



# NRAO NEWSLETTER

1 July 1998

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<http://www.cv.nrao.edu/html/newsletter/>

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## GREEN BANK

### Green Bank Telescope

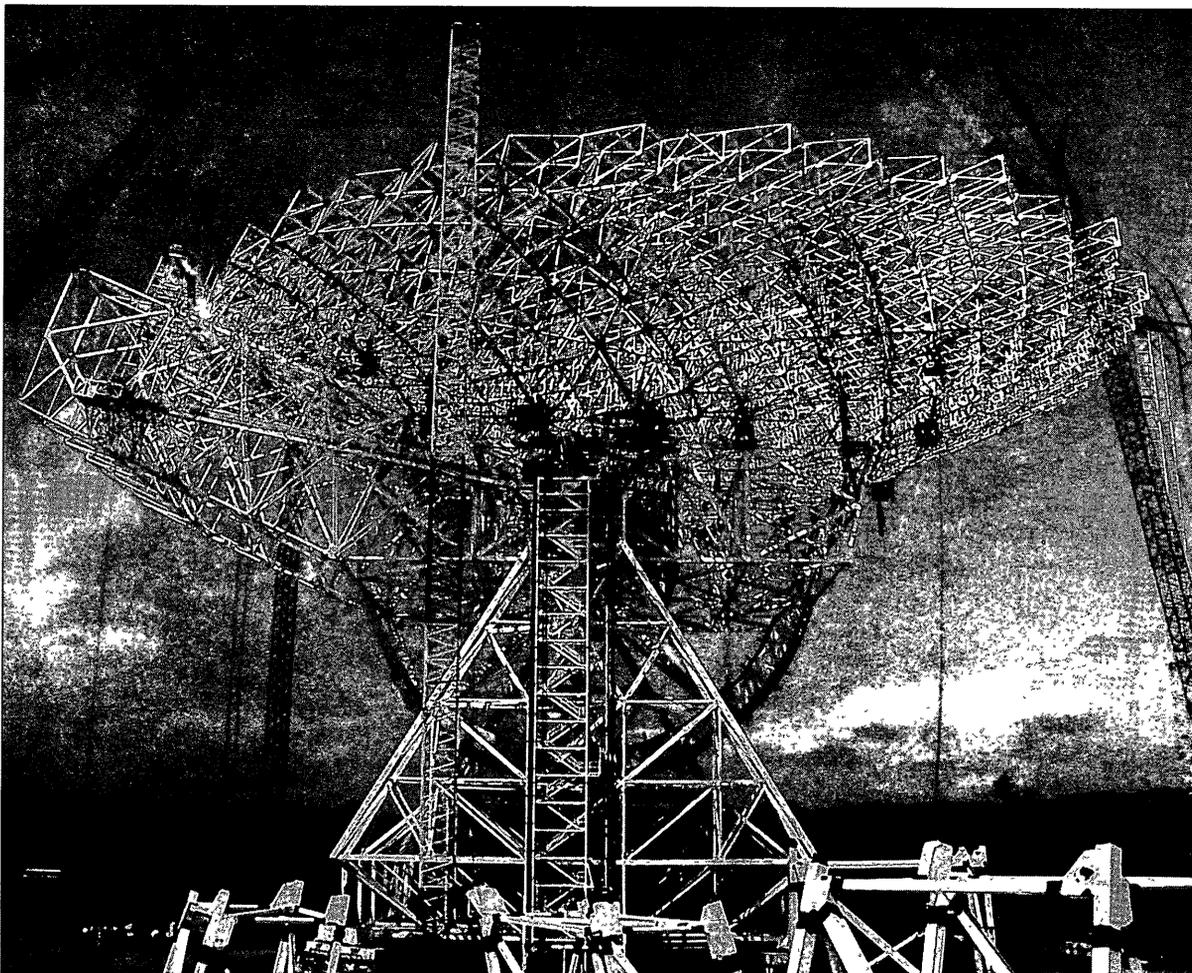
In late June the last of the twenty-two modules which comprise the backup structure of the GBT was raised into place. The figure shows the completed BUS mounted on the box structure. With this milestone achieved, one of the most complex and time-consuming portions of the construction program is nearly finished. There remains the completion of the welding of the beams joining the modules together. Approximately 97 percent of this "intermodule welding" is complete.

The primary effort now being expended at the site is aimed at correcting the poor quality welds discovered in the interior stiffeners in the permanent supports of the backup structure. The rework of the permanent supports and the connecting of the supports to the box will continue over the next several months.

After the permanent supports are installed the load of the backup structure will be transferred to them, and the tipping structure can then be rotated.

Additional work on the structure includes the preparation for the installation of the surface actuator cables, the checking of the shape of the backup structure on the temporary supports, painting, and installation of electrical gear. The assembly on the ground of portions of the vertical feed arm has been completed, and it is planned to lift the first of the lower modules onto the structure in late summer.

*W. H. Porter and D.E. Hogg*



## 140 Foot Telescope to Operate in 1999

The 140 Foot Telescope, which was previously scheduled to close at the end of 1998, will continue in operation through the first half of 1999. The regular suite of prime focus receivers covering frequencies up to 5 GHz will be available, as will the GBT receivers at the Cassegrain focus that cover 4-5 GHz (for VLBI only), 8-10 GHz (cannot be used for VLBI) and 18-26 GHz. The available back ends include the MKIV autocorrelator, the Spectral Processor, the Digital Continuum Receiver, and the VLBA and S2 systems for VLBI.

