NRAO NEWSLETTER

1990 April 1 No. 43

GREEN BANK

THE GREEN BANK TELESCOPE

The design effort for the GBT is proceeding rapidly in order to meet a deadline of June 1, 1990 for sending out a formal Request for Proposals (RFP). To date, fifty-five companies have responded to a November 1989 announcement about the project, of which thirty-two expressed continuing interest following the receipt of more detailed information from NRAO. Twelve wish to be considered as prime contractors. All will receive a written RFP and also will be invited to attend a pre-bid conference in Green Bank during the third week of June. Bids will be due to NRAO by October 1, 1990. A period for bid evaluation, negotiation, and NSF approval will occupy the rest of this year. NRAO expects to have a signed contract by early 1991. Initial astronomical use of the telescope is scheduled for early 1995.

The Green Bank Telescope will have a totally unblocked aperture. Bids will be based on a diameter of 100 meters, as projected on the plane normal to the direction of incident radiation. The GBT will provide full-sky coverage by using a wheel-and-track azimuth-elevation system. Its surface will consist of approximately 2000 solid panels, with adjustment and measuring mechanisms installed at every intersection of four panels, as well as around the outer edge of the surface. The panels, 2 meters x 2.5 meters in size, will be manufactured to a specified rms surface accuracy of 75 microns.

The frequency range of the GBT will be implemented in three stages. The contract will specify a telescope usable at frequencies as high as 15 GHz with no special provisions. The contractor will, however, install actuator units so that NRAO can increase the frequency coverage to at least 43 GHz. This second stage of development will use a "look-up" table of surface settings as a function of elevation angle, determined by holography and by calculation of expected and repeatable gravitational deformations. Nothing will be done during this second stage that would preclude an attempt to operate at frequencies much greater than 43 GHz. To do so, however, will require an accurate system for surface measurement. Such a system requires a real time research-and-development effort on the part of NRAO, which has begun.

The GBT will have a prime focus for feeds and receivers for frequencies less than about 1 GHz. Two Gregorian subreflectors will also provide a secondary focus at which several receivers can be mounted. An 8-meter subreflector with an rms surface accuracy of 250 microns will be used with feeds for 1-9 GHz. A 4-meter subreflector with a 100 micron surface will be used for frequencies greater than 6 GHz. Both subreflectors and the prime focus will be interchangeable via computer command. This arrangement maximizes the frequency flexibility of the GBT, thereby ensuring that favorable weather and scientific opportunities can be responded to quickly.

The contractor will be required to provide pointing accuracy, under benign environmental conditions, of 7 arcseconds. NRAO is developing precision pointing systems to refine the pointing to $\leq$ 2 arcseconds. HPBWs of the GBT are 34" and 18" at 22 and 43 GHz, respectively.

The photograph on the next page shows the site selected for the Green Bank Telescope, pending results of soil boring tests to be undertaken in April 1990. The view is from the southwest and shows the GBT scaled to its appropriate size.

R. D. HALL, D. E. HOGG, G. A. SEIELSTAD

SECONDARY SCIENCE TEACHERS' INSTITUTE

NRAO and West Virginia University have operated a summer workshop for high school science teachers in 1987, 1988, and 1989. The program now claims 126 alumni and alumnae who have attended two-week sessions in Green Bank and two-day follow-up sessions held regionally. One of the teacher-participants has described the program in the March 1990 Griffith Observer. The first three years were funded by the National Science Foundation, but a continuation proposal for 1990 and beyond was turned down by NSF. Fortunately the Claude Worthington Benedum Foundation has agreed to fund two sessions in 1990, June 17-30 and July 29-August 11. If you know teachers who may wish to attend, ask them to contact Sue Ann Heatherly at NRAO-Green Bank.

G. A. SEIELSTAD

The NRAO Newsletter is published quarterly by the National Radio Astronomy Observatory, Edgemont Road, Charlottesville, VA 22903-2475 USA. NRAO is operated by Associated Universities, Inc., under agreement with the National Science Foundation.

GREEN BANK COMPUTER NETWORK IMPROVEMENTS

NRAO-Green Bank's Local Area Network (LAN) has been upgraded to improve communications within the LAN and with the Internet. The improvements are in the areas of Masscomp networking, Internet mail, Network File System (NFS), inter-LAN communication, and data access.

With the acquisition of a Proteon 4100 gateway and the installation of NFS and Sendmail on our four Masscomp computers, we are able to fully integrate these machines into our LAN. We are now able to provide our users with full Internet capabilities including telnet, ftp, access to one's incoming mail from any site UNIX machine, and full use of Internet nameservers for outgoing mail. With NFS running on all UNIX machines, the users' environment appears identical whether logged into a SUN at the telescope or into a Masscomp at the Jansky Lab. NFS in conjunction with recent disk purchases also allows us flexibility in providing visiting users with extra disk space.

We have been using a LocalTalk network for our Macintoshes and the Apple LaserWriter printer in the Jansky Lab for over a year. Now, thanks to a newly acquired bridge, we have a direct connection between our Ethernet and LocalTalk LANs. Not only does this provide for fast, direct file transfer between any micro on LocalTalk and the UNIX machines, but Macintosh users, as well as UNIX users, can telnet to any site or Internet machine.

