mmA Joint Development Group (JDG) has been organized, we are looking at the mmA from a systems viewpoint trying to identify the outstanding issues that need to be addressed by the JDG. A list of questions is being prepared, the answers to which may carry the definition of the array design from that presented in the mmA proposal to the next level of detail. One or more technical meetings will be held in the next quarter to refine the questions and help us make specific plans to evaluate options.

Evaluation of the two potential mmA sites continues with several parallel efforts. Environmental impact studies (EIS) will be conducted on both sites beginning shortly after the first of the year. The studies will be done by an EIS firm under contract with the NRAO. Presently we have circulated a request for proposal from EIS companies in the southwest and will evaluate the bids we receive in the next month. Beyond this, the potential mmA site in the Magdalena mountains will also be studied from the standpoint of site road layout. The somewhat restricted

topography of this particular site means that the road locations must be chosen with care. A consultant, knowledgeable about road construction in mountainous terrain, has been engaged to advise us.

As an aid to understanding the information gained from the atmospheric transparency and stability measurements made over the last year at both sites, we have developed an atmospheric model that faithfully reproduces the spectrum of total power fluctuations measured at 225 GHz. The model will be used to compute the phase fluctuations as a function of baseline length and observing frequency under the range of conditions seen on both sites. This will provide a measure of the fraction of the time that interferometry will be possible in each of the array configurations as a function of time of year. In addition, the same model can be used to compute such things as the total power stability we can expect from beam-switched single dish observations.

R. L. BROWN

## AIPS++ USER SPECIFICATIONS

You are invited to participate in the development of users specifications for AIPS++, a software system that is intended to replace AIPS as a data analysis system for NRAO and other institutions. AIPS++ will be developed and implemented by a consortium consisting of the NRAO and a number of other observatories and universities in the United States and around the world. It will be implemented in C++ using techniques of object-oriented programming.

G. Croes, AIPS++ project manager, has asked me to form a small group to organize the writing of user specifications for AIPS++. Everyone is invited to send me short or long suggestions. Some of these contributions will be put in the AIPS++ User Specification Memo Series.

The memo series on AIPS++ User Specifications has been initiated to provide a distribution system for ideas about what AIPS++ should be from the point of view of the user. If you wish to receive this memo series, you may: send an e-mail message to rhjellmi@nrao.edu or mstanley@nrao.edu; call Meri Stanley at (505) 835-7310; or write to NRAO, P. O. Box 0, Socorro, NM 87801-0387 USA. Along with your request, please supply your complete mailing address. If you wish, just fill out the following information and mail it to us. The first three memos in the series are presently being distributed to the current mailing list.

R. M. HJELLMING

I wish to receive the AIPS++ User Specifications Memo Series.

NAME:

MAILING ADDRESS:

## TRAVEL REIMBURSEMENT TO FOREIGN OBSERVATORIES

Each year the NRAO administers for the NSF a small fund to support the travel of astronomers at U.S. institutions to foreign radio observatories. The motivation for this program is the following. Astronomers who, in the past, included observational studies using foreign radio telescopes in their grant proposals to the NSF would, of course, incorporate the cost of the travel in their NSF grant application budget pages. However, because the grant proposal would be submitted a year or more before work would commence the astronomer could not know, at the time the proposal was submitted, whether or not observing time would actually be granted. This led to the peculiar situation where the NSF would fund travel which, as it would subsequently turn out, could not be made or, worse, the NSF could deny funding because there was in fact no time assigned on a foreign telescope when the NSF grant proposal was submitted.

A partial solution to this quandary was found by the NSF asking the national observatories to administer the fund to reimburse travel by scientists at U.S. institutions who have

been assigned time on "unique" foreign telescopes. For radio observations, the NRAO administers the fund.

Astronomers eligible for reimbursement for travel associated with observing on foreign telescopes are those for whom all of the following apply: (1) they are employed at a U.S. institution; (2) they have a NSF Astronomy Division research grant, or the conditions of their employment permit them to receive a personal (as opposed to an institutional) NSF research grant; (3) they have been assigned telescope time; and (4) they agree to fly to the foreign destinations on a U.S. carrier. If all these conditions are met, applicants should contact Harvey Liszt (804-296-0344) for approval and for the necessary forms.