In view of the extended period of operations of the telescope, new proposals will be accepted. Proposals for time in late 1998 and the first quarter of 1999 must be received in Charlottesville by October 1, 1998. Proposals to use the instrument in the second quarter of 1999 should be received by January 4, 1999. Further information on 140 Foot Instrumentation and instructions on proposal preparation are available on the Green Bank web site.

*F.L. Lockman*

## MILLIMETER ARRAY

### Status of the Millimeter Array

With the approval of the National Science Board, the three-year Design and Development phase of the Millimeter Array has begun. On June 1, 1998, much of the NRAO staff who are assigned to the MMA Project were transferred formally onto it so this provides an easily remembered start date for the formal project at the NRAO. We are enormously pleased and very grateful for the efforts of everyone at the NRAO and in the U.S. community who worked to bring this about.

The Design and Development phase of the MMA is meant to provide us with an opportunity to prototype representative modules of some of the technically most demanding instrumentation. A prototype antenna is the most visible example of the effort but many of the other prototyping efforts are equally challenging: these include prototyping SIS mixers that are in fact MIC. SIS circuits on a single chip that incorporate balanced image separation; 4K cryogenics that is reliable and economical even when running at an ambient pressure 70 percent of that at sea level; an optical fiber signal transmission system with 16 GHz bandwidth; and a computing environment that is designed from the outset to be developed, used, and maintained remotely. A primary goal of the MMA D&D effort is to allow us to establish a firm cost basis for the construction phase of the project.

Approximately 20 people at the NRAO are now working on the MMA project, about a third of these people are at each of the Tucson, Socorro, and Charlottesville sites. By the end of the year the number of staff should grow to more than 30 all

together; their efforts will be augmented by the design and research efforts of another six people working at the OVRO and BIMA arrays. Advertisements for open positions with the MMA project can be found on the NRAO homepage <http://www.nrao.edu>.

Personnel assignments to the MMA project at the NRAO have brought about some changes that users of the Observatory will notice. In particular, Brian Glendenning has transferred to the MMA Project from AIPS++ where he worked for many years directing the technical work on that project; Brian is now the Division Head for all of MMA computing. Al Wootten has assumed the role of MMA Project Scientist replacing Frazer Owen. Frazer was the inspiration for much of what is now the MMA, and we are very grateful to him for his seminal insights and efforts.

The burden of organizing initial D&D work, assembling the staff and making the facilities ready for the staff to work effectively, has prevented much progress from being made with potential international partners in the MMA or in that larger, combined array that will subsume the MMA. However, in the weeks ahead discussions and negotiations on possible partnership arrangements will resume with a realistic expectation that a mutually satisfactory, and beneficial, international partnership can indeed be forged.

*R. L. Brown*

### MMA Activities in Tucson

The impact of MMA development activities in Tucson is growing and is welcomed by all. The site testing interferometers in operation in Chile, designed and built by Tucson engineers and scientists, continue to be operated and maintained from Tucson. A submillimeter tipper is now operational at this test

site. Earlier this year we hosted an international gathering of European, Japanese, Chilean, and U.S. groups to discuss existing and future millimeter and submillimeter site testing activities. MMA receiver development and production are scheduled to take place in Tucson, using mixer blocks supplied from the

Central Development Lab (CDL). In collaboration with the CDL, an orthomode transducer for the MMA has been built in Tucson; this prototype is designed for 90 GHz, but the goal is to extend the principle up to 300 GHz. MMA cryogenics design and development are also centered in Tucson under the guidance of Larry D'Addario. The MMA antenna group is based in Tucson, headed by Peter Napier in Socorro. An experimental laser local oscillator system is being developed in Tucson, and if successful, potentially provides a simpler, cheaper, and more

reliable local oscillator system for the MMA; we will report on the progress of this project in later Newsletters.

The additional staff in Tucson now supporting the MMA has already strained the available office and lab space; more MMA employees will be added by the end of this year. To accommodate this expansion, we are looking at various options of increasing the space available to NRAO at the University of Arizona.

*D.T. Emerson*

## IN GENERAL

### **NRAO-News: Introducing An NRAO Electronic News Bulletin**

Since June 1981, the NRAO has disseminated news of activities important to users via this Newsletter, which appears every four months. The Newsletter is both sent as hard copy and appears on the NRAO home page. We now plan to introduce a complementary vehicle called NRAO-NEWS, which will be sent via an e-mail exploder to a selected list of recipients initially numbering ~1000. The format will be quite different from that of the Newsletter: it will appear more frequently, on an as-needed basis, and the items will be much more cryptic, consisting of typically a couple of sentences and a URL path to more complete information on the WWW. The URL may be accessed by simply clicking on a link provided for each item.

There are several reasons for the new e-mail news vehicle.

(i) Since the number of people receiving the hard copy Newsletter was diminished a year or so ago as people elected to get the Newsletter directly from the WWW, we believe that use of the WWW has not been as extensive as we had hoped; (ii) at three-month intervals, the Newsletter is not always timely, and is sometimes out of phase with important news; (iii) technical matters in electronics or computing that can have an important effect on observers (e.g., discovery of a calibration error at a

given telescope) may not be efficiently disseminated by the Newsletter. In the latter case, such matters are described on a regularly updated basis on the web sites of the individual NRAO sites, but attention is currently not otherwise directed towards users, who often miss them. NRAO-NEWS will deliver this information in an active and timely fashion.

