



# NRAO NEWSLETTER

1988 April 1

No. 35

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## In General

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### OBSERVATORY BUDGET - 1988

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The Observatory budget for 1988 is given in the following table together with that for 1987 and the budget for 1989 proposed by the NSF in the President's budget.

	1987 <u>Actual</u>	1988 <u>Budget</u> <sup>1</sup>	1989 <u>Request</u>
NRAO Operations <sup>2</sup>	16.63	16.26	18.10
VLBA Operations	0.20	0.50	
VLBA Construction	<u>11.40</u>	<u>11.60</u>	<u>12.00</u>
	28.23	28.36	30.10

<sup>1</sup> Actual funds received by NRAO. This differs from official "NSF 1988 Plan" by amounts held back at NSF for special programs and reserve.

<sup>2</sup> Does not include VLBA or USNO Green Bank Interferometer operations.

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For NRAO operations, exclusive of VLBA operations and construction, the loss in 1988 of \$370k in new NSF funds compared with 1987 is exacerbated by a smaller carryover from the prior year and less overhead recovery from the Voyager/Neptune Encounter project, which is winding down as the work is completed. The total reduction in income for 1988, compared with 1987, is \$700k. Inflation, even at the rather modest rate of 4.4 percent, amounts to an additional new expense of nearly \$750k. The net result is that in 1988 NRAO must reduce its expenditure from 1987 by about \$1.5M at least. The impact of the budget reduction has been felt across the entire scope of Observatory activities. Among specific actions taken are the following:

- A reduction in force of 30 full-time positions, about 10 percent of the total operations staff, which required the dismissal of 15 employees. In addition, several part-time employees were dismissed and several full-time employees were made part-time.
- The Research Equipment budget was cut in half, to \$430k. This budget pays for the capital costs of developing, prototyping, and building new instrumentation. Until recently it was typically \$1.0M-\$1.5M. As an investment in the continued viability of telescopes whose original cost exceeded \$100M, the 1988 RE budget is disturbingly low. Only the highest priority projects of those already underway can proceed.
- All other areas of the budget have been held flat at best, with most being cut. There will be no increase in VLA track maintenance, no significant purchases of computing equipment, and no restoration of the postdoctoral program now at half its former size, to cite only three examples of many that could be given.

The budget difficulties for NRAO in 1988 follow three successive years of declining operations budgets in current year dollars, that is, the dollars actually received with no adjustment for inflation. The effect of inflation, of course, is to compound this problem.

- If NRAO had today the budget it had in 1984 increased only to account for inflation and nothing else, its budget would be \$20.1M, about 24 percent more than what is actually available from NSF in 1988.
- Adjusted for inflation, the 1988 budget is equal to that of 1978, well before full operation of the VLA was realized. Much of the operation of the VLA, which represents over half of NRAO activity, has been absorbed into the overall budget.
- The 1988 operations staff level is now equal to that of 1978, when the build-up of VLA staff was only about 30 percent complete.

NRAO's budget problems are shared by all aspects of NSF-funded astronomy--resources are inadequate. The prospects for 1989 are not particularly bright, as can be seen from the above table, especially not when one considers that budgets appropriated are almost always less than budgets requested. The NSF Division of Astronomical Sciences has announced plans to review the facilities it supports. In particular, a Radio Facilities Panel will meet April 21-23 to review both NRAO and university radio facilities and make recommendations for future funding of these facilities based on scientific priorities.

This is a difficult period for astronomy in general and radio astronomy in particular. We share a sense of frustration when resources fall so far short of needs and opportunities. As we deal with this situation it is very much in our common interest to work together, as a community, arguing the case for support of astronomy and basic research in general, presenting the excitement of scientific opportunities, and making the best use of the resources we have.

P. A. Vanden Bout

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A N N O U N C E M E N T

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It is a pleasure to announce the appointment of Miller Goss as Assistant Director - Socorro Operations effective April 1, 1988. Miller has contributed scientific leadership and management skill to the Observatory since he joined the staff, and I look forward to working with him as

he assumes responsibility for VLA and VLBA operations.