Finally, the network allows observers to access 140-foot on-line data from any on-site SUN running POPS with no perceptible loss in performance. Since we have upgraded the operating system running on our SUN machines, the data-transfer between the 140-foot Control Modcomp and the analysis system has proven to be highly reliable.

M. A. CLARK

INTERFERENCE TO MAINLINE OH OBSERVERS FROM NAVSTAR/GPS SATELLITES

The Global Positioning System (GPS) of satellites continuously transmits at two frequencies, 1575.42 MHz (L1 link) and 1227.6 MHz (L2 link). Additionally, the satellites launched after July 1983 carry an Integrated Operational Nuclear Detection System (IONDS) that operates sporadically (whenever there is an atmosphere nuclear burst) at 1381.05 MHz (L3 link).

The full system will consist of 18 active satellites and three active spares in 12-hour orbits in a configuration of six orbital planes with three satellites per plane.

Two codes are superimposed on the L1, L2, and L3 carrier link frequencies modulating their phases: a coarse acquisition (C/A) code at a rate of 1.023 MHz and a precise (P) code at a rate of 10.23 MHz.

John Galt of DRAO, Penticton discovered strong CW interference at a frequency of 1667.49 MHz and determined it was from the 9th harmonic of the "P" code clock rate on the L1 (1575.42 MHz) link of a GPS satellite. Subsequent observations by Galt of all active GPS satellites confirmed interference at 1667.49 MHz from six satellites launched prior to October 1985. Galt did not see the interference on the satellites launched after 1985. This may indicate that the interfering signal arises via an aging process, or perhaps recent satellites have a different design.

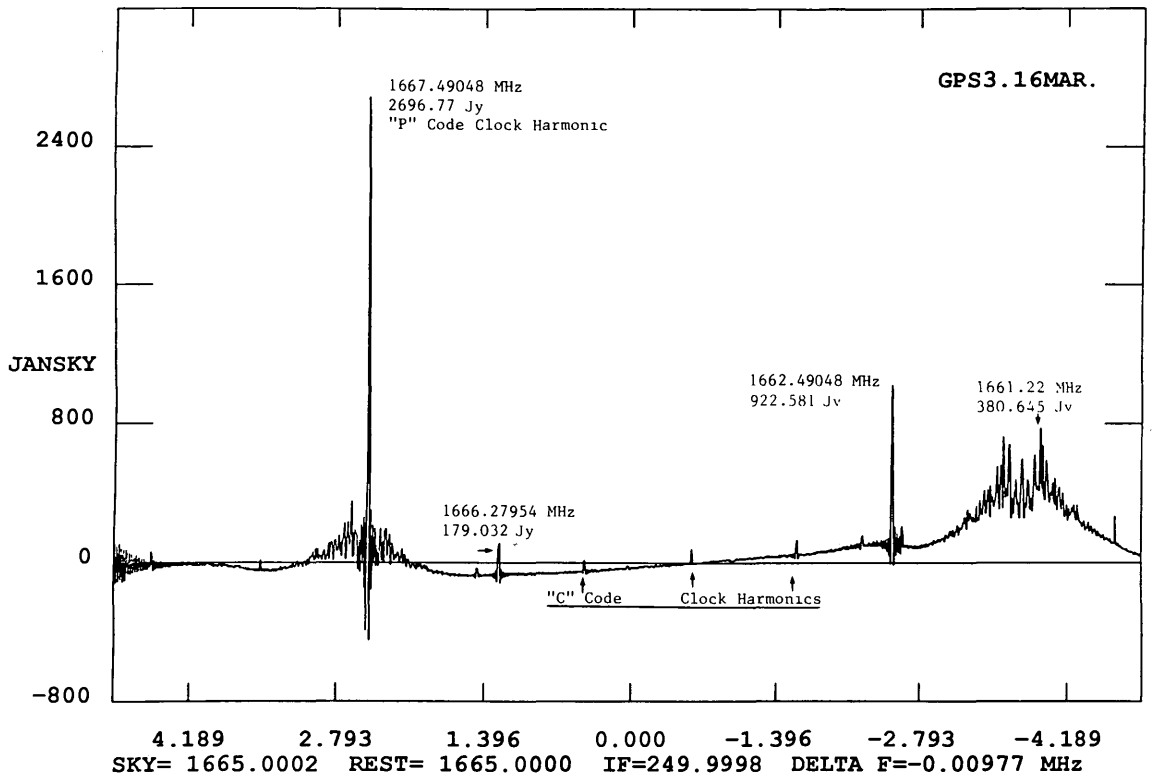
On 15 and 16 March 1990, Ron Maddalena and Wesley Sizemore used the 43-meter telescope at Green Bank to observe GPS satellites 3, 6, 8, 9, 10, 11, 13, 14, 18, and 19. Their pointing accuracy was only 9 arcmin (HPBW ≈ 18'), so the measured fluxes could be low by as much as a factor of two. The accuracy with which we measured frequencies over the 10 MHz bandwidth of the 1024 channel autocorrelator was approximately 10 kHz.