It is difficult to guess how often NRAO-NEWS will appear, but we anticipate on average every six weeks. We are presently preparing the lists of recipients and constructing the exploder. We expect the first issue sometime before the end of the summer. If you have not received the NRAO-NEWS Bulletin e-mail by the first of September and you are interested in being on the subscription list please subscribe via <http://www.cv.nrao.edu/nrao.news.html> or send e-mail to: [majordomo@majordomo.cv.nrao.edu](mailto:majordomo@majordomo.cv.nrao.edu). and include in the body of your message "subscribe NRAO-NEWS." We encourage comments from recipients.

The NRAO Newsletter will maintain its current format and purpose; it will continue unchanged.

*The Editor*

### **NRAO Jansky Lecture**

I am pleased to announce that the Jansky Lecturer for 1998 will be Bernard F. Burke, the William A. M. Burden Professor of Astrophysics at the Massachusetts Institute of Technology. Bernie Burke is one of the most familiar names in radio astronomy, with a record of research that extends over a large variety of topics, from his co-discovery of Jupiter radio bursts to more recent work in the search for gravitational lenses and in very long baseline interferometry from space. He was for many years a member of the Board of Trustees of Associated Universities, Inc., until he joined the National Science Board.

Professor Burke will present a lecture entitled "Radio Telescopes: Reaching for the Astronomical Frontiers." Tentative dates are: Green Bank on October 21; Charlottesville on October 20; Tucson on November 6; and Socorro on November 4. The New Mexico Symposium will be held on the same date as the Jansky Lecture in Socorro. Astronomical researchers from NRAO and neighboring universities and laboratories are invited to present their research in 10 to 15 minute talks at this symposium.

*P.A. Vanden Bout*

## Observatory-Wide Computing Developments

An area of software effort which will ultimately affect observers is the purchase of a PC-based computerized maintenance management system, described in the Socorro computing section. This software is required to track repairs, scheduled maintenance, and engineering changes to instruments. It will replace the existing MAINT program used in Socorro, which was developed in-house several years ago. It is likely that the same package will be adopted in Green Bank as well. We view this software as a long-term investment in the reliability of the VLA, the VLBA, and the GBT.

In 1997 NRAO was able to upgrade approximately 65 old Sun workstations to new models. This year we are again going through this process. With the significant improvements achieved earlier this year in AIPS performance on Intel x86 platforms, Linux has become an attractive option for many

computing tasks. Accordingly, about three-quarters of the roughly 50 UNIX upgrades we plan to purchase in the next few months will be Linux systems; the rest are SPARC Ultra 10s.

After these purchases, there will be approximately 65 Linux systems NRAO-wide, compared with about three times that many Suns. The popularity of Linux is growing rapidly at many academic institutions and among our user community, but SPARC/Solaris continues to be the most common platform for AIPS use by a considerable margin. Due to the limited availability of some of the commercial software that NRAO requires, PCs running Linux cannot completely replace our Suns; nor can PCs compete at the higher end of the workstation market. We therefore anticipate that both environments will be used in-house for the foreseeable future.

*M.R. Milner*

## Charlottesville Computing Developments

A simple CD-ROM recorder was purchased during the quarter; this device is now used both for generating the current release of AIPS for the astronomical community, and for providing a reliable long-term backup medium for staff and visitors. Interest in AIPS on CDROM (with "live" binaries for Linux and Solaris) has been quite strong and has kept this new machine busy.

In conjunction with the Observatory-wide initiative to upgrade our oldest Sun workstations, the Charlottesville computing group has worked hard to ensure that the Linux/Intel platform can be widely deployed with a minimum of administrative overhead. This includes generation of an "NRAO-tuned" Linux system that can be distributed to any NRAO site that requests it.

*P.P. Murphy*

## AIPS++ Newsletter for June 1998

We are pleased to announce the publication of the June 1998 edition of the AIPS++ Newsletter at URL:

<http://aips2.nrao.edu/aips++/docs/newsletters/jun98/junenews/junenews.html>.

Older copies of the newsletter are available at:

<http://aips2.nrao.edu/aips++/docs/newsletters/frontpage.html>.

To alert those interested to each new issue of the AIPS++ Newsletter, we have inaugurated an AIPS++ newsletter mailing list. When a new edition is published, we will send an announcement to this mailing list. To subscribe to the mailing

list, send e-mail to [majordomo@majordomo.cv.nrao.edu](mailto:majordomo@majordomo.cv.nrao.edu) with the following command in the body of your e-mail message:

`subscribe aips2news`

If you ever want to remove yourself from this mailing list, you can send e-mail to [majordomo@majordomo.cv.nrao.edu](mailto:majordomo@majordomo.cv.nrao.edu) with the following command in the body of your e-mail message:

`unsubscribe aips2news`

If you ever need to get in contact with the owner of this mailing list, have trouble unsubscribing, or questions about the list itself, send e-mail to [owner-aips2news@majordomo.cv.nrao.edu](mailto:owner-aips2news@majordomo.cv.nrao.edu).

*T.J. Cornwell*

## 1998 Users Committee Report: Summary

The Users Committee met June 4-5, 1998, in Socorro. The meeting was chaired by Donald C. Backer, UC Berkeley.

Many thanks to the Director, Assistant Directors, and NRAO staff for an informative meeting. What follows is a brief summary of issues and concerns; our full report may be found on the NRAO home page at the following URL: <http://www.cv.nrao.edu/html/headquarters/fullcrpt98.html>.

**GENERAL ISSUES** - The Committee would like a brief report at the beginning of each meeting from the Director on specific questions and issues raised in the previous year's report. In general the presentations at the meeting need a sharper focus on user issues following general points of information. The user community's independent voice in issues of funding, spectrum management, and international development is weak. We suggest that delegates from U.S. national observatory user committees could form an AAS committee to make themselves heard.