The foreign travel fund is a small program that is quickly depleted in the first few months of each calendar year. If you are eligible, contact Harvey as soon as your time assignment is made.

R. L. BROWN

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Students seeking modest support for their research programs should consider applying for a Sigma Xi grant-in-aid. The maximum grant size is \$1000. Neither the student nor those recommending them for the award need

be members of Sigma Xi. For more information and application forms call (800) 243-6534.

P. A. VANDEN BOUT

## SUMMER STUDENTS

Twenty-two students, nineteen of them sponsored under a Research Experience for Undergraduates grant from NSF, worked with NRAO staff members distributed among the four sites during the summer. There had been nearly 150 applicants; 33 NRAO staff members requested a summer student to work on a project. As the last of the students returns to his home institution, the 1992 summer program begins. Information and application forms have been mailed soliciting applications for research assistantships next summer. The majority of the assistantships will be offered to undergraduate students who are currently enrolled in U.S. undergraduate institutions and who will not receive their degrees before or during the summer of 1992. A limited number of assistantships will be available for graduate students or students from non-U.S. institutions.

Owing to the large number of applicants, and the difficulty of distributing materials among sites across the continent, the deadline for receipt of application materials has been advanced to January 20, 1992; notice of decisions will be sent by March 1, 1992. Forms are available from department heads or by writing to:

Program Director, Summer Student Program  
National Radio Astronomy Observatory  
520 Edgemont Road  
Charlottesville, VA 22903-2475

H. A. WOOTTEN

## REBER 80TH

Congratulations to radio astronomy pioneer Grote Reber on his upcoming 80th birthday, December 22, 1991.

Friends should send greetings to the following address:  
General Delivery, Bothwell, Tasmania, AUSTRALIA.

P. A. VANDEN BOUT/B. ERICKSON

## TERMINATION OF NRAO BITnet & SPAN CONNECTION

The Charlottesville VAX 11/780, CVAX, currently provides the NRAO's SPAN and BITnet access. With the removal of CVAX at the end of 1991, we plan to eliminate our SPAN and BITnet connections. Both SPAN and BITnet are in fact being superseded by INTERNET. Although it would be possible to install the SPAN and BITnet software on another NRAO machine, we plan instead to concentrate our limited resources on INTERNET connectivity.

If you are currently on INTERNET the change will not affect you; you should use our INTERNET address for your correspondence with colleagues at the NRAO. If you are not currently on INTERNET and have only SPAN and/or BITnet access, you can still communicate with colleagues at the NRAO, but the details of how to do this will change.

The following is a moderately detailed description of how to reach the NRAO on INTERNET from SPAN and BITnet sites.

### NETWORK CHANGES PRIMER

#### 1. E-mail

##### a) sending from SPAN nodes to NRAO:

SPAN correspondents should send mail through the NASA gateway EAST:

```
EAST::"bburns@nrao.edu" (or 6913::"bburns@nrao.edu")
```

(substitute the relevant NRAO account name for `bburns`, of course). This will cause mail to arrive at the machine called "`nrao.edu`" (David Brown's workstation), where our NRAO-wide alias table will route the mail to the recipient's mailbox. If your correspondent replies to this message, the return address you will see should show the actual location of your colleague's mailbox, e.g. `EAST::"bburns@polaris.cv.nrao.edu"`.

##### b) sending from BITnet nodes to NRAO:

Almost all BITnet hosts use sophisticated mailers which can accept Internet addresses, and they automatically send the traffic to an appropriate gateway (e.g., CUNYVM). Therefore, it is generally sufficient to send to your colleague's Internet address, e.g., `bburns@nrao.edu`. Your local system manager will know the format to be used (like `SMTP%` on CVAX); it is different on IBMs and VAXen, and not even the same on all BITnet implementations on VAXen.