I want to thank Dave Heeschen for the service he has given as acting director of the VLA during a critical period.

P. A. Vanden Bout

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J A P A N E S E I N I T I A T I V E 1 9 8 8

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The NSF has recently announced a new program that is designed to encourage cooperative research with Japanese institutions and that may be of particular interest to U. S. radio astronomers who collaborated with Japanese colleagues in the use of the Nobeyama telescopes and/or other international facilities. In order to fully address the program goals, the NSF will:

- fund long-term research stays (6-15 months) in Japan (including dependents);
- provide fellowships for scientists and engineers to study the Japanese language;
- help identify and secure opportunities for American researchers at Japanese research institutions;
- fund survey teams to visit Japan to report on the state-of-the-art in specific disciplines.

The 1988 NSF budget for all four components of the program is \$800,000.

If you wish to receive a copy of the full Japanese Initiative Fact Sheet or to obtain further information, contact the following office:

Attn: Japan Initiative, Room 1208  
Division of International Programs  
National Science Foundation  
1800 G Street NW  
Washington, DC 20550  
Tel: 202 357-9558  
Electronic Mail: cwallace@note.nsf.gov

R. J. Havlen

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FOREIGN TELESCOPE PROGRAM

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U. S. observers are reminded that NRAO has a program of providing travel support to foreign radio telescopes which offer unique capability for proposed observing programs. Requests for this support should be submitted in writing to the NRAO Director at least thirty days prior to the anticipated observing time and should include a copy of the originally submitted proposal, verification of assigned time from the foreign institution, and a statement in support of the "uniqueness" of the telescope/receiver system to be used as it impacts the planned research. Support for accompanying Ph.D.

dissertation students will be considered on the basis of a justifying statement from their faculty advisor.

The following list of observatories have communicated to NRAO a willingness to consider proposals from U. S. observers. R. Havlen (804 296-0223) can be contacted for the application procedures. Special requirements are noted in the table; "none" means that observing time is allocated on the same basis as NRAO--scientific merit only.

ObservatorySpecial Requirements

Australia Telescope	None
DRAO Synthesis Radio Telescope	None
IRAM - 30 m	"... very limited access is given to observers from non-member states." Collaboration is recommended.
James Clerk Maxwell Telescope - 15 m	None
Jodrell Bank - MERLIN	None
Jodrell Bank Telescopes	None; "... usual procedure is to arrange collaboration..."
Max-Planck Inst. fur Radio-astronomy (Bonn) - 100 m	None
Nancay Observatory	None; "... scientific merit is the principal criterion for awarding time..."
Nobeyama Observatory	None
Onsala Observatory - 20 m	Local collaborator required
Parkes - 210 ft	None; special program for NASA time exists
Swedish - ESO Submillimeter Telescope - 15 m	ESO time: "...time on ESO telescopes is awarded primarily on the basis of scientific merit..." Collaboration recommended. Swedish time: Swedish collaborator required during the first years of operation.
Westerbork Array	None

R. J. Havlen

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WORKSHOP POSTPONED

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The second NRAO workshop on Millimeter Array Science, which had been scheduled for late May, has been postponed. At this time, based upon recommendations of the MMA Advisory Committee which met at the end of February, the NRAO will be focussing its MMA efforts on developing a clear list of alternate plans for the instrument. Issues such as the cost of a

reconfigurable array or a higher frequency capability will mean tradeoffs that should rightly be evaluated during the eventual MMA Science Workshop. In this sense the May workshop would have been premature, and it will be scheduled at a later date.

