NRAO NEWSLETTER

1989 January 1 No. 38

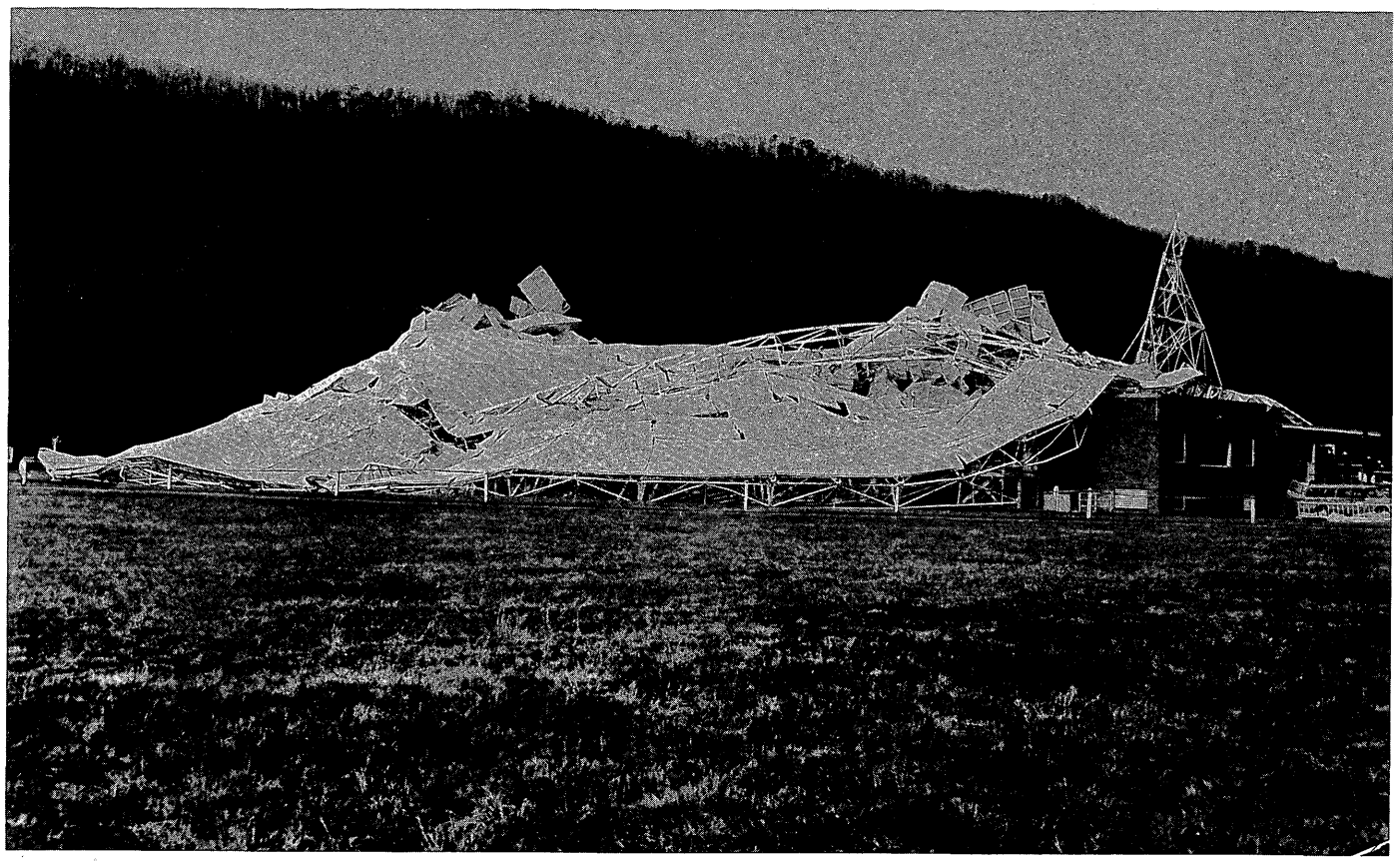
GREEN BANK

300-FOOT TELESCOPE COLLAPSE

At 9:43 p.m. EST on Tuesday the 15th of November, the 300-ft telescope in Green Bank collapsed. It is a total loss. Fortunately, no one was injured. The telescope was in routine operation at the time of the collapse, nearing the end of a long run that would have completed the second 6-cm wavelength continuum survey of Broderick, Condon, and Seielstad. The seven-feed receiver used for the continuum survey has been recovered from the wreckage and appears to have survived its plunge to the control building roof.