**VERY LONG BASELINE ARRAY (VLBA)** - The VLBA is coming of age. We recommend development and deployment of a "first look" imaging procedure for simple experiments to encourage wider use. This would necessarily include some phase referencing experiments as these are increasingly popular and successful.

**ASTRONOMICAL IMAGE PROCESSING SOFTWARE (AIPS)** - The continuity and modest improvement of AIPS is essential for synthesis imaging with the VLA and VLBA. The current "simple-image" development in AIPS++ is an important building block toward a useable system. A release of AIPS++ in early 1999 is a critical milestone to achieve. Small AIPS++ workshops around the country may be useful when sufficient general purpose imaging capability is available.

**SPECTRUM MANAGEMENT AND RFI** - The large effort in battling with Iridium is important on the one hand, yet frightening on the other hand owing to it being just the tip of an iceberg. The millimeter spectrum is the new frontier and early protection of the Chile site is warranted. The Green Bank staff have set a model for minimization of on-site RFI. How can radio astronomers be more effective in preserving our capability to observe in the future?

**GREEN BANK** - We encourage the NRAO to do all it can to keep the Green Bank Telescope (GBT) construction and the commissioning on track and to introduce the GBT monitor &

control interface to external users as soon as, and as widely as, possible. Delay of the GBT leads to the need for continued use of the 140 Foot Telescope in 1999. Use of the GBT spectrometer on the 140 Foot for a limited set of observations would provide both important scientific results and early input on its GBT use.

**VERY LARGE ARRAY (VLA)** - The C-Short configuration needs further assessment of its impact and consultation with past users before being made a permanent substitute for the C configuration. Continued advertising of the status of the C configuration in newsletters is important. The looming Modcomp problem needs prompt attention. We enthusiastically support the VLA Upgrade Plan. We urge NRAO to continue consulting with the community about instrumentation projects that are proceeding through MRI channels as these are driven by funding partners and their goals, not by widely-discussed scientific priorities.

**TUCSON** - Use of the 12 Meter Telescope for 3 mm and 1 mm VLBI and MMA development are reasonable requests.

**MILLIMETER ARRAY (MMA)** - We are pleased to hear that a project scientist has been appointed for the MMA Project and look forward to the opening of communication channels with users regarding design issues. A number of "user questions" that will feed into the Project were raised and one or more of the advisory committees need to appoint members who will look out for the general user (i.e., those not associated with NRAO, OVRO, or BIMA).

Recent funding leads to the need for a "full steam ahead" approach in the U.S., coupled with a need to settle issues about foreign partners and their concerns.

**OTHER** - The resources of the Central Development Laboratory have been stretched lately by the competition between the needs of NRAO telescopes and the development of amplifiers for outside users. No one is completely satisfied, and therefore careful attention to future demands—current telescopes, MMA, and outsider users—is needed.

The role of NRAO staff at the various sites in the area of public outreach was raised in 1997 and needs to be revisited in 1999. Documentation of past and planned efforts is requested for our discussions.

*D. C. Backer, Chair  
University of California, Berkeley*

## 12 METER

### Major Summer Shutdown Projects at the 12 Meter Telescope:

The 12 Meter Telescope will be shutdown for approximately five weeks starting on July 6. We will follow this with an approximately three week period of system tests before resuming regular observing. During these periods we will complete a number of repair, maintenance, and upgrade tasks which include:

- (1) Installation of a new digital correlator.
- (2) Installation of a new prime focus control system.

- (3) Dome inspection and repair.
- (4) Maintenance on the central cold load calibration system.
- (5) Improvements to the receiver and IF system to increase continuum sensitivity.

*J.G. Mangum and D.T. Emerson*

### On-The-Fly Analysis at NRAO Tucson

In order for us to provide assistance with the analysis of OTF data, visiting observers can make arrangements to use the NRAO Tucson downtown computing services for their OTF analysis. Observers who might benefit particularly from the use of the NRAO-Tucson computing system are those with limited OTF analysis experience, or those whose home computing resources

are strained in handling the quantity and processing needs of OTF data. In particular, on-site assistance from the 12 Meter scientific staff in the analysis of OTF data may prove helpful. If you are interested in visiting Tucson to analyze 12 Meter OTF data, contact Jeff Mangum ([jmangum@nrao.edu](mailto:jmangum@nrao.edu), 520-882-8250 x113).

*J.G. Mangum*

## VLBA/VLBI

### ARISE Science Workshop

A two-day workshop focused on the science to be done with the proposed ARISE future space VLBI mission will be held in Green Bank on August 19 and 20, 1998 (Wednesday and Thursday). ARISE is included in the long-range roadmap for the Structure and Evolution of the Universe theme of NASA. The purposes of the workshop are to increase community involvement in determining the science to be done with the mission, and to develop a more detailed scientific case for ARISE for the upcoming astronomy decade committee. There will be a few presentations summarizing the mission and its technical status, but the remainder of the workshop will be devoted to the scientific goals of ARISE rather than to technical details of the mission. The workshop will be organized around several key science areas to be addressed by ARISE, such as gamma ray blazars, high-frequency polarization VLBI of AGN, and water megamasers. It is anticipated that there will be sessions on each of these topics, including one or two invited

talks of about 30 minutes in length, plus some shorter contributed papers and considerable time for discussion. These talks would present the scientific rationale for particular observations, and any specific technical requirements on the mission that would enable those observations. About one and a half days will be devoted to the science sessions. The remaining time will be used for tours of the GBT facilities, and of the Green Bank Earth Station that is presently used for VSOP tracking. For more information about the workshop, including the tentative schedule and a registration form, please see [http://www.nrao.edu/~julvesta/arise\\_gb.html](http://www.nrao.edu/~julvesta/arise_gb.html). You may also contact the meeting organizer, Jim Ulvestad, at [julvesta@nrao.edu](mailto:julvesta@nrao.edu). Contributed papers should be proposed on the registration form or by contacting the meeting organizer. For reservations and accommodations, please contact Becky Warner in Green Bank at [bwarnar@nrao.edu](mailto:bwarnar@nrao.edu).