Alwyn Wootten and Frazer Owen

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USERS COMMITTEE ISSUES AND RECOMMENDATIONS

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The October 28/29, 1987 Users Committee meeting held in Charlottesville provided the traditional forum for the discussion of operational concerns and priorities for making the best use of NRAO's limited resources throughout difficult budgetary times. Listed below are several of the issues and recommendations that were summarized in the committee report by J. Moran, Discussion Leader:

1. Single Dish Data Processing - Multibeaming with the new Green Bank 300-ft and Kitt Peak 12-m telescope receivers will serve to accentuate existing deficiencies in NRAO single dish mapping software. The coordinated development of a common single dish processing system for Green Bank and Tucson was encouraged.

2. AIPS - More emphasis on spectral line development is needed. The driving factors are the upcoming tenfold increase in available correlator channels and the increased use of bandwidth synthesis to map large fields.

3. Travel Reimbursement Non-airfare related expenses are beginning to dominate the cost of using an NRAO facility. The Users suggested that the NRAO reimbursement policy might be more beneficial to the users if a way could be found to simultaneously lower on-site charges,

eliminate airfare support, and reduce administrative overhead.

4. Scheduling and Refereeing At the 12-m telescope backup proposals for less than perfect 1 mm observing time should routinely be reviewed by the site director to insure quality, viability, and novelty.

Required VLA data rates should be evaluated explicitly by the referees. Continuing proposals (i.e., multiconfiguration) should not automatically receive a priority that would prevent good, new proposals from receiving observing time.

5. VLA - More P and K band calibrator sources are needed.

Deferring needed VLA maintenance, although economically expedient in the short term, has probably run its course. The NRAO should be prepared for a more constant and higher level of maintenance outlay in future years.

Strong support was voiced for the Array Telescope Computing Plan, which has now been submitted to the NSF for funding.

R. J. Havlen

## VLBA

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SELECTED VLBA ITEMS

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The VLBA program received \$11.6M of construction funds for 1988. This amount is adequate to initiate correlator construction, and to start another two antenna fabrications for Owens Valley, CA and St. Croix, VI. At the Pie Town, NM site, monitor and control software development and remote pointing tests continued. Subreflector installation is scheduled for early April. At the Kitt Peak, AZ site the initial mechanical, electronics, and cryogenics outfitting have been completed. The Los Alamos, NM antenna installation has been accepted except for punch list items. At Fort Davis, TX the antenna structure is erected and main reflector panels are being installed.

The North Liberty, IA and Brewster, WA sites are complete, and await antenna installations by RSI.

At Owens Valley, construction has begun on the building and antenna foundation, which is now site #7. St. Croix, VI replaces it as #8 due to extended site acquisition procedures required on that island. The first of a sequence of enabling and approval documents for the Mauna Kea, HI site have been submitted to local authorities.

Operations funds in 1988 are sufficient to allow the Pie Town antenna to be operated to support NUG observing sessions and extensive testing. Kitt Peak and Los Alamos antennas will not be available for NUG observations until 1989. As mentioned in the January, 1988 Newsletter, the Pie Town antenna should be requested in the same way as other NUG antennas by NUG proposers.

Ken Stetten

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VLBA CORRELATOR CHIP

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The VLBA correlator group recently issued an RFP soliciting commercial proposals for the final design, prototyping, and fabrication of an application-specific VLSI chip based on an extensive preliminary design by NRAO. This chip functions as a radix-4 stage in the station-based FFT section of the correlator, and is also configurable as a multiplier/accumulator in the baseline-forming section. Input and output data values are expressed in a specialized complex floating-point representation of limited (7 bit) precision which is particularly appropriate to the noiselike signals typical of radio astronomy applications.

This chip may be of interest to designers of back end equipment which produces final or intermediate results in the spectral domain. Possible applications would include any interferometer system involving high-resolution spectroscopy and/or many elements, as well as single-dish spectrometers and pulsar de-dispersion devices. FFT lengths up to 2048 are supported at specified signal sample rates up to 32 MHz.