#### 2. File transfer.

##### a) accessing files on NRAO hosts from SPAN:

The VMS SPAN user can enter a command of the following form:

```
COPY EAST"host.domain!user password"::"remote-file" VMS-file
```

The following is an example of anonymous-FTP access with this recipe.

```
$ directory/size/date east"cv3.cv.nrao.edu!anonymous guest"::"tables/"
Directory EAST"cv3.cv.nrao.edu!anonymous password"::
    "bitearn.nodes"      0 1-OCT-1991 14:42
    "bitnetnodes.txt"   0 1-OCT-1991 14:42
    "hosts"             0 1-OCT-1991 14:42
    "networks"         0 1-OCT-1991 14:42
    "nodes.txt"        0 1-OCT-1991 14:42
```

Total of 5 files, 0 blocks.

```
$ copy east"cv3.cv.nrao.edu!anonymous guest"::"tables/nodes.txt"nodes.dat/log
%COPY-S-COPIED,
    EAST"cv3.cv.nrao.edu!anonymous password"::"tables/nodes.txt"
```

copied to DISK\$RES:[DWELLS]NODES.DAT;1 (1268 records)

**b) accessing files on NRAO hosts from BITnet:**

It is possible for BITnet users to fetch files from FTP servers at NRAO, by using the BITFTP gateway on BITnet host PUCG, which is also Internet host `pucg.princeton.edu`. Full instructions on this facility can be obtained by sending (from the BITnet node) a message to `BITFTP@PUCG` containing the single word "help". The mechanism of BITFTP is to send it E-mail messages with main body of the form:

```
FTP hostname NETDATA (or: FTP hostname UUENCODE)
USER username password
< other FTP commands > (commands: dir, cd, get)
QUIT
```

If the username is "anonymous" the password may be omitted. The BITFTP facility is mostly used by BITnet users who need to fetch files from anonymous-FTP servers on the Internet. Several NRAO machines have anonymous-FTP servers (e.g., `fits.cx.nrao.edu`, `ccc.cx.nrao.edu`, `zia.aoc.nrao.edu`). The files are transmitted by BITFTP in NETDATA or UUENCODE format. All BITnet implementations have facilities for decoding files in IBM "NETDATA" format; Unix machines on BITnet can also decode files in "UUENCODE" format.

**3. Remote login (SET HOST):**

**a) logging in on NRAO hosts from SPAN hosts:**

```
SET HOST EAST (or: SET HOST 6913)
At the login prompt respond with: host.domain!
```

where *host.domain* is a full name like `nrao1.cv.nrao.edu`.

We realize that at a few locations there may be special problems that invalidate some of the directions described above. If you are unsure, try the INTERNET access now while you still have the SPAN and BITnet access. If you cannot make it work with the help of your local network guru, we will try to help.

A word to the wise:

In wide area networking, INTERNET will be increasingly dominant. If your institution does not yet have INTERNET access, make sure the people responsible understand your needs. This will become even more important as remote observing grows.

G. CROES

## REMOVAL OF CVAX

CVAX, the Charlottesville based VAX 11/780, will be removed at the end of 1991. Please make sure you backup or remove any files you desire to retain before the end of the year. Anything left on this computer will be lost.

AIPS data should be backed up using FITS format; most other file types can be transported to a UNIX machine via FTP. You should not use the VMS backup utility for anything unless you plan to restore on another VAX

(outside NRAO). We have found programs that read VMS backup tapes on a UNIX system to be unreliable.

If you have any procedures or services that are CVAX dependent, please contact Ernie Allen ((804) 296-0209 or e-mail: `eallen@nrao.edu`) to discuss various alternatives. CVAX has served us all well, but it is no longer cost effective.

W. R. BURNS





EDITOR NRAO NEWSLETTER  
NATIONAL RADIO ASTRONOMY OBSERVATORY  
520 EGGEMONT ROAD  
CHARLOTTESVILLE, VA 22903-2476 USA

NON-PROFIT ORG  
U S POSTAGE PAID  
PERMIT # 373  
CHARLOTTESVILLE, VA

FORWARDING AND RETURN  
POSTAGE GUARANTEED,  
ADDRESS CORRECTION REQUESTED

**To:**

**DATED MATERIAL - DO NOT DELAY**

## COMPUTING AT NRAO-NM

A visualization project was recently begun which will allow observers to monitor their data on a workstation at the VLA site in near-real time. A SPARC station-2 was purchased for this purpose, and initial development has already started. The recent installation of TCP/IP and a C compiler on the Modcomps will allow the SPARC station to obtain data directly over the network. A small team of programmers and scientists has been formed to design and produce this much-requested facility, which we anticipate will take nearly a year to implement fully. A partial system should be in use by the spring of 1992.