*J.S. Ulvestad*

## Space VLBI

Fringes at K-band between the VSOP mission's HALCA spacecraft and the VLBA were detected on April 9, in an observation recorded on March 22, downlinked from HALCA via the Goldstone tracking station. This test observation exploited the appearance of an unusually bright, bursting water maser in Orion-KL. The successful detection occurred during an 11-minute interval near perigee, during which projected baselines varied from 400 to 2700 km. Previous estimates of the K-band system's performance were confirmed and refined: system temperature of about 1500 K and effective aperture of 0.1 square meter. This was the first operation of the overall VSOP system at K-band, and a variety of subsystems such as the tracking station's phase transfer loop and the correlator's orbit implementation all appeared to work satisfactorily at that frequency. Further information on this result is available on the NRAO Space VLBI Project page of the NRAO web site.

Data from VSOP observations must often be distributed to multiple users, as a result of the mergers and data sharing decided by the Scientific Review Committee. In many cases, some users receive a subset—by array, time, or polarization—of the full observation. It has taken some time to develop the software necessary to extract these subsets, and for the mission Science Operations Group to specify completely the distributions to be done. In April, it became possible to start processing this backlog, and by the end of May it had been brought up to date. It is expected that future observations will be distributed immediately in as many copies and/or subsets as necessary. This process makes the mission more productive scientifically, and in any case is less burdensome operationally than the alternative of making and correlating multiple, partially redundant observations.

*J. D. Romney*

## VLBI Network Call for Proposals

Proposals for VLBI Global Network observing are handled by the NRAO. There are usually four Global Network sessions per year, with up to three weeks allowed per session. The Global Network session currently planned is:

**Date**

11 Nov to 01 Dec 1998

**Bands**

6 cm, 18 cm, 3.6 cm

**Proposals Due**

01 Jun 1998

Five centimeter spectral line observations will also be available in November on the European VLBI Network (EVN). The September EVN session will be devoted entirely to observations with the HALCA satellite.

Proposals will be due October 1 for the first two 1999 Global Network sessions.

It is recommended that proposers use a standard cover sheet for their VLBI proposals. Fill-in-the-blanks TeX files are available via anonymous ftp from ftp.cv.nrao.edu, directory proposal or via the VLBA home page on the WWW. Printed forms, for filling in by typewriter, are available on request from Lori Appel, AOC, Socorro.

Any proposal requesting NRAO antennas and antennas from two or more institutions in the European VLBI network constitutes a Global proposal. Global proposals MUST reach BOTH network schedulers on or before the proposal deadline date; allow sufficient time for mailing. In general, fax submissions of Global proposals will not be accepted. Proposals requesting use of the Socorro correlator must be sent to NRAO even if they do not request the use of NRAO antennas; proposals for the use of the Bonn correlator must be sent to the MPIfR even if they do not request the use of any EVN antennas. For Global proposals, or those to the EVN alone, send proposals to:

R. Schwartz

Max Planck Institut für Radioastronomie  
Auf dem Hugel 69  
D 53121 Bonn, Germany

For proposals to the VLBA, or Global Network proposals, send proposals to:

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

Proposals may also be submitted electronically, in Adobe Postscript format, to proposevn@hp.mpifr-bonn.mpg.de or propsoc@nrao.edu respectively. Care should be taken to ensure that the Postscript files request the proper paper size.

*B. G. Clark*

## VLBA Developments

Summarized below are some major VLBA developments during the first half of 1998 of potential interest to array and correlator users. For further information, please contact the undersigned or those identified with specific topics. Other major VLBA developments are described in accompanying articles.

**TAPE CONTROL:** Automatic tape allocation was exercised extensively by AOC staff in January and February, then adopted for all recordings at the VLBA and VLA starting in March. This was an important step toward multiple projects per tape at the VLBA and VLA, which is targeted to commence in July for all projects to be correlated in Socorro. At that time, tape control will become fully automated. Tape changes will no longer be synchronous across the VLBA, but will tend to change during normal working hours, and thus at different times depending on time zone. Observers will no longer be able to predict where on the tape their data will be written. This step will enable us to schedule short observations efficiently and will provide greater flexibility for scheduling Targets of Opportunity. (In the original VLBA concept, much of the time on the array was to be reserved for allocation on short timescales, in queue-based or dynamic scheduling mode; we expect to start doing some of this next year.)