The purpose of this announcement is to alert interested members of the NRAO user community to

the possibility of purchasing these chips directly from the selected vendor. We do not anticipate arranging joint purchases, as the expected quantity price breaks do not seem to warrant the accompanying complexity. Our present, budgetary cost estimate is \$67 each. The RFP calls for a contract award by 1988 June 1, with final design beginning at that point, prototype chips to be delivered by September 15, and final production chips by the end of the year. Please direct expressions of interest or questions to me at NRAO's Charlottesville office, or at 804-296-0242.

References in the VLBA Correlator Memo series which may be consulted for further information include: #87, a chip specification substantially the same as that sent to potential vendors, and #91, an overview of its applications within the VLBA correlator, both by Escoffier; and #92, a summary of some of the extensive simulations of chip performance by Benson, Broadwell, and Escoffier. Copies of these documents can be obtained from Betty Trujillo at the VLBA Project Office in Socorro.

Jonathan Romney

## 12-Meter

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NEW CORRECTING SUBREFLECTOR

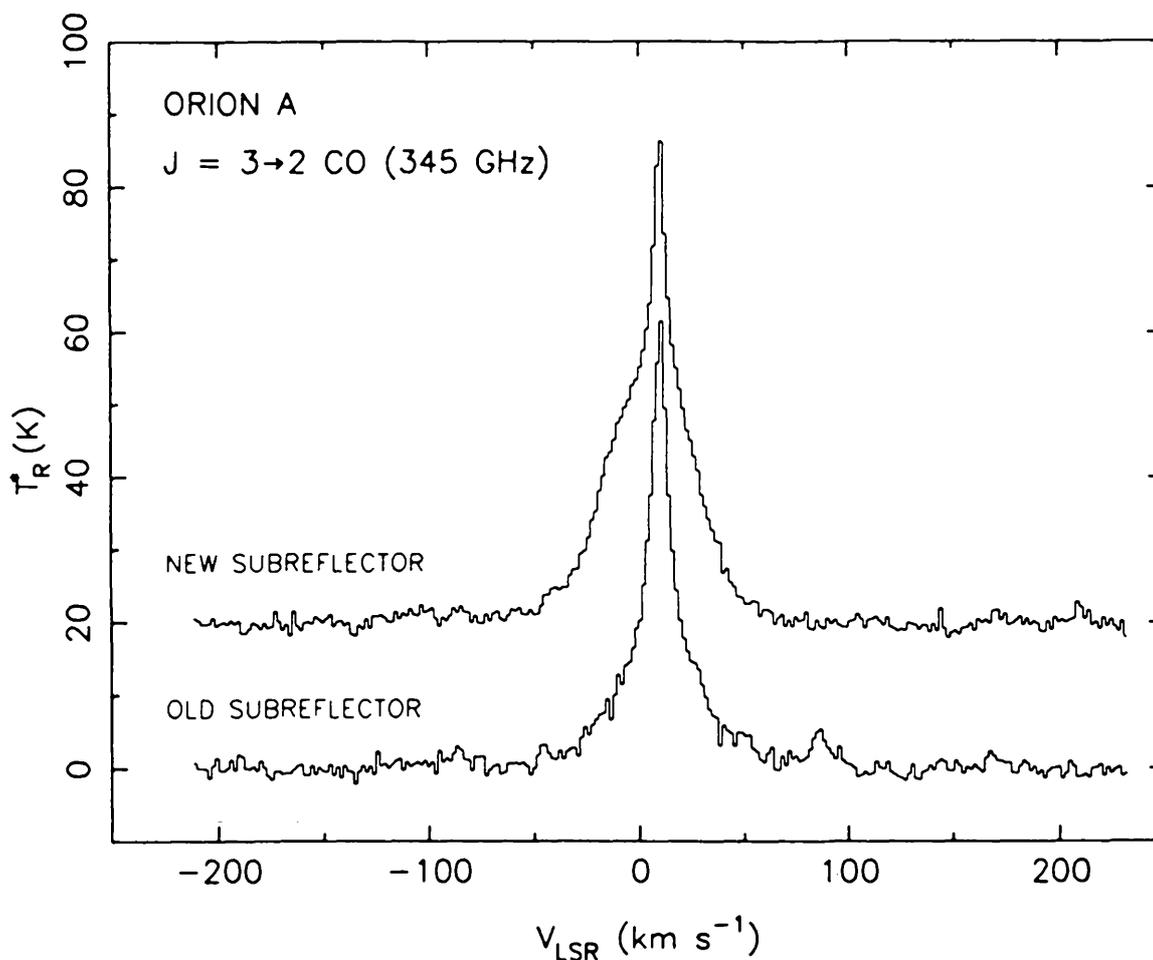
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A new, shaped subreflector that corrects for errors in the primary reflector has been installed on the 12 m. The subreflector was made at the University of Texas by John Davis and Charles Mayer. Davis and Mayer analyzed holography data taken at the 12 m and found that the largest contribution to surface error was astigmatism. They calculated a subreflector shape that corrects for the astigmatism and other surface errors and shaped the subreflector accordingly. The new subreflector produced a -50 percent increase in point source signal strength at 345 GHz. As an example, spectra of the Orion J - 3-2 CO emission taken before and after the subreflector replacement are shown in the figure on the next page. The wings of the CO emission, which originate in the compact