The spectrum shown on the next page is for GPS-3. The signal at 1667.49048 MHz at a strength of 2700 jansky is the 9th harmonic of the "P" code clock rate. Also visible are several harmonics of the "C" code clock rate and a signal at 1662.49048 MHz. This spectrum is typical of the older satellites. The newer satellites (13, 14, 18, and 19) were not as bad, but signals were detected at approximately 1662.5 MHz with strengths of 19 to 722 jansky and the lobe at approximately 1661.2 MHz with strengths of 9 to 174 jansky. The lobe was not detected on GPS-18. The spike at 1667.49 MHz was not observed on any of the new satellites.

The 3rd, 4th and 5th harmonic of the "P" code clock rate of the L3 (1381.05 MHz) link may be producing interference in the 1400-1427 MHz radio astronomy band.

All radio observatories will be adversely affected by these GPS transmissions.

W. A. SIZEMORE



NATIONAL RADIO QUIET ZONE PROTECTED

The NRAO has been involved in litigation before the Federal Communications Commission (FCC) over applications for commercial television licenses for use of Channel 64, 770-776 MHz. Two applicants filed, one well within the National Radio Quiet Zone (NRQZ), the other just outside. Both would produce interference far in excess (>104 times) of the allowable levels at Green Bank, and at a frequency that has been used in the past and will most likely be in the future.

As FCC regulations permit, NRAO objected initially to the applicant within the NRQZ. An FCC judge ruled in NRAO's favor. The applicant denied a license appealed, however, on the grounds that NRAO had not objected to a station outside the NRQZ which would also generate interference in excess of our limits. NRAO therefore did object to the latter license applicant as well.

Administrative Law Judge Joseph Chachkin, on February 12, 1990, denied licenses to both applicants. In these times of increasing RFI (see Sizemore's accompanying article, for example), this is very welcome news. In effect, the boundaries of the NRQZ have been extended. The Judge's ruling was quite strong. Some excerpts from his decision follow:

"NRAO foresees...commencement of the operation of the new facility [the GBT] in late 1994.... [B]ecause other important plans are being developed to improve the NRAO in Green Bank as it heads into the next century, the protection against interference afforded by the NRQZ continues to be of crucial importance.

"If the Commission becomes aware of the potential interference to NRAO by an applicant located outside the Quiet Zone...the Commission would be derelict in its duty to protect NRAO operations if it did not consider the proposed interference.

"The whittling away of the protection afforded the Quiet Zone would, over time, render it of little use for astronomical research.

"The public interest is better served by continuing to protect the radio astronomy activities at the NRAO facilities."

G. A. SEIELSTAD

12-METER

NEW 1.3 MM SIS RECEIVER

A new 1.3 mm, dual-polarization SIS receiver will be available for use by observers in the fall observing period this year. A prototype version of this receiver is now completed and will have been tested on the telescope by the time this article appears. Observers wishing to use the new receiver this year should submit their proposals by the July 1 deadline. The receiver will be available for general use by November.

The receiver will tune between 200-240 GHz and will have a receiver noise temperature, including all receiver optics, of ≤ 400 K (SSB) over this frequency range. Recent developments in the laboratory suggest that by the fall the receiver may have both a larger tuning range and a considerably lower noise temperature. We will update the performance specifications in the next Newsletter.

This is the first of the new-generation SIS receivers to go on the 12-meter. The two SIS mixers are housed in an 8-port cryostat, that is intended to contain up to four dual-polarization pairs of receivers, each covering a different waveband. Two such 8-port cryostats will be constructed, containing receivers that will eventually cover all the atmospheric windows available at the 12-meter. Each lens, feedhorn, and mixer assembly is housed in a removable insert. The cryostats are closed-cycle, 4 K systems that should be more efficient than the hybrid (liquid helium) cryostat in use on the current 3 mm SIS receiver at the 12-meter. In addition, this will be the first computer-tuned receiver on the 12-meter. The use of computer tuning eliminates the need for separate control racks for each receiver, which speeds up the construction time-scale and reduces the shortage of rack space in the control room.

This is a joint project between Tucson Operations and the Central Development Laboratory.

J. W. LAMB, J. M. PAYNE, D. T. EMERSON,
P. R. JEWELL, A. R. KERR, AND N. J. BAILEY

VLBA

SELECTED ITEMS

Operation - The Fort Davis, TX site was declared the fourth operable antenna in February. Test and evaluation observing, remote controlled from Socorro are underway. Staffing adequate to support Network observing at this site, however, is not expected until early 1991. The Pie Town, Los Alamos, and Kitt Peak antennas participated in 6 and 18 cm Network observations in March, and Pie Town additionally at 2.8 cm. Pie Town also also participated in NASA/JPL network crustal dynamics runs in January, February, and March.

Record/Playback Systems - Haystack Observatory has now completed a total of 12 data recording systems, plus one kit to be assembled at the AOC to train VLBA maintenance personnel. The last eight units are being equipped from the first batch of commercially (Honeywell) produced MkIIA/VLBA narrow track headstacks. Electronics for simultaneous 36 track playback/bit synchronization to the VLBA correlator have now been developed by Haystack, and recently delivered to the Charlottesville correlator laboratory to facilitate its interface development and test. Haystack Observatory has recently demonstrated recording at a rate over one gigabit per second on a VLBA recorder specially equipped with an additional three simultaneously driven headstacks.