This past summer all NRAO sites had a brush with hackers in Tucson. Although no real damage was done, it brought home the fact that an open environment on Internet is also a very vulnerable one. As a result, security has been tightened somewhat. In the future the password for the AIPS account at the AOC will be changed more frequently. We may also have to take the precautionary step of disabling visitors' personal accounts when they have left the AOC. This has already been done for those who had not used their account in over a month. These can be re-enabled very easily on request. We have every intention of keeping the working environment here as friendly as possible.

Those of you on SPAN or BITNET networks should read the article elsewhere in this Newsletter which describes the upcoming disconnection of the NRAO VAX in Charlottesville from these networks. There is ample time now to uncover problems and find workarounds before this actually happens, and we will need to know if you have difficulty reaching us through Internet.

The shortage of computing resources for data reduction at the AOC continues to make itself felt. This has been somewhat alleviated by the installation earlier this year of three workstations which visitors can reserve. All are equipped with at least 1 gigabyte of data storage. Work has been underway during the past several months on the VLBA Computing Procurement, which should result in a number of new computers being installed at the AOC early in 1992. This will provide a substantial infusion of new computing power and disk space and will allow reduction of VLBA as well as VLA data in a much more comfortable and productive environment.

M. R. MILNER

## VLA OBSERVE (3.1.0)

A new version of VLA OBSERVE (3.1.0) was released on October 1, 1991. This version contains many bug fixes. Observers should use this latest version in preparing their observe files. With the demise of CVAX in Charlottesville and NRAO dropping its SPAN node, SPAN users may obtain the current VMS version of OBSERVE via anonymous ftp from uvax1.aoc.nrao.edu or by contacting Theresa McBride (tmcbride@nrao.edu) at the AOC.

making generic VLBI observing files (in particular VLBA antenna control files and VLA observe files). A preliminary design document should be available via anonymous ftp from zia.aoc.nrao.edu soon. We encourage and welcome comments and suggestions from users outside of NRAO.

W. K. YOUNG

Design and prototyping has begun on a VLBA OBSERVE. VLBA OBSERVE will be a general purpose tool for

## UNCALIBRATED DATA ON FITS TAPES

While it is possible for NRAO to provide remote users with FITS format tape copies of uncalibrated VLA data, it is time consuming and requires disk space for the analysts to FILLM the data before writing the FITS tape. It is far easier for NRAO to prepare a copy of the archive tape(s) for the remote observer, who then can load the data into AIPS using FILLM. For the few cases where an observer cannot read an archive tape copy, a FITS tape will be

provided; all others will be sent archive tape copies. Since a FITS tape requires a special effort by the NRAO staff, requests for FITS copy must be cleared by Miller Goss. Requests for copies of archive tapes may be sent to Peggy Perley and Dave Wunker at analysts@nrao or (505) 835-7359.

P. PERLEY

## MACINTOSH TOOLS FOR VLA OBSERVERS

The response to the previous newsletter announcement of Macintosh software tools for VLA observers has been good. For those of you who missed the first announcement, the tools are described briefly below. You can obtain them from Doug Wood at (505) 835-7398 or by e-mail to [dwood@nrao.edu](mailto:dwood@nrao.edu).

**VLA PLANNER:** These EXCEL worksheets help you prepare for VLA observations. Similar to Alan Bridle's VLAPLAN, VLA PLANNER predicts the outcome of a particular observation and alerts you to potential problems given the array, correlator configuration, and the properties of your source. VLA PLANNER supports both continuum and spectral line observations and is easily updated as receiver systems improve. You must already have a copy of Microsoft Excel 1.5 or later to use these files.

**VLA CALIBRATOR CATALOG:** Choosing calibrators by staring at pages of coordinates and calibrator properties can be a mind numbing experience. With this HyperCard stack you can pick calibrators graphically from a map of the sky. Enter the coordinates of your source and its position is plotted on an all-sky map of the calibrators. Click on a nearby calibrator and its properties are quickly displayed along with its distance from your source. You can also search for calibrators by name, sort the catalog by flux at a given wavelength, and add notes to the data base for future reference. The calibrator catalog includes the most recent calibrator data, including the new P band calibrators. You need HyperCard (v2.0 is recommended) to use these stacks.