A study is underway to determine the cause of the collapse. Associated Press distributed a story that confused the design of the 300-ft telescope with that of its sister instrument, the 140-ft telescope, with the implication that one design was used for both telescopes and that that design was deficient for the larger telescope. This is obviously nonsense; the 300-ft was designed as a distinct instrument from the outset.

P. A. VANDEN BOUT



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300-FOOT COLLAPSE STUDY

What caused the collapse of the 300-foot telescope? The question is of considerable interest to designers of telescopes and to those responsible for their operation and maintenance. A Technical Assessment Panel has been appointed, jointly by AUI and NSF, to investigate the collapse. The panel is comprised of R. M. Matyas (Vice President emeritus, Cornell Univ.), E. Cohen (Managing Partner, Ammann & Whitney Consulting Engineers), and G. F. Mechlin (Vice President R&D retired, Westinghouse Corp.). R. Williams (House of Representatives Committee on Science, Space & Technology, K. J. Johnston (NRL), and L. Oster (NSF) are participating in the study as official observers. The panel hopes to make a preliminary report in February.

An internal NRAO group headed by D. Heeschen has also been appointed by the director to work with the Green Bank staff to assemble information on the design, construction, maintenance, and operation of the telescope, to investigate the collapse and the circumstances surrounding the telescope status and operation just prior to the collapse. This group, consisting of A. Bridle, M. Balister, D. Heeschen, H. Hvatum, and L. King, is primarily concerned, at present, with helping the external Panel collect the information needed for its study.

D. S. HEESCHEN

REPLACEMENT TELESCOPE

Since the collapse of the 300-foot there has been considerable discussion about replacing the telescope. The prospect of considering a new, large aperture telescope in Green Bank has been discussed and endorsed by the radio panels of the last two astronomy decade survey committees. Over the past year an internal NRAO committee considered the scientific requirements for a fully steerable telescope that would replace the 140-foot telescope. Their report was used as the starting point for a workshop held in Green Bank, December 2-3, to discuss the scientific implications of the loss of the 300-foot telescope and to draw up requirements for a replacement telescope. The proceedings of that workshop will be available soon. At the request of E. Bloch, Director of NSF, the proceedings, together with a rough concept of a replacement telescope, were presented to the Foundation. Senators Byrd and Rockefeller of West Virginia have expressed a keen interest in having the telescope replaced and a willingness to seek funding for the project. NSF is considering the matter.

P. A. VANDEN BOUT

FOREIGN TELESCOPE OPPORTUNITIES FOR FORMER 300-FOOT USERS

The NRAO has received many expressions of sympathy from colleagues in the U.S. and abroad concerning the loss of the 300-foot telescope. We take this opportunity to thank our colleagues for their concern.

Representatives of two institutions, P. Mezger of the Max-Planck Institute for Radio Astronomy and P. Chamaraux of the Nancay Observatory, have reiterated their willingness to consider proposals from U.S. observers. They expressed the hope that this would be helpful to former users of the 300-foot telescope. We express our strong appreciation to these institutions and colleagues for their interest.

Applicants for time at the 100-m and Nancay are reminded of the Unique Foreign Telescope Travel Support Program. Observers who obtain time on these telescopes, or on one of the other designated unique foreign radio telescopes, will be reimbursed for air fare (U.S. carrier) on application to NRAO. Contact P. Jackson or H. Liszt at (804) 296-0211 before making observing trip for information.