Correlator - Prototypes of the correlator "FX" chip were delivered on March 16, some thirteen months behind schedule. This forth prototype version is the first application in an entirely new gate array product, introduced by the vendor to resolve persistent failures experienced by NRAO, as well as other customers, in the on-chip memory. It appears to perform, for the first time, as predicted by the vendor-guaranteed simulations. An extensive evaluation process to verify conformance to the designed functionality has now begun. Initial test results have been entirely satisfactory.

Construction Status - Mechanical and electronic outfitting is underway at the North Liberty, IA antenna. Erection of the Brewster, WA antenna is about 80 percent complete. Outfitting is scheduled to start this summer. The Owens Valley, CA antenna is complete. It awaits outfitting scheduled for this winter. The Hancock, NH site work is almost complete. Antenna erection there is scheduled to start this spring. A favorable result from a Saint Croix government hearing has apparently cleared the way for site construction to resume soon. Approximately two months of uninterrupted work at this site should complete the antenna foundation. A bid package for the site construction at the Mauna Kea location is expected to be issued by NRAO in April.

K. J. STETTEN

NON-NETWORK OBSERVING WITH THE VLBA

Proposals for the use of operational VLBA antennas are welcomed. See the 1 April 1989 Newsletter for proposal guidelines. In brief, proposers can request time on one or more operational VLBA antennas outside of VLBI Network runs. Either single dish or interferometric projects can be proposed. Proposal deadlines and observing periods are identical to those for the VLA advertised elsewhere in this Newsletter. During the observing period applicable to the next proposal deadline (15 June 1990), the VLBA antennas at Pie Town, Kitt Peak, Los Alamos, Fort Davis, and North Liberty will be capable of MkII VLBI at 18, 6, and 1.3 cm. Brewster will have those capabilities in December 1990. Regrettably, VLBA operating budget limitations mean that we cannot guarantee the participation of all these VLBA antennas, and only a few non-Network projects can be scheduled per month.

Two short documents useful to VLBA proposers are available. The "VLBA Astronomical Readiness" document describes the readiness of the VLBA antennas for astronomical observing. The "VLBA Specification Summary" document gives the essential specifications of the VLBA project. These documents are updated regularly and are maintained in plain ASCII text in NRAO's computer network, in directory 6654::UMA3:[VLBA] under file names ASTRO. and SPECS., respectively. VLBA proposals are refereed. Observing time is granted by the VLA/VLBA Scheduling Committee on the basis of scientific merit and technical feasibility, without regard to the national affiliation of the proposer(s). All proposals must be submitted with a VLBA proposal cover sheet, copies of which can be obtained from R. J. Havlen at the AOC in Socorro. Those requesting a VLBA cover sheet will also be mailed the ASTRO. and SPECS. documents described above. Contact the undersigned at the AOC if further information is needed. Proposals should be sent to: Director, NRAO, Edgemont Road, Charlottesville, VA 22903-2475.

Proposers of interferometry projects who also request non-VLBA antennas must list those antennas on the VLBA proposal cover sheet. The non-VLBA entry can be used to request one or more antennas at the VLA, without needing to submit a separate VLA proposal. If other non-VLBA antennas are listed, then the proposal must also be submitted to the directors of those antennas. The VLBA proposal path is designed to complement, and not replace, existing VLBI networks in the U.S. and Europe. Thus VLBA proposals requesting long lists of non-VLBA antennas will automatically be turned down by the VLA/VLBA scheduling committee, unless the proposal convincingly argues that the project cannot be done through existing VLBI networks.

Successful VLBA proposals are scheduled by B. G. Clark, during times when a VLBA operator is on duty. VLBA operating budget limitations do not permit continuous operator coverage. If a VLBA project involves non-VLBA antennas, the timing of the project should be coordinated between Clark and the schedulers of the non-VLBA antennas.

VLBA observers are reminded that they need to arrange for their experiments to be correlated before they can be scheduled. This will be true until the VLBA correlator becomes available for general use. Correlation capabilities at the NRAO are restricted to the Socorro MkII correlator, recently moved from Charlottesville. Correlation at Socorro must be done by the observer. Most MkII observations will be correlated elsewhere. Pie Town is currently capable of Mark III observing, and Kitt Peak is expected to gain this ability during the autumn. Proposers of MkIII VLBA observations, especially those to be correlated at Haystack, must submit a proposal to the U.S. VLBI Network for use of the correlator time and, until the VLBA acquires its own tape, for use of MkIII tapes. Note that such proposals for use of MkIII resources are already required of the millimeter observers despite the fact that they do not use Network telescopes.

J. M. WROBEL, R. C. WALKER

VLA

VLA COMPUTER STATUS

The DICOMED film recorder is now fully operational on Yucca. Software support from AIPS as well as for SunView screen dumps is now available. The AIPS task TVFLM spools the IIS tv display to the dicomed while the task IMFLM spools image data to the Dicomed using the current IIS transfer function and color table. The ISIS task DICREC spools a SunView rasterfile.

The online ModComp system now supports additional correlator modes. Four IF line data and spectral line polarization modes are being tested. Work continues in both AIPS and ISIS to accommodate the new correlator data.