outflow source, are seen to have increased in strength significantly. (These are double sideband spectra with CO in the lower sideband in the "New" spectrum and in the upper sideband in the "Old" spectrum.)

This summer, we plan another iteration on the subreflector. The 12-m staff will attempt to take a high resolution holography map that will identify panel surface errors more precisely as well as the large-scale errors such as astigmatism. We expect that the next generation subreflector will produce even higher telescope efficiencies.

D. T. Emerson, P. R. Jewell, and J. M. Payne



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SPECTRAL LINE TOTAL POWER MAPPING

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We have updated the control system mapping software to allow spectral line total power mapping. The observing procedure, called "TPM," will allow a rectangular RA-DEC grid with an arbitrary number of rows, columns and grid spacings. Off source reference positions may be specified in RA, DEC, azimuth, or elevation. The observer may specify the number of "ONs" per "OFF," and the number of "CALIBRATES" per "OFF." The previous mapping techniques of position or

frequency switching using a catalog of automatically generated positions are also available. Several observers have used the total power mapping technique with good results. Standard analysis system procedures for displaying RA-DEC maps also exist. For more information, contact one of us.

E. B. Stobie and P. R. Jewell

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HIGH FREQUENCY OBSERVING SEASON

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Most of the February observing schedule for the 12 m was devoted to observations in the 330-360 GHz band. We were very fortunate with the weather during this month as we had long periods of clear skies with zenith precipitable water vapor levels between 1 and 3 mm. Only one high frequency observing program was seriously affected by the weather this season, and that program has been rescheduled in the "high frequency backup" observing block. This

scheduling system, in which a block of time is reserved to reschedule, in part, those high frequency programs affected by poor weather, has worked well and will probably be retained for next season. This system has not been unacceptably disruptive to the lower frequency schedule and improves the chances that high frequency programs can be completed in a single season.

P. R. Jewell

# VLA

## VLA CONFIGURATION SCHEDULE

### I. Schedule of Reconfiguration Dates

<u>From</u>	<u>To</u>	<u>Starting Date</u>	<u>Completion Date</u>
C	C/D	May 23, 1988	June 3, 1988
C/D	D	June 27, 1988	July 1, 1988
D	A	October 3, 1988	October 28, 1988

### II. Summary 1988/89

<u>Period</u> <sup>†</sup>	<u>Configuration</u>	<u>Antennas Available</u> <sup>*</sup>			<u>Proposal Deadline</u>
		<u>327 MHz</u>	<u>8.4 GHz</u>	<u>23 GHz</u>	
1988 Q2	C, C/D	22	17	15	
1988 Q3	D	22	20	18	March 15, 1988
1988 O,N,D,J	D→A, A	27	25	21	June 15, 1988
1989 F,M,A,M	A/B, B, B/C	27	27	24	October 15, 1988
1989 J,J,A,S	C, C/D	27	27	27	February 15, 1989
1989 O,N,D	D	27	27	27	June 15, 1989

Maximum antenna separation for the four VLA configurations are: A-36 km, B-11 km, C-3 km, D-1 km. Further information is summarized in the "VLA Observational Status Report" available from Alison Patrick, National Radio Astronomy Observatory, P.O. Box 0, Socorro, New Mexico 87801, Telephone: 505 772-4240.