P. A. VANDEN BOUT

RICH LACASSE TO HEAD GREEN BANK ELECTRONICS

Effective January 1, 1989, Rich Lacasse began serving as Division Head for Electronics at NRAO Green Bank. Mr. Lacasse will be happy to discuss users' observing needs with them. Rich replaces Roger Norrod, who wishes to devote more time to engineering. Roger has agreed, however, to serve as Assistant Division Head.

The community owes Roger Norrod its thanks for his excellent service. I am confident Rich Lacasse will continue this tradition of excellence.

G. A. SEIELSTAD

DEDICATION OF THE ARRAY OPERATIONS CENTER

The official dedication of NRAO's new Array Operations Center (AOC) took place on December 8, 1988 only a few hectic days after the moving vans had left the scene. A crowd of well over 300 persons was present at the ceremony to mark this major milestone in the operational consolidation of the VLA and the future VLBA telescopes.

New Mexico's U.S. Senator Pete Domenici delivered the keynote address at the event. His strong support along with backing by U.S. Senator Bingaman and State Senator Martin and State Representative Olguin were vital in procuring funding for the building. The State of New Mexico and the National Science Foundation jointly funded the construction of the AOC.

The AOC currently houses about half of the VLA scientific, technical, and administrative support staff as well as the headquarters of the VLBA construction project. It will eventually form the nucleus for scientific activity for both the VLA and the VLBA.

R. J. HAVLEN

Pictured left to right W. M. Goss, Senator P. Domenici, P. A. VandenBout and R. E. Hughes

NRAO NEW MEXICO MOVES INTO ITS NEW HOME

The move into the Array Operations Center (AOC) began on November 28 with the move of furniture and office contents from the VLA site. By Thursday, December 1 all the furniture had been moved into the AOC, including that in the "old" Socorro office building.

The Convex was moved into the AOC, beginning on December 12, and was up and running one week later. The two VAX 11/780's were moved the week of December 19.

The AOC is a three-story building of about 67,000 square feet. It currently houses about 100 employees from both VLBA construction and operations and VLA operations. The other employees remain at the VLA site. Approximately 10,000 square feet of floor space has been left unused to save on maintenance and utility costs. This space will eventually be used as VLBA operations build up over the next few years to its full level in 1992.

R. C. BIGNELL

VLBA

SELECTED ITEMS

Operation - Observations were made by the Pie Town telescope during the September-October 1.3, 2.8, and 3.6 cm Mk II and Mk III NUG runs. Operators in Socorro controlled the station VME monitor and control computer via modems and terminal as part of a continuing debug program to reveal problems of station self-sufficiency. During a second NUG run at 6 and 18 cm in November, unattended control and scan sequencing was performed by the station computer with only occasional monitoring and assistance by the remote operator. This NUG run achieved approximately 80 percent effective observation time. In addition, four days of NASA Crustal Dynamics geodesy runs were performed in Mk IIIA compatibility mode at the Pie Town telescope.

The Kitt Peak telescope is scheduled to receive its final outfitting during January-February 1989. Its observational availability for Mk II Network observations is scheduled for the second quarter of 1989. Due to expected NRAO operation budget limitations in 1989, only Pie Town and Kitt Peak will be available for NUG observing sessions during 1989.

General - Telescope performance to the extent of limited observation and test data has been within expectations, but more rigorous testing is scheduled for the near future. Underway are more extensive pointing tests, test observations at 86 GHz, and holographic antenna surface measurements. Tests performed on prototype HEMT 43 GHz amplifiers being developed at the Charlottesville electronics lab give a noise temperature of 55 K. A system noise temperature of about 100 K may be expected when the VLBA antennas are equipped with 43 GHz receivers in 1990 and 1991.

A contract change-order for initial production quantities of the VLBA recorders is being implemented with Haystack Observatory. Five recorders and two playback drives are to be fabricated during 1989. The production Data Acquisition Racks to complete the antenna terminals are being assembled in Charlottesville, as are Playback Drive Interfaces to the correlator.