The four telex tape drives on Yucca continue to give problems. Version 8.0 of Convex OS failed to install properly using these tape units. Additional work is now scheduled on Cholla to try and install Convex 8.0 using the Convex supported tape drives on Cholla.

The PC version of OBSERVE is almost ready. It is undergoing testing and should be available 2nd quarter this year.

R. R. PAYNE

VLA CONFIGURATION SCHEDULE

Configuration	Starting Date	Ending Date	Proposal Deadline
A	23 Feb 1990	11 Jun 1990	15 Oct 1989
A/B	22 Jun 1990	09 Jul 1990	15 Feb 1990
B	13 Jul 1990	04 Sep 1990	15 Feb 1990
B/C	14 Sep 1990	01 Oct 1990	15 Feb 1990
C	05 Oct 1990	07 Jan 1991	15 Jun 1990
C/D	18 Jan 1991	04 Feb 1991	15 Jun 1990
D	08 Feb 1991	06 May 1991	15 Oct 1990

The maximum antenna separations for the four VLA configurations are: A-36 km, B-11 km, C-3 km, D-1 km.

Approximate Long-Term Schedule

	Q1	Q2	Q3	Q4
1990	A	A	B	C
1991	D	A	B	B,C
1992	C	D	A	A,B
1993	B	C	D	A
1994	A,B	B	C	D

Observers should note that in the ensuing 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 B configuration observations near 8^h RA should be considered. C configurations near 15^h RA will also be difficult.

W. M. GOSS, B. G. CLARK

VLA DISSERTATIONS

Dissertation students and their advisors who propose to carry out a major portion of their thesis observations with the VLA should be cautioned that obtaining multiple daytime allocations on the VLA cannot be presumed for a single cycle through the VLA configurations. Fewer than 35 VLA observing proposals, out of nearly 4000 received in the last ten years, have received over 72 hours of observing time. For this reason, some large projects may not be appropriate as dissertation topics. The scheduling committee may require them to be spread over two or more configuration cycles in spite of good to excellent reviews from the referees. Large proposals must be outstanding and of urgent current interest for the committee to schedule them with the timeliness demanded by thesis research. Once a thesis project has been started, however, the committee will make every effort to commit telescope time through the remainder of the configuration cycle in amounts commensurate with the initial allocation to ensure the timely completion of the project at that level.

B. G. CLARK, W. M. GOSS, R. J. HAVLEN

VLA INFORMATION SYSTEM

Information on various topics related to the VLA is available on one of the CONVEX computers at the AOC. The subjects presently available include: baseline corrections for the VLA, VLA hardware status, VLA equivalent system temperature measurements, VLA configuration, VLA Observational Status Report, VLA archive list, VLA calibrator list, and other miscellaneous items. In addition, there is a summary of the VLBA specifications and current construction status. Access to the Socorro switch is by modem (1200 or 2400 baud, 8 bit, N parity) on telephone number (505) 835-7010. Once the Socorro DDS: prompt is reached, access the CONVEX by typing CHOLLA and log into the vlais account. A menu is presented listing the choices. A brief description of the commands can be obtained from the help command.

R. C. BIGNELL

IMPROVED SPECTRAL LINE CAPABILITIES AT THE VLA

With the software update of February 28, 1990 the VLA online system has been enhanced to make available most of the spectral line modes that are supported by the correlator. The only modes which have not been yet released concern spectral line polarization. Formal checks that the new modes are correct have been made, but these modes will not be considered fully supported until we have received feedback from the NRAO scientific staff that correct data are being produced. To date, no calibrated data or maps have been produced from data taken with the newly released options provided by the revised software.

Because of the greatly increased flexibility offered by the enhancements, it is strongly recommended that observers intending to use one of these modes contact NRAO staff well in advance of their observing run in order to discuss the preparation of OBSERVE files. Moreover, due to the increased complexity, observers will normally be expected to visit the AOC in Socorro regarding the initial data calibration and reduction.

Al Braun has modified the distributed version of OBSERVE to allow all new features. What follows is a summary of all spectral line modes which are currently supported, including some information on OBSERVE:

1. All single IF modes (1A, 1B, 1C, and 1D) should function as before. The change should be transparent in these modes.

2. All 2 IF modes (2AB, 2AC, 2AD, 2BC, 2BD, and 2CD) now function correctly. Until now, modes 2BC and 2BD were not supported. (The modes 2A, 2B, 2C, and 2D are obsolete. They have never been supported by OBSERVE.)

3. The 4 IF mode produces data. This allows one spectrum per IF for all baselines (the modes 4A and 4D are obsolete. They have never been supported by OBSERVE.)

4. The polarization modes (PA and PB) produce data. These produce 4 spectra per baseline. The spectra are AA, CC, AC, and CA for mode PA; and BB, DD, BD, and DB for PB. However, the crossed-hand terms are not correct. Work to show whether this problem lies in the correlator, the online system or the offline system or the offline processing is continuing. Therefore this mode will not yet be released for general use.

5. Multiple subarrays in spectral line mode are supported, but mixed spectral line and continuum subarrays will not be allowed.