**“CALIBRATION” TRANSFER:** The VLBA correlator currently distributes visibility data to observers, but does not attach to those data the ancillary tables needed for calibration and editing. The process of building such tables and attaching them to the visibility data is known as “calibration” transfer. The initial tests of calibration transfer by AOC staff revealed serious problems applying transferred tables. The basic difficulty is that current table formats used by the VLBA correlator have diverged from those specified in VLBA Memo #108. The revised table formats will be defined and documented, for use in Socorro and at other

correlators. The AIPS group intends to mend calibration transfer, including various FITLD and general table problems uncovered, for the October 15, 1998 release. (Contact - C. Flatters)

**ASPEN SERVER CHANGES:** VLBA operations now consolidates and archives all information for each observing project in one location on the aspen file server in Socorro. This scheme makes it easier (a) for anyone, including the observer, to access the complete history of a project by stepping through files related to the scheduling, observing, correlation, and quality control stages; (b) for the project’s AOC contact to assist with quality control and to diagnose any problems revealed; and (c) for all ground antennas (radio or tracking) to obtain performance feedback from the VLBA correlator. (Contact - M. Stanley)

**1000TH PROJECT:** The VLBA correlator released its 1000th scientific project April 28, 1998 not quite four years after its first release on May 4, 1994 and six years after the correlator detected its first fringes on May 6, 1992. For these 1000 projects, a total length of 2.0 Gm of tape was recorded at the ten VLBA stations and played back in Socorro. This length is 50 times the equatorial circumference of the Earth, five times the mean distance to the Moon, and half again the diameter of the Sun. (Contact - J. Romney)

**DOCUMENTATION:** “The VLBA Observational Status Summary” and “The SCHED User Manual” were updated. These VLBA documents can be accessed from the NRAO home page.

**IN PROGRESS:** Efforts continue on 512 Mbps and the rewrite of the operations software.

*A. J. Beasley and J. M. Wrobel*

## VLBA 3 mm Status

Prototype VLBA 3 mm dual-polarization receivers, covering nominally 80-90 GHz, are now in use at Pie Town and Los Alamos. System equivalent flux density (also known as  $T_{\text{sys}}$  in Janskys) is about 8000 Jy. NRAO participation is routine in the Coordinated Millimeter VLB Array, scheduled by Haystack Observatory.

Two more antennas, Fort Davis, TX, and Mauna Kea, HI, are expected to receive prototype receivers by year’s end.

First VLBA-only fringes were reported in late April, and can be viewed at: <http://www.nrao.edu/vlba/html/3MM/3mm.html>

A Major Research Initiative proposal was submitted by NRAO to the National Science Foundation earlier this year, which, if approved, would permit completion of VLBA receivers for the 3 mm band.

More discussion of the current status, calibration, and proposed frequency coverage can be found in VLBA Scientific Memo #17, reachable from the NRAO home page at: <http://www.nrao.edu/vlba/html/3MM/scimemo17.html>.

Contact: Vivek Dhawan, [vdhawan@nrao.edu](mailto:vdhawan@nrao.edu)

V. Dhawan

## The VLBA Correlator Pulsar Gate

Pulsar gating is now available on the VLBA Correlator. The gate is operational for nearly all combinations of observing and correlating modes. The gate has a pulse phase resolution of 1024 points with the pulsar phase updated at 16 microsecond intervals. The delays in the pulse arrival times due to dispersion are tracked across the individual VLBA bands and between bands separated in frequency. Observers may set the gate open and close phases.

Gating operation has been tested using a number of VLBA pulsar observations including polarization runs. For a complete description of the pulsar gate, please see the VLBA Pulsar Gate Observer's Guide on the VLBA web page, [http://www.nrao.edu/~jbenson/pulsar\\_gate.html](http://www.nrao.edu/~jbenson/pulsar_gate.html)

*J.M. Benson*

## Accurate Source Position Service

For the past year, NRAO has offered to provide astrometric quality source positions in response to requests from users. The positions are measured during the joint NASA/USNO/NRAO 18-station geodetic/astrometric observations that occur about every two months and that mainly serve other purposes. A modest number of requests have been received and, so far, all were for sources that have adequate strength and for which no previous astrometric positions have been accepted. Of these, positions for nine sources, with formal errors between about 0.1 and 3 mas, have been returned. Several more are still in the pipe.

With this note, we remind the community of the availability of this service. It has proven especially useful in cases where the calibrator source to be used for an upcoming VLBI phase referencing observation has a poorly known position. But, please do not wait until too close to the time the position is needed to make a request. It takes a minimum of two to four months to obtain a position because of the wait between observing runs and the amount of time it takes to schedule, observe, fringe search, correlate, release, and reduce these large runs. Also, do not request too many sources; only a small number can be added to each run.

If you have a source for which you need a position, first check that it really qualifies. We have received a number of requests for sources that were too weak, or for which good positions were already available. A source should have at least 0.1 Jy at 2.3 and

8.4 GHz and there should be some indication, either from past observations or from a flat spectrum, that it can be seen with VLBI. A good place to check for known source positions is at the USNO Web site [http://www.usno.navy.mil/neos\\_vlbi.html](http://www.usno.navy.mil/neos_vlbi.html). Also, VLA positions for a large number of sources, good to 12–55 mas, are available by anonymous ftp at <ftp.aoc.nrao.edu> in file `pub/sources.jvas` (the JVAS survey—see the article by Joan Wrobel in this Newsletter).

Requests for positions may be made by e-mail to [cwalker@nrao.edu](mailto:cwalker@nrao.edu). Please include the following information:

1. A short scientific justification.
2. Source names.
3. Source coordinates good to at least 0.5 arcseconds.
4. The expected flux densities at 2.3 and 8.4 GHz.
5. Evidence that there will be compact structure.

Requests for positions of more than ten sources will not be considered. The requested sources will be compared with objects in recent and proposed VLA and VLBA proposals so that conflicts are avoided. Accepted sources will be observed as soon as possible and positions will be returned by e-mail. The results will be public domain immediately, and source positions, and in many cases even images, will appear on the geodetic web sites.