Construction Status - The first five antennas are erected. The sixth and seventh sites (Brewster, WA and Owens Valley, CA) have completed antenna foundations and control buildings. Antenna erection is scheduled to be completed at these two sites, as well as starting the eighth antenna erection in 1989. A signed lease has been obtained for the Hancock, NH site. Its antenna foundation and building are expected to be under construction starting in the spring 1989. Procedures for obtaining leases for the Saint Croix, VI and Mauna Kea, HI sites continue.

K. J. STETTEN

NEW MK III HYBRID MODE IN THE VLBA CORRELATOR

Compatibility between the VLBA and Mk III VLBI systems generally has been discussed in the sense that the VLBA Data Acquisition System is capable of emulating a Mk III Data Acquisition Terminal. This feature facilitates the incorporation of VLBA stations into U.S. VLBI Network operations during construction of the Array. The aggregate bandwidth which can be recorded compatibly is limited by the VLBA channelization scheme to the equivalent of Mk III "Mode B."

Mk III-to-VLBA compatibility, i.e., capability of the VLBA correlator to read and correlate Mk III recordings, is a more complex matter. Only recently has design of the correlator's "playback interface" advanced sufficiently that it is possible to commit to supporting the Mk III format at all. VLBA channelization again restricts the aggregate bandwidth for correlation of Mk III channels against matching VLBA channels in one pass; 32 MHz compatibility bandwidth can be correlated in real time (with either 2 or 4 MHz Mk III channels), 64 (or 56) MHz requires twice real time, 112 MHz quadruple time. VLBA planning has long considered this level of compatibility to be adequate, based on the U.S. VLBI Network Transition Plan, on the European VLBI Network's plans for building VLBA-compatible recorders, and on the general expectation that the VLBA recording system would be widely adopted. Members of the world VLBI community, however, have frequently urged that the VLBA adopt a more comprehensive Mk III-to-VLBA compatibility, for reasons including the unique capabilities of several U.S. telescopes, the present uncertain outlook for funding of the EVN project, and recent cost increases for VLBA recording systems as well as the current lack of any established supplier to institutions outside NRAO.

A "Mk III Hybrid Mode" has now been defined for the VLBA correlator. It is intended to support primarily wideband continuum observations using a mixture of VLBA and Mk III facilities, by correlating groups of contiguous Mk III video channels against a single, wider VLBA channel. Mk III Mode B can be used without restriction, with Modes A and C subject to the requirement that pairs of video converters be tuned to yield contiguous sidebands. In particular, all the networks standard Mk III setups are supported. No new hardware is required to implement this feature, but it involves some technical risks. VLBA Correlator Memo 94, available from Betty Trujillo at the VLBA Project Office in Socorro, describes the background, requirements, specifications, benefits, and risks of this new correlator mode.

J. D. ROMNEY

VLA

VLA CONFIGURATION SCHEDULE

I. Schedule of Reconfiguration Dates

Configuration	Starting Date	Ending Date	Proposal Deadline
A	28 Oct 1988	07 Feb 1989	15 Jun 1988
A/B	17 Feb 1989	06 Mar 1989	15 Oct 1988
B	10 Mar 1989	01 May 1989	15 Oct 1988
B/C	12 May 1989	30 May 1989	15 Oct 1988
C*	02 Jun 1989	25 Sep 1989	15 Feb 1989
C/D	06 Oct 1989	23 Oct 1989	15 Feb 1989
D	27 Oct 1989	16 Jan 1990	15 Jun 1989

*The C configuration will be modified, by removing two antennas from the center of the array, to reduce shadowing at the declination of Voyager.

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

II. Approximate Long-Term Schedule

	Q1	Q2	Q3	Q4
1989	A	B	C	D
1990	A	A	B	C
1991	D	A	B	B,C
1992	C	D	A	A,B
1993	B	C	D	A

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.