6. The individual IFs may now have independent bandwidths. However, correlator firmware imposes a restriction on bandwidth selection when using the multiple IF spectral line modes such that all the IFs must be at 50 MHz total bandwidth or they must all be less than 50 MHz. In other words, when multiple IFs are specified with different total bandwidths none of these can be 50 MHz. This restriction holds independently for each subarray.

7. The individual IFs may now have independent data selection criteria.

8. Autocorrelation spectra are produced for all active antennas. The autocorrelation spectra are handled in the same way as the cross-correlation data (i.e., the options for lag spectra, Hanning smoothing and data selection are applied).

9. Bandpass normalization and Hanning smoothing are available with all spectral line modes. The same options, such as Hanning smoothing or autocorrelation normalization, will be applied to each IF in the multiple IF modes.

10. Channel zero (the "continuum" channel) is incorrectly computed in the case of a four channel spectrum (before Hanning smoothing). This will arise only in the case of correlator modes 4, PA and PB with a bandwidth of 50 MHz. It is not a problem if a four channel spectrum is produced as a result of data selection. Totally erroneous data is produced if the data selection parameters require a two channel spectrum. There are no plans to fix either of these "problems".

More detailed information about these changes are available in the 1990 edition of the Observational Status Report, Guide to Spectral Line Observing by A. Rots (soon to be reissued), or from E. Brinks in Socorro.

E. BRINKS, G. C. HUNT, K. SOWINSKI

ARRAY COMPUTING - SUPERCOMPUTER OPPORTUNITIES

The NRAO long term plan for VLA and VLBA computing has three distinct components.

1. The NRAO will focus on hardware and software approaches to array telescope data processing that can readily be exported to our users at their home institutions or at regional supercomputer centers;

2. The NRAO will purchase enough "small supercomputers" and imaging workstations to handle the projected data processing demands of about 40 to 50 percent of all VLA/VLBA proposals, expecting that a total capacity sufficient to process another 40-50 percent of such proposals will also become available to NRAO users at their home institutions;

3. The most cpu-intensive 10 percent of the projected VLA/VLBA projects will be handled either by processing at supercomputer centers or by being deferred until its processing costs become manageable.

The NRAO's planned use of supercomputers involves both the use of AIPS on these machines and the use of other software. The other software will include comprehensive packages like AIPS, but developed and supported outside the NRAO, or specialized stand-alone programs supplied by the NRAO or by others. Examples of the former are the WERONG package (designed by the National Center for Supercomputing Applications (NCSA) for the Cray X-MP and continuum data) and the MIRIAD package (designed by the NCSA for the Cray 2 and spectral-line data). An example of the latter is the SDE-fly routine for wide field imaging, especially at low frequencies, developed at the NRAO by Tim Cornwell.

In support of AIPS on supercomputers, the NRAO has been working to make AIPS run on Cray hardware under UNICOS. This work has been done in cooperation with Cray Research using their facilities and those provided by University of Minnesota. AIPS currently runs on the CRAY XY-MP under UNICOS with only a few limitations. The system uses the virtual TV with the display facility provided by a SUN workstation. The most serious limitations are lack of interactivity on the display (which can be overcome by running AIPS separately on the workstation) and limited access to tapes. These limitations are considered temporary. The NRAO is distributing a partial UNICOS implementation on the 15APR90 AIPS installation tapes. For information. contact Bob Burns at the NRAO in Charlottesville, *bbums@nrao.edu*, (804) 296-0229.

The University of Minnesota is currently using the AIPS UNICOS system to do routine processing on a CRAY X-MP. For information, contact Larry Rudnick. He may be contacted at *larry@ast1.spa.umn.edu*, (612) 624-3396, University of Minnesota, Dept. of Astronomy, 116 Church St. SE, Minneaopolis, MN 55455. The Minnisota group would be glad to provide information on their experience and to explore possible collaborations.

The University of Toronto has begun installing the AIPS UNICOS system on their CRAY X-MP and also supports a number of stand-alone programs. For information contact Phil Kronberg. Kronberg may be reached at *kronberg@radio.astro.utoronto.ca*, (416) 978-4971, Univ. of Toronto, Dept. of Astronomy, Toronto, ON M5S 1A7, Canada. The Toronto center can provide help and supercomputer time to users on request.

The WERONG and MIRIAD packages are available now at the NCSA on "friendly user" basis without the need to apply explicitly for supercomputer time. Those with datasets that cannot be processed without supercomputer power, e.g., 8k by 8k continuum images or spectral line observations that exceed the limits prescribed by the NRAO for reduction on NRAO computers, are invited to contact Richard Crutcher to discuss their program. Crutcher may be contacted at *crutcher@atlas.astro.uiuc.edu*, (217) 333-9581, National Center for Supercomputing Applications, Beckman Institute for Advanced Science and Technology, Drawer 25, 405 North Mathews Avenue, Urbana, IL 61801.

Several other NSF-funded supercomputer centers have expressed interest in supporting array data processing. We expect that by summer AIPS will be running at about five Cray sites. We believe that at least one of these will be an NSF-funded center that accepts proposals for computer time from the academic community.

The NRAO plans to hold an AIPS supercomputer school/workshop in the fall of this year. This will be held at Cray Research in Minneapolis and will be co-sponsored by Cray Research and the NRAO. Its purpose will be to provide information and training for new AIPS supercomputer sites and to compare experience at existing sites. For information, contact Bob Burns at NRAO.