<sup>\*</sup>All 27 antennas are available at 1.4, 5, 15 GHz. At 23 GHz the number given is the number of antennas with new receivers, approximately three times more sensitive than current ones.

<sup>†</sup>Note change to configuration based scheduling. See this Newsletter No. 34, dated January 1, 1988 for details.

### III. Approximate Long-Term Schedule

	<u>Q1</u>	<u>Q2</u>	<u>Q3</u>	<u>Q4</u>
1988	B	C	D	A <sup>#</sup>
1989	A <sup>+</sup>	B	C <sup>*</sup>	D
1990	D	A	B	C
1991	C	D	A	B

<sup>#</sup> All antennas equipped for 327 MHz operation

<sup>+</sup> All antennas equipped for 8.4 GHz operation

<sup>\*</sup> Voyager-Neptune encounter August 24, 1989. Modified C array to minimize shadowing.  
All antennas equipped for 23 GHz operation.

M. Goss

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THE ARRAY OPERATIONS CENTER

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The new Array Operations Center for the combined VLA and VLBA is about half completed. The steel and concrete work is finished and the building is being closed in. Inside, the framework for the partitioning is mostly in place and the electrical, plumbing, heating and air conditioning contractors are busy at work. It

is expected that the building will be available around the middle of July. Planning is in progress for the transition into the new building. The major part of the move will probably be done in August.

Dick Sramek

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VLA X-BAND OPERATIONS

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In March, the JPL/NASA funded addition of the X-band receiving system reached the two-thirds mark with 18 antennas outfitted. Receivers can be tuned from 7.7 to 9.0 GHz with receiver noise temperatures less than 20 K, but feed performance bandwidth probably causes zenith system temperatures greater than 33 K for frequencies below 8.0 GHz and above 8.8 GHz. Normal noise calibration values are about

$4 \pm 1$  kelvin and solar noise calibrations are about  $700 \pm 200$  kelvin across the frequency band. Twenty-seven antennas will be usable at X-band by mid-December. Recent scientific uses at X-band include solar imaging and detection of another hydrogen recombination line.

Bill Brundage

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REMOTE DATA PROCESSING AND VLBI SUPPORT SERVICES AT THE VLA

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The recent budget cuts have left the Data Analyst group short one position. This will have several immediate impacts.

(b) The Data Analysts will no longer calibrate the VLA visibility data collected as part of a particular VLBI run in the normal VLA manner.

The amount of VLA data which can be calibrated and observing files which can be prepared by the Data Analysts will be reduced by about 25 percent.

(c) The VLA will supply the second operator (tape hanger) support for Mark III runs less than 12 hours. However, for Mark III VLBI runs which are longer than 12 hours the Principal Investigator will be responsible for sending someone to assist as a tape hanger.

Management of VLBI support has changed significantly. The tasks previously carried out by Ina Cole will be taken over by others. The most important changes affecting VLBI observations using the VLA (and the VLBA) include:

Users are also reminded that the VLA does not currently support in-absentia observing for VLBI phased array observations at P-band (90 cm) or K-band (1.3 cm). The current changes in remote support for VLBI observations using the VLA (and the VLBA) have made it more imperative that all observing files be prepared and submitted at least two weeks prior to the start of the Network session.

(a) Pat Crane will be the contact point for any problems or questions relating to Network runs using the VLA, and Craig Walker will be the contact for Network runs utilizing the VLBA.