*R. C. Walker*

## Proceedings from IAU Colloquium 164: Radio Emission from Galactic and Extragalactic Compact Sources

The printed proceedings from IAU Colloquium 164, held during April, 1997 in Socorro, New Mexico, are now in press:

1998, IAU Colloquium 164: Radio Emission from Galactic and Extragalactic Compact Sources, Astronomical Society of the Pacific Conference Series, Volume 144, eds. J. A. Zensus, G. B. Taylor, & J. M. Wrobel.

Registered participants of the meeting will receive the proceedings from the editors this summer, as each registration fee included the cost of one copy. Others can order the proceedings directly from the ASP via their web site

<http://www.aspsky.org/html/confser/confer.html>.

Everyone is welcome to consult the electronic preprints from the proceedings at: <http://www.cv.nrao.edu/iau164> or <http://www.mpifr-bonn.mpg.de/zensus/iau164> or via the NRAO home page at <http://www.nrao.edu/>, under "Meetings & Workshops," then select "IAU Colloquium 164."

The page numbers in the electronic preprints are identical to those for the printed proceedings.

*J. M. Wrobel, G. B. Taylor, & J. A. Zensus (MPIfR)*

## VLA

### VLA Configuration Schedule

Configuration	Starting date	Ending date	Proposal Deadline
B	03 Jul 1998	19 Oct 1998	2 Feb 1998
CnB	30 Oct 1998	16 Nov 1998	1 Jun 1998
C	20 Nov 1998	01 Feb 1999	1 Jun 1998
DnC	12 Feb 1999	01 Mar 1999	1 Oct 1998
D	05 Mar 1999	01 Jun 1999	1 Oct 1998
A	19 Jun 1999	27 Sep 1999	1 Feb 1999
BnA	08 Oct 1999	25 Oct 1999	1 Jun 1999

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) and extreme northern sources (north of about 80 degrees declination).

### Approximate Long-Term Schedule

	Q1	Q2	Q3	Q4
1998	D,A	A	B	C
1999	D	D,A	A	B
2000	C	C,D	D	A
2001	B	B,C	C	D
2002	A	A,B	B	C

Observers should note that some types of observations are significantly more difficult in daytime than at nighttime. These include observations at 327 MHz (solar and other interference; disturbed ionosphere, especially at dawn), line observations at 18 and 21 cm (solar interference), polarization measurements at L-band (uncertainty in ionospheric rotation measure), and observations at 2 cm and shorter wavelengths in B and A configurations (tropospheric phase variations, especially in summer). They should defer such observations for a configuration cycle to avoid such problems. In 1998, the C configuration daytime will be about 18<sup>h</sup> RA and in 1999 the D configuration daytime will be about 2<sup>h</sup> RA.

Time will be allocated for the VLBA on intervals approximately corresponding to the VLA configurations, from those proposals in hand at the corresponding VLA proposal deadline. The VLBA spends about half of available observing time in

coordinated observations with other networks, with the scheduling dictated by those networks. In decreasing order of the time devoted to the observations, these are HALCA space VLBI, Combined Millimeter VLBI Array, Global astronomical VLBI with the EVN, and geodetic arrays coordinated by GSFC.

Any proposal requesting NRAO antennas and antennas from two or more institutions affiliated with the European VLBI network is a Global proposal, and must be sent to the EVN scheduler as well as to the NRAO. VLBA proposals requesting only one EVN antenna, or requesting unaffiliated antennas, are handled on a bilateral basis; the proposal should be sent both to NRAO and to the operating institution of the other antenna requested. Coordination of observations with non-NRAO antennas, other than members of the EVN and the DSN, is the responsibility of the proposer.

*B. G. Clark*

### Interferometry and Imaging: Barry Clark at 60

Nearly 150 people attended a symposium in Socorro entitled "Interferometry and Imaging: Barry Clark at 60," (his birthday was actually March 5, 1998), on June 25 and 26. Participants included scientists from across North America as well as from Europe, India and Australia. The sessions featured talks outlining the development of high-resolution radio astronomy, its impact on our understanding of the universe, and future prospects and instruments.

Speakers laced their talks with personal reminiscences and stories from Barry Clark's nearly 40 years of involvement in interferometry. At an evening banquet, Barry was honored by numerous colleagues, and received 60th birthday gifts from Associated Universities, Inc., Mexico's UNAM, India's Raman Research Institute, and individuals.

*D. G. Finley*

## Continuum Correlator Observing: Gated Versus Ungated

With the July 1, 1998 update to the VLA online software, we plan a change to the correlator continuum signal processing that is incompatible with continuum gated correlator observations. Gated spectral line observations will not be affected. In the short term, a version of the continuum processing software that does work for gated observations will be secreted away and can be made available if requested. Requests should be made to the undersigned, at least two weeks prior to observing. In the longer term, we intend to unify the continuum processing systems as the workload permits.

After the July 1 update, all ungated continuum observations will benefit from "complex correlation" or will (ultimately) benefit from "widebanding" efforts:

**COMPLEX CORRELATION:** In continuum mode the VLA correlator produces twice as many products as are needed to

generate all polarization products for each baseline with a bandwidth of 50 MHz. Historically we have only used half of these products. D. Bagri (1998, VLA Test Memo 210) has shown that combining the used and unused correlator products increases the SNR by about eight percent for a bandwidth of 50 MHz and also leads to a measurable decrease in the average closure errors.

**WIDEBANDING:** Alternatively, using all the products will allow the VLA correlator to produce data for 100 MHz input signals if the samplers can work effectively over that range. D. Bagri (1998, VLA Test Memo 211) modified three antennas to transmit bandwidths of 75 MHz and, with proper signal processing, showed that the sensitivity increase was as expected for the bandwidth increase. The widebanding of more antennas will progress as funds become available.