D. O. WOOD

## THE VLA OBSERVERS PREFLIGHT CHECKLIST

I have prepared a "preflight" checklist to help you check your observe file before you submit it to the operators at the VLA. The list asks a number of questions about your OBSERVE file and about your observing strategy to help you avoid some common problems. You can obtain an electronic copy via anonymous ftp from [zia.aoc.nrao.edu](ftp://zia.aoc.nrao.edu)

(192.43.204.7; cd pub/observe, and get the README file) or by sending e-mail to [dwood@nrao.edu](mailto:dwood@nrao.edu). Contact Theresa McBride, (505) 853-7220, if you would like a hard copy version.

D. O. WOOD

## WORLD ASTRONOMY DAYS

The VLA will be cooperating fully with the activities associated with the International Space Year (ISY) known as World Astronomy Days (WAD). During periods in the last half of 1992 and extending into 1993 there will be worldwide collaboration to gather simultaneous multi-spectral information from astrophysical sources. The European Space Agency (ESA) has taken the lead in the organization of World Astronomy Days with the full support of the IAU. Specific inquiries or suggestions for observing programs should be directed to Willem Wamsteker, ESA IUE Observatory, P. O. Box 50727, 28080 Madrid, Spain, or e-mail to [wilsa::safisy](mailto:wilsa::safisy).

All proposals to obtain VLA data for a WAD program will be peer reviewed in the customary manner for observing time allocation. The appropriate VLA Observing Application deadlines are February 1, 1992, for D configuration proposals (June to September) and June 1, 1992, for A configuration proposals (October to December). Please indicate clearly on the application that it is to be considered for WAD participation.

R. J. HAVLEN

## NEW PROPOSAL DEADLINES

Effective in 1992 new deadlines will be in force for the submission of all proposals requesting observing time on either the VLA or the Interim VLBA. All existing deadlines will be advanced earlier by two weeks such that the 1992 and later deadlines will be February 1, June 1, and October 1. All proposals received before one of these deadlines will be considered for observing time on the next available configuration following the proposal review

process (i.e., the D configuration for the February 1, 1992, deadline).

The deadline change, in anticipation of full VLBA operation in the future, will align the VLA deadlines with those of the current US and European VLBI networks.

R. J. HAVLEN

## RECENT VLA MEMORANDA

### High Time Resolution Processor (HTRP) Memoranda

No. 113 - "The Origin of the 180° Phase Shift in HTRP Polarization Data," M. McKinnon (06/91)

### Millimeter Array Memoranda

No. 67 - "HFET's and Receivers for the Millimeter-Wave Array," M. Pospieszalski (08/91)

### Computer Memoranda

No. 183 - "IAT/UTC Clock Ver. 2.0," P. Dooley (04/91)

No. 184 - "IAT/UTC Clock Ver. 2.1," P. Dooley (09/91)

Copies of any VLA numbered memorandum or a copy of the listings of all VLA numbered memoranda are available from Meri Stanley, P. O. Box 0, Socorro, NM 87801 or (505) 835-7310.

M. A. STANLEY

## 12-METER

### NEW 3 MM SIS RECEIVER

The new 3 mm SIS receiver is now in regular use at the 12 m. This is a dual polarization receiver with two frequency sections, one covering the 68-90 GHz band and the other covering the 90-116 GHz band. The telescope operator can switch from one band to the other in minutes. The cryostat is a 4 K, closed-cycle system. The receiver can be tuned to have a single-sideband response--with typically 20 dB rejection--through the adjustment of tuning shorts in the mixer block. Typical SSB noise temperatures are ~ 80-90 K. On the  $T_r$  scale, which includes forward

scattering and spillover losses, the on-sky system temperature is typically ~ 250 K in the middle of the 3 mm band. At both the low and high ends of the band, where atmospheric  $O_2$  contributes significant noise and attenuation, the system temperatures may be > 400 K, even in good weather.

J. W. LAMB, J. G. COCHRAN,  
J. M. PAYNE, P. R. JEWELL

### CONTROL SYSTEM UPGRADE

We have finished the basic hardware and software upgrade to the 12 m control system. This summer, we removed the VAX 11/750 from all remaining functions in the control (and analysis) systems. All control functions are now executed from a VME-based Sun workstation running Unix and a family of dedicated microprocessors, mostly running the VxWorks real-time operating system. Users should find the new system faster and more efficient than the version running last year.

include making the observer and operator interfaces more flexible and powerful, allowing the observer more direct access to the control system via "passive" and "active" fields, and improvements in the performance of the servo system that will allow, among other things, more efficient mapping.