C. Bignell

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UPDATE ON NRAO THIRD SYNTHESIS WORKSHOP

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We have mailed to all recipients of the NRAO Newsletter the announcement and registration form for the third NRAO Workshop on Synthesis Imaging, to be held in Socorro from June 15-22, 1988. We have reproduced the registration form

on the next page. Please complete and return to me as soon as possible. If you have any questions concerning the workshop, you may contact me at (505) 772-4225.

Rick Perley

THIRD NRAO WORKSHOP ON SYNTHESIS IMAGING

JUNE 15 - 22, 1988

Please return this form as soon as possible to:

Dr. R. A. Perley  
N.R.A.O.  
P. O. Box 0,  
Socorro, NM 87801

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TELEPHONE \_\_\_\_\_

If your address during May/June is different than that above, please include, with dates.

Please indicate your professional level:

- Undergraduate
- Graduate Student
- Post-Doctoral
- Scientific or Engineering Faculty/Staff
- Other

Have you observed with the VLA?  Yes  No

Please fill in below, as appropriate.

I definitely plan to attend \_\_\_\_\_ ( )

I hope to attend, and will confirm later \_\_\_\_\_ ( )

I wish to attend: the whole conference \_\_\_\_\_ ( )

the first half only \_\_\_\_\_ ( )

the second half only \_\_\_\_\_ ( )

I would like to participate in the "Observing Tutorial" on  
June 18 and 19 \_\_\_\_\_ ( )

Please reserve dormitory accommodation .....(a) room only ( )

.....(b) room and meals ( )

I wish to share a room with \_\_\_\_\_

I intend to stay in a motel, and  
wish to use New Mexico Tech dining facilities \_\_\_\_\_ ( )

If there are any subjects you wish to have discussed, please indicate.



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VLA ARCHIVE AND CALIBRATOR PROGRAM

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The VLASORS program, available for use on IBM PCs or compatibles, to search for VLA calibrators or sources observed with the VLA has been updated. More extensive proposal information is now included and the data is complete up to the end of 1987.

If you wish a copy of the new version (updates will not be automatically sent out), send your request (and three diskettes when practical) to Alison Patrick at the VLA.

C. Bignell

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CHANGES IN SOCORRO SHUTTLE SERVICE

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The Socorro Shuttle Service that provides commercial transportation between Albuquerque and Socorro four times daily (departs Socorro at 6:00 a.m., 10:30 a.m., 3:00 p.m., 8:00 p.m., and departs Albuquerque at 8:00 a.m., 12:30 p.m., 5:00 p.m., and 10:30 p.m.) has increased their round-trip fare to \$36. The one-way fare remains at \$20.

advance with the Socorro Shuttle Service at (505) 835-0040 or 835-3410, or through Donna Silva at the VLA at (505) 772-4357 and that users will be charged for no-show trips unless the reservations have been cancelled in advance (at least three hours for trips from Albuquerque to Socorro and at least one hour for the Socorro to Albuquerque trip).

Users are reminded that the use of this service is by reservation only (at least 24 hours in

C. Bignell

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RECENT VLA MEMORANDA

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The following VLA numbered memoranda have been issued since last reported in this Newsletter:

VLA Test Memorandum No. 152, "The Sensitivity of the VLA" (R. Perley) January, 1988.

VLA Computer Memorandum No. 178, "Benchmarking the AIPS Calibration Package" (R. Perley) January, 1988.

Copies of any VLA Numbered Memoranda or a copy of the listings of all VLA Numbered Memoranda are available from Alison Patrick at the VLA, P.O. Box 0, Socorro, NM 87801 (505) 772-4240.

VLA Scientific Memorandum No. 158, "Precision of Meteorological Measurements" (B. Clark) December, 1987.