*K. Sowinski and J.M. Wrobel*

## New Mexico Computing Developments

The VLA re-archiving project finished reformatting and re-archiving data from 1986, and has now progressed well into 1987, its last year. In another couple of months, we will have re-archived all previous VLA data from 1976 to the present. As reported in the last newsletter, a bug was discovered in the conversion program which, for pre-1988 data, caused zero amplitudes and phases for certain observing parameters. In the meantime, we have compiled a full list of affected observations. After completing 1987, we will spend a number of months reformatting all observations in this list using the corrected conversion program.

Good progress was made with the installation of fiber optic links at the VLA site. All the fiber is in place, we are currently busy with the precise and time consuming task of terminating the fibers. If this is done incorrectly, unacceptable loss of signal will result. The link connecting the VLA Control Building and the Technical Services Building is operational, connections to the other main buildings is planned in the near future. We expect to complete this project by the end of June.

After receiving bids from several vendors, and based on local demos of their products, we selected a commercial PC-based maintenance system to replace our locally developed product.

Primary use is at the AOC, the VLA, and the VLBA sites, but it is not unlikely that Green Bank will adopt this system as well. We expect to receive the product and the dedicated server it will run on early this summer. We are currently developing an implementation plan in order to make the transition from the old to the new system as smooth as possible.

We have noticed that in the current Exabyte drive market there is a tendency to move away from full support for low-density tapes. We predict that in the near future we will have no choice but to buy drives that can only write at high density (though reading low density tapes may still be supported). This means that the possibility for AOC visitors to write tapes at low density is expected to gradually decline in the future. Scientists who tend to use Exabyte tapes originating at the AOC are advised to ascertain that reading tapes at high density is supported at their home institute.

An important personnel change took place. Ruth Milner, for many years Manager of Computer Systems, moved to a position related to NRAO Observatory-wide computing. It is hard to replace Ruth, but we are fortunate to have hired in her place James Robnett, who previously held a comparable position at New Mexico Tech.

*G. A. van Moorsel*

## 1998 Synthesis Imaging Summer School

The Sixth Summer School in Synthesis Imaging took place from June 17 through June 23 of 1998 in Socorro, NM. Attendance at this school was a record-breaking 139 people from 13 countries. The participants heard 28 lectures on interferometry, spent one day in a data reduction tutorial and enjoyed an in-depth tour of the VLA. A book containing the lectures will be edited by Greg

Taylor, Chris Carilli and Rick Perley and published by the Astronomical Society of the Pacific (ASP). For periodic updates on the status of the book visit the school web page at <http://www.nrao.edu/~gtaylor/synth98.html>.

*G. B. Taylor*

## 1612 MHz OH Observing at the VLA

The full-time activation of the Iridium constellation of communication satellites in September 1998 will have a significant impact on VLA observations of the 1612 MHz transition of OH. Besides occasional interference when a satellite flies through the near sidelobes, the 90 millisecond uplink/downlink cycle of the Iridium constellation will continuously beat against the 102 millisecond calibration cycle of the VLA. When any Iridium satellite is above the horizon and transmitting (100 percent of the time after September 1998) this beating is sufficiently strong to corrupt the on-line system temperature corrections applied to the data and to cause all data to be flagged due to wild system temperature variations. For this reason, the normal calibration cycle must be turned off during all

1612 MHz observations (or any other observation that includes the frequencies between 1620-1630 MHz in the 50 MHz front-end used for measuring the system temperature). This will result in some degradation in the accuracy of the absolute flux density calibration. To turn off the calibration cycle a request should be made to the array operator to set columns 64 and 65 blank in a special Front End Parameters file (better known as the SYSLROT file). For an example of such an instruction, or those planning a 1612 MHz observation are encouraged to contact the undersigned ([gtaylor@nrao.edu](mailto:gtaylor@nrao.edu)).

*G. B. Taylor*

## A Catalog of 2118 Compact Radio Sources in the Northern Sky

A catalog of 2118 compact radio sources was derived from the Jodrell Bank - VLA Astrometric Survey (JVAS) of flat-spectrum sources (Patnaik et al 1992, MNRAS, 254, 655; Browne et al. 1998, MNRAS, 293, 257, Wilkinson et al., MNRAS, submitted). Each compact VLA source (a) has a peak flux density at 8.4 GHz  $\geq 50$  mJy at a resolution of 200 milliarcsecond; (b) contains 80 percent or more of the total source flux density; and (c) has a position known to a rms accuracy of 12-55 milliarcsecond. The 2118 sources are uniformly distributed in the northern sky at galactic latitudes  $|b| \geq 2.5$  degrees.

Although these sources are primarily intended for use as phase calibrators for the Jodrell Bank MERLIN, they will also be suitable as phase calibrators for the NRAO VLA and can be considered as candidate phase calibrators for VLBI arrays

(Peck & Beasley 1998, IAU Colloquium 164, 155) and the NRAO MMA (Holdaway, Owen & Rupen 1994, MMA Memo No. 123). Furthermore, compact radio sources close to the galactic plane can be used to probe the interstellar medium, through studies of scintillation, angular broadening, Faraday rotation, and both molecular and atomic absorption. Compact radio sources also are useful as navigation aids for spacecraft missions to solar system bodies. Finally, masing conditions in cometary comas can be examined by observing compact radio sources during occultation events.

The catalog of 2118 compact radio sources is available via anonymous ftp from host `ftp.aoc.nrao.edu`, cd to directory `/pub` and get file `sources.jvas`. The file can be read by the NRAO VLBI scheduling program SCHED

*J. M. Wrobel for the JVAS Team*





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