W. M. GOSS

CONVEX C-1

We are pleased to announce that the NRAO will be acquiring a third CONVEX C-1, to be located at the Array Operations Center in Socorro. Delivery is expected in March, 1989 with operation beginning soon thereafter. This computer will join the existing Convex and the two VAX 11/780s to provide future calibration, imaging, and computation capability in New Mexico.

These extended resources will permit decommission of the DEC-10 and the Pipeline system. For financial reasons, we will do this as soon as possible after the new computer is operational. Currently all functions of the DEC-10 and the Pipeline are being transferred to other machines, and expect that the shutdown will have minimal effect on observing, calibrating, and imaging capabilities.

Unfortunately, all DEC-10 backup tapes will be unprocessable after the decommission. Writing software to read these tapes on other machines is a major undertaking, and NRAO has no plans to do this. It is recommended that Export tapes be written for all data currently in backup format which users wish to preserve. Failing this, users will find it necessary to recalibrate their data from the original archive tapes. However, it is known that some of these tapes cannot be read without some loss of data, although the expected fractional loss will be small. Ways to rewrite these tapes to prevent further deterioration are under consideration.

The NRAO cannot consider converting all existing Backup tapes into Export format. Only for EMERGENCY CASES, and then on a case-by-case basis, will this be done. No doubt most users have already performed this translation. If you believe you have a good case, please make it to Rick Perley or Miller Goss at the VLA.

R. A. PERLEY and W. M. GOSS

PC-AIDED VLA OBSERVING STRATEGIES

I have developed two programs--VLAPLAN and VLAUVPL--to help continuum and line observers plan VLA observing strategies (and proposals) using an IBM PC or compatible computer. My aim has been to consolidate into one menu-driven, self-documenting package the main algorithms, graphs and other information that are useful when designing VLA observing strategies. These resources were previously scattered through many different NRAO documents.

VLAPLAN is a spreadsheet in which you can adjust imaging parameters (such as resolution, field of view, allowable distortion, bandwidth, averaging time and sensitivity) interactively while reviewing the consequences for VLA configuration choices, total integration times, data set sizes and other critical parameters. It contains several tools to help you resolve conflicts between your imaging parameters, the VLA hardware capabilities, and restrictions imposed by VLA computing policies. It also provides "help" screens with information on known RFI signals, VLA configuration schedules, and other sources of advice about VLA hardware or VLA observing strategies.

VLAUVPL is a spreadsheet that plots the u,v tracks of the innermost or outermost three VLA antennas for a specified VLA configuration, declination, and elevation limits. It also produces graphs of u,v distance versus hour angle and of elevation angle versus hour angle. It is a useful adjunct to VLAPLAN for projects that are sensitive to the details of the u,v coverage at large hour angles, where baselines may be highly foreshortened by projection.

Both VLAPLAN and VLAUVPL can run under Lotus 1-2-3 Version 2, Borland Quattro, or any other spreadsheet programs that can read and execute worksheet files in .WK1 or .WKQ format. You need an IBM-compatible PC with at least 320 k of available RAM, a graphics board, and the host spreadsheet program. Little or no user familiarity with the host program is assumed, however. The worksheets provide their own menus and on-screen documentation, and the graphical displays scale themselves to the context of your inputs.

Copies of the software are available on 5-1/4 inch diskettes upon request to Sandra Montoya at NRAO, P. O. Box O, Socorro, NM 87801; ask for the VLAPLAN distribution diskette. The diskette contains its own documentation files, but hard copy of a User's Guide is also available from Sandra Montoya; ask for VLA Computer Memo No. 179.

A. H. BRIDLE

VLA OBSERVATIONAL STATUS REPORT

The latest version of the VLA Status Report was sent to active VLA users in mid December. A copy may be obtained from Sandra Montoya at (505) 835-7310.