Alison Patrick

## Green Bank

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ENTERING SPECTRAL LINE DATA INTO AIPS

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Observers who map large regions of the sky with the 140-ft or 300-ft telescopes can now produce a three dimensional (position-position-velocity) array--a data cube--from their spectral line data using a program on the Masscomp computer in the Jansky Lab. The program accepts spectral line scans from KEEP tapes or files generated on the Modcomp, or in PCPOPS. The scans must have some processing, such as removal of baselines, before they can be used by the CUBE

program. After reading in the data, the user defines a rectangular region of the sky and a velocity range for the cube. The program then searches for scans which fall into this volume and inserts them into the cube. The cube file is a FITS image file which can be read into such programs as AIPS.

Ronald J. Maddalena

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RECORD EDITING OF SPECTRAL LINE DATA FROM THE 140-FOOT

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Normally, all the records which make up a scan at the 140-ft telescope are averaged together before the observer can examine them. In the presence of interference, no matter how brief, entire scans have had to be deleted. Now, however, records within scans can be deleted.

To accomplish this, a program on the Masscomp computer in the Jansky Lab accepts the tapes produced by the control computer at the telescope which contain the individual records

of the observations. The program displays the records from within the scans that the observer feels to be suspect and averages together only those records which the observer feels are free from problems. The averages are stored on the Masscomp so that the user can process them further with POPS. (Note that observers on the 300-ft have been able to edit records using a different set of programs for over a year.)

Ronald J. Maddalena

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POSSIBLE ERRORS IN SKY FREQUENCIES AND VELOCITIES RECORDED FOR 140-FOOT DATA

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We have recently encountered and corrected a problem in the spectral-line software of the 140-ft control computer. When an observer asked for oversampling or 80 MHz bandwidths from the Mark IV correlator, the sky frequency recorded with the data could have been as much as 10 kHz from what its value should have been. The recorded center velocities would also have been in error by a velocity shift equivalent to the error in the frequency. (The observing sky

frequency was correct, however.) Most observers would find such an error to be trivial for their experiments. However, we can supply information on how to correct the recorded sky frequency and center velocity for those interested observers who have used 80 MHz bandwidths or oversampling. The problem has been corrected.

Ronald J. Maddalena and Bob Vance

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PROGRAMS FOR CREATING OBSERVING FILES FOR THE 140-FOOT TELESCOPE

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As mentioned in the previous Newsletter, the card reader at the 140-ft telescope has been replaced with a PC. An observer creates files on the PC which look identical to the old card decks. In order to facilitate the creation and editing of these files, we have written programs specifically designed to create, edit, and check them. Many observers will probably want to create their files at their home institution and carry them to Green Bank on floppies, so we will send any interested observer a copy of the

programs. The programs run on an IBM compatible PC with a math co-processor and DOS, version 3.0 or higher.

If interested, please send one formatted double-density, double-sided 5-1/4 inch floppy to me and I will return it with the software plus documentation.

Ronald J. Maddalena

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TRAVEL TO AND FROM GREEN BANK

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Due to recent budget restrictions, we are asking visitors to make travel plans and connections through Charlottesville whenever possible. Transportation will then be available from Charlottesville to Green Bank. An automobile shuttle runs one day every week between the Charlottesville NRAO offices and the Green Bank Observatory. The car departs from both sites at 9:00 a.m., meets halfway, and returns by noon. The normal shuttle day is Wednesday, but some flexibility is possible to accommodate travelers to or from Green Bank. If travel on the shuttle

cannot be arranged, a GSA vehicle will be available at the Edgemont Road office building in Charlottesville for you to drive to Green Bank. Plans to ride the shuttle or use the GSA vehicle should be arranged with Becky Warner in Green Bank at (304) 456-2227. Family members and friends are not permitted to ride in GSA vehicles. If you do not have your own transportation or cannot make connections through Charlottesville, alternate arrangements may be made with Becky Warner.

Richard L. Fleming





EDITOR NRAO NEWSLETTER  
NATIONAL RADIO ASTRONOMY OBSERVATORY  
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CHARLOTTESVILLE, VA 22903-2475 USA

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