W. R. BURNS, A. H. BRIDLE

VLA CALIBRATOR PROGRAM

We now have a program for IBM PCs (and compatibles) which can be used to maintain different calibrator databases, including the VLA data set. This is a completely separate program from VLASORS. It includes the capability to flexibly define the bands, position, and resolution quality codes. It has the same search capabilities that are built into VLASORS. Copies of this program, along with the current VLA calibrator list, may be obtained from Sandra Montoya (505 835-7310). The program and data set are distributed on one 360k, 5.25" diskette.

R. C. BIGNELL

VLA ARCHIVE DATA UPDATE

Data for the VLA archive and calibrator search program, VLASORS, has been updated to include all of the sources observed during 1989 and a completely revised calibrator list which now includes 3.6 cm flux densities. This program runs on an IBM PC (or compatible). There have been small changes to the program, including an improved installation procedure. Copies of the program along with the complete data sets may be obtained from Sandra Montoya (505 835-7310). Currently the program and data are distributed on four 360k, 5.25" floppy disks. We will be able soon to support distribution on 3.5" floppies (720k or 1.44k) and 1.2M 5.25" floppies. We would appreciate it if you could send us some blank diskettes to help offset distribution costs.

R. C. BIGNELL

FAX TRANSMISSIONS

Many VLA/VLBA proposals are now being sent to us via facsimile machines. We have finally faced the facts and accepted the flood as inevitable. Unfortunately, many of the earlier generation machines are not reliable transmitters. We still receive some submissions that are distorted beyond repair. We therefore urge our users not to rely only on a last minute fax to beat the proposal submission deadline. Make sure there is a hard copy in the mail to us that will arrive on time. We cannot guarantee that a garbled fax copy will receive special treatment in time for adequate review.

In the future we hope to develop an electronic mail proposal submission program. Meanwhile we ask you to continue using the normal mail.

R. J. HAVLEN

VISITING SOCORRO - RECENT UPDATE

It is extremely important that all scientific visitors to NRAO/Socorro/VLA give us a 2 week advance warning of their intent to visit. Please do not just "drop in" at a moment's notice. As much as we like to see you, we need an appropriate amount of time to make the necessary logistic arrangements to insure that your visit is a productive one. This includes lining up staff technical assistance, avoiding conflicts in computer support, and coordinating housing and transportation. This advance courtesy applies uniformly to current observers as well as to those visitors who will only be analyzing existing data. Please call Eileen Latasa at (505) 835-7357 to make reservations.

The Socorro Shuttle Service went out of business at the end of February. The NRAO has, however, recently contracted with a new service (as yet unnamed) which will be operating on an as-needed reservation only basis. Because of the limited capabilities of this new service, VLA/VLBA visitors are strongly advised to schedule their arrival/departure times to/from the Albuquerque Airport between the hours of 8 a.m. and 8 p.m. Outside of these times, the traveller should probably arrange to stay overnight in Albuquerque or to rent a car for the trip to Socorro. Please consult directly with Eileen Latasa to obtain the latest information on the new service and to make reservations.

R. J. HAVLEN

IN GENERAL

THE MILLIMETER ARRAY PROPOSAL

The product of the November 1989 Millimeter Array (MMA) scientific workshop is an extensive update of the earlier scientific rationale for the MMA. Results from observations made over the past few years further strengthen the argument for a sensitive, high resolution instrument operating at wavelengths where such objects as galactic nuclei and protostellar disks are not obscured. Indeed, the MMA will spatially resolve the non-stellar objects SIRTF will detect and do so with the resolution of the Hubble Space Telescope. The need for the MMA is very evident. The reports of the workshop will constitute the statement of the MMA scientific program in the proposal to be submitted to the NSF.

A draft of the MMA proposal is now complete. It will be circulated in April for comment to those individuals who have participated in MMA scientific workshops or technical advisory meetings. Others who are interested in reading the draft material should contact me for a copy. With the criticisms and comments we receive, we'll amend the proposal and ask AUI to submit it to the NSF in May.

We would certainly like to acknowledge with appreciation the efforts of all those who have so generously contributed their time to the development of the MMA concept. Our thanks to you is our commitment to see the project to a timely and successful completion.

A descriptive brochure on the MMA is attached to this issue of the NRAO Newsletter.

R. L. BROWN

SEVEN-BEAM RECEIVER TO PARKES

In May and June of this year a 4.85 GHz receiver on loan from the NRAO will be used to produce a new, deep continuum survey of the sky southward of -36 degrees declination. This will complement a similar survey made from the northern hemisphere. Following the southern survey, the receiver will be available for general astronomical use. However, potential users should carefully assess whether their requirements may have already been met by the survey which is anticipated to be complete to around 30 mJy.

The receiver is a 14-channel system fed from seven beams, each producing two polarized outputs. Six beams are arranged concentrically around the seventh at a spacing of close to three half-power-beamwidths (HPBW). The HPBW will be 3.9 arcminutes on the Parkes 64-meter telescope. It is expected that typical on-cold-sky system temperatures will be in the vicinity of 30 K and the available continuum bandwidth will be about 600 MHz.