J. R. HAGEN, T. W. FOLKERS, W. PETERS,  
A. V. DOWD, P. R. JEWELL

Although the basic upgrade is now complete, we still have many projects in mind to enhance the system. These

### CHANGE IN FORMAT OF THE GZFL FILE

The filter bank zero check array is now subtracted from the calibration GAINS array by the on-line system and is no longer explicitly recorded in the GZFL (Gains and Zeroes) file. In addition, we have changed the format of the GZFL file to be identical to the raw data PDFL file.

In general, only those observers processing total power mapping data, for which calibration is done off line, will be concerned with the GZFL file.

D. T. EMERSON

## SUMMER SHUTDOWN MISCELLANEOUS

We have just completed a typically busy summer shutdown period. In addition to the major projects described above, we had many other jobs on the agenda. Once again, we carefully inspected the dome door drive mechanism, which last summer was found to have major mechanical faults. This summer, the news was much better: we found only 10 broken rollers compared to more than 60 last summer. This leads us to conclude that the maintenance and lubrication schedule undertaken in the past year is proving effective. We will shortly install a "soft-start" system on the drive motors that should further reduce wear on the rollers.

We have also installed new observer dormitories on the site. At this writing, the work is near completion and we

expect the dorms to be habitable shortly. The new installation consists of seven motel-style rooms, each with its own entrance and bath. One of the rooms is equipped to accommodate physically disabled visitors. In addition, a separate building serves as a library and "common-use" facility, and contains a television and kitchenette.

Other projects include the installation of a 225 GHz "sky tipper" and an on-line, digital weather station that measures temperature, relative humidity, and barometric pressure.

P. R. JEWELL, D. A. CHASE,  
M. A. GORDON, D. A. WEBB

## UNIPOPS AT THE 12 METER TELESCOPE

Thanks to the efforts of Bob Garwood (NRAO/Charlottesville) and Ron Maddalena (NRAO/Green Bank) we now have the new NRAO single-dish data reduction system, UniPOPS, running at the 12 m. Observers can gain access to filter bank, hybrid spectrometer, and continuum digital backend data through the LINE and CONDAR programs. UniPOPS runs on a Sun Sparcstation I, now situated at the observer's console. During the transition period to UniPOPS, we will retain

the VMS-based POPS program running on the DEC VAXStation 3100(CHIMP). One can open a "window" to the VAXStation on the Sun workstation. Some applications, such as NOD2, have not been converted to the Sun workstation, and will have to be run from the VAXStation. All data files are accessible to either data reduction system.

D. T. EMERSON, P. O. HART, P. R. JEWELL

## TELEX LINE TO TUCSON DISCONTINUED

Due to the lack of use and as a cost-saving measure, we have discontinued the telex line to the NRAO/Tucson office. Anyone needing to contact us by telex can still do so by sending the telex to Charlottesville (TWX 910-997-0174), where it will then be forwarded to us by fax. We can also be reached directly via fax (602) 882-7955 or by e-mail. Staff members at Tucson, as at the other NRAO

sites have a standardized e-mail address, consisting of their first initial and up to seven letters of their last name. For example, to reach our secretary Jennifer Neighbours, a valid Internet address would be [jneighbo@nrao.edu](mailto:jneighbo@nrao.edu).

D. T. EMERSON

# IN GENERAL

## GBT USER INTERFACE

The monitor and control system for the Green Bank Telescope is now being designed. A critical part of it is the user interface: the means by which the astronomer commands the telescope to do the desired observations, and monitors the data and equipment during the observation. We have a draft specification for the user interface that is available for your comments. At this time we are most interested in developing the correct functionality of the interface, so comments on its

suitability and its look and feel would be most valuable. At a later stage we will ask for detailed suggestions on specific functions, control language syntax, displays, and so on.

If you would like an e-mail copy of the draft specification, please request one via Internet to [jlockman@nrao.edu](mailto:jlockman@nrao.edu).

J. R. FISHER, F. J. LOCKMAN

## THE MILLIMETER ARRAY

Now that the mmA Joint Development Group (JDG) has been organized, we are looking at the mmA from a systems viewpoint trying to identify the outstanding issues that need to be addressed by the JDG. A list of questions is being prepared, the answers to which may carry the definition of the array design from that presented in the mmA proposal to the next level of detail. One or more technical meetings will be held in the next quarter to refine the questions and help us make specific plans to evaluate options.