W. M. GOSS

NEW VLA TEST MEMORANDUM

The VLA Test Memorandum No. 153, "The Tuning Range and Sensitivity of the VLA," by Rick Perley is now available. The absolute sensitivity of the VLA frequency bands over their entire tuning ranges is summarized. Contact Sandra Montoya at (505) 835-7310 for copies.

S. MONTOYA

12-METER

12-METER TELESCOPE OPERATIONS

During the Fall observing season, observers have experienced a few system problems. We have made a concerted effort to fix these problems, and give an update below.

Source Catalogs. In the last Newsletter we advertised a new capability for entering source catalogs from IBM PC floppy disks brought from home by the observer. Subsequently, we found that transmission of the catalogs from the PC to the control computer gave occasional errors, and so we temporarily withdrew the facility. We have now solved the transmission problems and, once again, invite observers to bring their source catalogs on 5-1/4 floppy diskette. Details of the system are available upon request to the Tucson office (602) 882-8250.

SIS Receiver. The 3 mm SIS receiver has experienced a few problems during the past few months, all of which have now been solved. At the beginning of the September observing season the receiver was found to have high noise temperature in one of the polarization channels. The receiver was removed from the telescope and the bad channel was repaired. Both receiver channels now have SSB noise temperatures in the 90-130 K range throughout their tuning band (90-115 GHz).

Twice this season the SIS has experienced refrigerator failures that have resulted in 1-2 days of down-time, although in both instances it was possible to continue observations with alternative receivers. These were unrelated faults and do not indicate any fundamental problems.

Since the SIS was first installed about two years ago, some noise temperature resonances in the bandpass have been noticed. Under certain conditions the resonances can distort the final spectrum, particularly on long integrations that yield RMS values less than a millikelvin. James Lamb, the engineer for the SIS receiver, traced these resonances to leakage of cross-polarized emission from the feed horns. By replacing a plane mirror in the polarization splitter with a wire grid, James has been able to eliminate the resonances with no degradation in receiver performance.

Mapping Software. We have been developing some software for the analysis and display of spectral line maps, which involves writing processed spectra to a special mapping file, gridding the data according to offset and desired mapping parameter, and finally displaying a contour map. Inevitably, a few bugs have shown up. We believe (pious hope!) that the bugs are now out and the system is working reliably for all of our mapping modes.

Note to Observers. We encourage you to submit an observer's comment sheet at the conclusion of your run. Although manpower or fundamental equipment limitations may make immediate solutions difficult, we take these comments very seriously and remedy what we can as fast as we can.

P. R. JEWELL AND D. T. EMERSON

STAFF CHANGES AT TUCSON

We regret to announce that Betty Stobie has left the NRAO Arizona Operations to take up a new job at the Space Telescope Science Institute. We are sure that our observers will join us in thanking Betty for her many contributions to Tucson and to NRAO as a whole and to wish her well in her new position.

The new software team in Tucson consists of Chris Biemesderfer, who joined us from the STScI last June, Pat Murphy who transferred to Tucson from the VLA, and Bill Peters on a part-time basis, dividing his time between NRAO and the Steward Observatory. Chris has assumed responsibility for the current Forth control system and Pat is looking after the analysis systems, although this division of labor is not rigid. Bill will be working with Chris and Pat on the new telescope control system planned for the 12-meter telescope.

P. R. JEWELL AND D. T. EMERSON

IN GENERAL

PAGE CHARGE SUPPORT

Let me remind those of you who request partial page charge support from the NRAO that we can honor your request only if:

1. You send four copies of the paper prior to publication to the NRAO librarian in Charlottesville; and

2. You footnote-mention the NRAO in the text with: "Operated by Associated Universities, Inc., under cooperative agreement with the National Science Foundation."

Since point (2) here is so familiar perhaps your eyes slide past an important change, indeed the first such change in more than 25 years. The new phrase is "*cooperative agreement*" replacing "*contract*." In 1989, and for the subsequent four years, AUI will operate the NRAO under Cooperative Agreement No. AST-8814515 with the NSF.

R. L. BROWN

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