Proposal forms for use of the Parkes Telescope (and the Australia Telescope Compact Array in Narrabri) are available from Phyllis Jackson at NRAO, 804-296-0221. Proposals for the third quarter must reach: The Director, Time Assignment Committee, Australia Telescope National Facility, P. O. Box 76, Epping NSW 2121, Australia, by 27 April 1990.

P. A. VANDEN BOUT

1990 JANSKY LECTURESHIP

It is a pleasure to announce that Prof. Alan H. Barrett will serve as the 23rd Jansky Lecturer.

Al Barrett is best known for his discovery of the hydroxyl radical, OH, in the interstellar medium. This was the first of the many interstellar molecules discovered via their radio wavelength emission. He and his students went on to pioneer the use of ammonia as a thermometer of the interiors of dense interstellar clouds and to reveal many fundamentally new aspects of the Galactic Center. Besides his leadership role in the pioneering of interstellar molecular spectroscopy and the subsequent development of this major area of astronomical research, he has made contributions in diverse technically related areas, including the discovery of limb darkening on Venus, contributing to the development of very long baseline interferometry for the study of OH masers, and making important advances to remote sensing and medical diagnostics.

He will deliver a lecture entitled "The Beginnings of Molecular Astronomy" on October 23 in Charlottesville and November 30 in Socorro.

P. A. VANDEN BOUT

FOREIGN TELESCOPE TIME

Users are reminded of the NSF program, administered by NRAO, that provides the air travel expenses for observers who are scheduled time on "unique foreign telescopes." Information on this program can be obtained by contacting Harvey Liszt (804-296-0344) or Phyllis Jackson (804-296-0221) for proposal forms and procedural details.

The following four millimeter wavelength observatories have all indicated a willingness to consider outside proposals, on the basis of scientific merit, for grants of observing time.

James Clerk Maxwell Telescope The JCMT is scheduled in semesters, September-February, March-August. The proposal deadline for the September 1990-February 1991 semester is April 30, 1990. Applications should be sent to the Executive Secretary, PATT, SERC, Polaris House, North Star Avenue, Swindon, SN1 1ET, United Kingdom. Application forms can be obtained from that address, or from Dr. J. M. MacLeod, Radio Science Section, Herzburg Institute of Astrophysics, 100 Sussex Drive, Ottawa, Ontario, K1A OR6, Canada. Outside use of the JCMT amounted to 10%, 23%, 26%, and 18% in the last four semesters, not counting the 10% guaranteed to the University of Hawaii.

IRAM 30-Meter Telescope - The IRAM 30-meter telescope is scheduled in four month blocks: May-August, September-December, January-April. The proposal deadlines are February 1, June 1, and October 1, respectively. Applications should be sent to: Scientific Secretariat, IRAM, Domaine Universitaire, 38406 St. Martin d'Heres, France. Proposal forms may be obtained from that address. Outside use of the 30-meter telescope has grown since operations began: 6% ('86), 13% ('87), 20% ('88), and 18% ('89). Roughly one-third of the outside time has been scheduled for programs with no partner country collaborators.

Swedish ESO Submillimeter Telescope - The SEST is scheduled in semesters with proposal deadlines of April 15 for the six months beginning October 1, and October 15 for the six months beginning April 1. The SEST observing time is split 50:50 between the European Southern Observatory (ESO) and Sweden/Finland, offering two routes for the submission of outside proposals. Proposals for Swedish time should be sent to Prof. R. Booth, Onsala Space Observatory, S-439 00, Onsala, Sweden. Proposal forms may be obtained from that address. Proposals for ESO time (submitted on different forms) should be sent to the Visiting Astronomer Section, ESO, Karl-Schwarzchild Strasse 2, D-8046 Garching bei Munchen, Germany. You should write to the same address for the ESO forms. Roughly 10 percent of the SEST observing went to outside users last year.

Onsala 20-Meter Telescope - Observers interested in time on the Onsala 20-meter telescope should follow the procedure given above for the Swedish SEST time.

Nobeyama Radio Observatory (NRO) - Both the NRO 45-meter telescope and millimeter wave interferometer are scheduled in two sessions dividing the October through May observing season. The deadlines for receipt of proposals for the 1990-91 sessions will be announced later and will fall sometime in August and October 1990, respectively. Proposals should be sent to the Program Committee; Nobeyama Radio Observatory; Nobeyama, Minamimaki, Minamisaku; Nagano 384-13; Japan. Proposal forms may be obtained from that address. The observing time for both instruments is allocated two-thirds to the open program and one-third to maintenance, tests, development, and long-range internal programs. To date, 31 percent of the scheduled 45-meter open program proposals were proposed by outside scientists. The same figure for the millimeter interferometer is 46 percent. Collaboration with an internal scientist is not required, but the NRO encourages such collaborations in the interest of efficiency and better communications with telescope operators and local staff.

A number of foreign centimeter-wavelength facilities have also indicated a willingness to entertain outside proposals. Users are referred to the April 1988 issue of the Newsletter, and to the article in this issue on Australian facilities. Again, Harvey Liszt and Phyllis Jackson can supply proposal forms and procedural details.

THE EDITOR

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