Evaluation of the two potential mmA sites continues with several parallel efforts. Environmental impact studies (EIS) will be conducted on both sites beginning shortly after the first of the year. The studies will be done by an EIS firm under contract with the NRAO. Presently we have circulated a request for proposal from EIS companies in the southwest and will evaluate the bids we receive in the next month. Beyond this, the potential mmA site in the Magdalena mountains will also be studied from the standpoint of site road layout. The somewhat restricted

topography of this particular site means that the road locations must be chosen with care. A consultant, knowledgeable about road construction in mountainous terrain, has been engaged to advise us.

As an aid to understanding the information gained from the atmospheric transparency and stability measurements made over the last year at both sites, we have developed an atmospheric model that faithfully reproduces the spectrum of total power fluctuations measured at 225 GHz. The model will be used to compute the phase fluctuations as a function of baseline length and observing frequency under the range of conditions seen on both sites. This will provide a measure of the fraction of the time that interferometry will be possible in each of the array configurations as a function of time of year. In addition, the same model can be used to compute such things as the total power stability we can expect from beam-switched single dish observations.

R. L. BROWN

## AIPS++ USER SPECIFICATIONS

You are invited to participate in the development of users specifications for AIPS++, a software system that is intended to replace AIPS as a data analysis system for NRAO and other institutions. AIPS++ will be developed and implemented by a consortium consisting of the NRAO and a number of other observatories and universities in the United States and around the world. It will be implemented in C++ using techniques of object-oriented programming.

G. Croes, AIPS++ project manager, has asked me to form a small group to organize the writing of user specifications for AIPS++. Everyone is invited to send me short or long suggestions. Some of these contributions will be put in the AIPS++ User Specification Memo Series.

The memo series on AIPS++ User Specifications has been initiated to provide a distribution system for ideas about what AIPS++ should be from the point of view of the user. If you wish to receive this memo series, you may: send an e-mail message to rhjellmi@nrao.edu or mstanley@nrao.edu; call Meri Stanley at (505) 835-7310; or write to NRAO, P. O. Box 0, Socorro, NM 87801-0387 USA. Along with your request, please supply your complete mailing address. If you wish, just fill out the following information and mail it to us. The first three memos in the series are presently being distributed to the current mailing list.

R. M. HJELLMING

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R. L. BROWN

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Program Director, Summer Student Program  
National Radio Astronomy Observatory  
520 Edgemont Road  
Charlottesville, VA 22903-2475

H. A. WOOTTEN

## REBER 80TH

Congratulations to radio astronomy pioneer Grote Reber on his upcoming 80th birthday, December 22, 1991.

Friends should send greetings to the following address:  
General Delivery, Bothwell, Tasmania, AUSTRALIA.

P. A. VANDEN BOUT/B. ERICKSON

## TERMINATION OF NRAO BITnet & SPAN CONNECTION

The Charlottesville VAX 11/780, CVAX, currently provides the NRAO's SPAN and BITnet access. With the removal of CVAX at the end of 1991, we plan to eliminate our SPAN and BITnet connections. Both SPAN and BITnet are in fact being superseded by INTERNET. Although it would be possible to install the SPAN and BITnet software on another NRAO machine, we plan instead to concentrate our limited resources on INTERNET connectivity.

If you are currently on INTERNET the change will not affect you; you should use our INTERNET address for your correspondence with colleagues at the NRAO. If you are not currently on INTERNET and have only SPAN and/or BITnet access, you can still communicate with colleagues at the NRAO, but the details of how to do this will change.

The following is a moderately detailed description of how to reach the NRAO on INTERNET from SPAN and BITnet sites.

### NETWORK CHANGES PRIMER

#### 1. E-mail

##### a) sending from SPAN nodes to NRAO:

SPAN correspondents should send mail through the NASA gateway EAST:

```
EAST::"bburns@nrao.edu" (or 6913::"bburns@nrao.edu")
```

(substitute the relevant NRAO account name for `bburns`, of course). This will cause mail to arrive at the machine called "`nrao.edu`" (David Brown's workstation), where our NRAO-wide alias table will route the mail to the recipient's mailbox. If your correspondent replies to this message, the return address you will see should show the actual location of your colleague's mailbox, e.g. `EAST::"bburns@polaris.cv.nrao.edu"`.

##### b) sending from BITnet nodes to NRAO:

Almost all BITnet hosts use sophisticated mailers which can accept Internet addresses, and they automatically send the traffic to an appropriate gateway (e.g., CUNYVM). Therefore, it is generally sufficient to send to your colleague's Internet address, e.g., `bburns@nrao.edu`. Your local system manager will know the format to be used (like `SMTP%` on CVAX); it is different on IBMs and VAXen, and not even the same on all BITnet implementations on VAXen.

#### 2. File transfer.

##### a) accessing files on NRAO hosts from SPAN:

The VMS SPAN user can enter a command of the following form:

```
COPY EAST"host.domain!user password"::"remote-file" VMS-file
```

The following is an example of anonymous-FTP access with this recipe.

```
$ directory/size/date east"cv3.cv.nrao.edu!anonymous guest"::"tables/"
Directory EAST"cv3.cv.nrao.edu!anonymous password"::
    "bitearn.nodes"      0 1-OCT-1991 14:42
    "bitnetnodes.txt"    0 1-OCT-1991 14:42
    "hosts"              0 1-OCT-1991 14:42
    "networks"           0 1-OCT-1991 14:42
    "nodes.txt"          0 1-OCT-1991 14:42
```

Total of 5 files, 0 blocks.

```
$ copy east"cv3.cv.nrao.edu!anonymous guest"::"tables/nodes.txt"nodes.dat/log
%COPY-S-COPIED,
    EAST"cv3.cv.nrao.edu!anonymous password"::"tables/nodes.txt"
```

copied to DISK\$RES:[DWELLS]NODES.DAT;1 (1268 records)

**b) accessing files on NRAO hosts from BITnet:**

It is possible for BITnet users to fetch files from FTP servers at NRAO, by using the BITFTP gateway on BITnet host PUCG, which is also Internet host `pucg.princeton.edu`. Full instructions on this facility can be obtained by sending (from the BITnet node) a message to `BITFTP@PUCG` containing the single word "help". The mechanism of BITFTP is to send it E-mail messages with main body of the form:

```
FTP hostname NETDATA (or: FTP hostname UUENCODE)
USER username password
< other FTP commands > (commands: dir, cd, get)
QUIT
```

If the username is "anonymous" the password may be omitted. The BITFTP facility is mostly used by BITnet users who need to fetch files from anonymous-FTP servers on the Internet. Several NRAO machines have anonymous-FTP servers (e.g., `fits.cx.nrao.edu`, `ccc.cx.nrao.edu`, `zia.aoc.nrao.edu`). The files are transmitted by BITFTP in NETDATA or UUENCODE format. All BITnet implementations have facilities for decoding files in IBM "NETDATA" format; Unix machines on BITnet can also decode files in "UUENCODE" format.

**3. Remote login (SET HOST):**

**a) logging in on NRAO hosts from SPAN hosts:**

```
SET HOST EAST (or: SET HOST 6913)
At the login prompt respond with: host.domain!
```

where *host.domain* is a full name like `nrao1.cv.nrao.edu`.

We realize that at a few locations there may be special problems that invalidate some of the directions described above. If you are unsure, try the INTERNET access now while you still have the SPAN and BITnet access. If you cannot make it work with the help of your local network guru, we will try to help.

A word to the wise:

In wide area networking, INTERNET will be increasingly dominant. If your institution does not yet have INTERNET access, make sure the people responsible understand your needs. This will become even more important as remote observing grows.

G. CROES

## REMOVAL OF CVAX

CVAX, the Charlottesville based VAX 11/780, will be removed at the end of 1991. Please make sure you backup or remove any files you desire to retain before the end of the year. Anything left on this computer will be lost.

AIPS data should be backed up using FITS format; most other file types can be transported to a UNIX machine via FTP. You should not use the VMS backup utility for anything unless you plan to restore on another VAX

(outside NRAO). We have found programs that read VMS backup tapes on a UNIX system to be unreliable.

If you have any procedures or services that are CVAX dependent, please contact Ernie Allen ((804) 296-0209 or e-mail: `eallen@nrao.edu`) to discuss various alternatives. CVAX has served us all well, but it is no longer cost effective.

W. R. BURNS





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