

NATIONAL RADIO ASTRONOMY OBSERVATORY

Charlottesville, Virginia

October 1, 1979 - December 31, 1979

RESEARCH PROGRAMS

<u>140-Foot Telescope</u>	<u>Hours</u>
Scheduled observing	1916.00
Scheduled maintenance and equipment changes	177.00
Scheduled tests and calibration	51.00
Time lost due to: equipment failure	26.50
power	65.00
weather	7.25
interference	0.00

The following line programs were conducted during this quarter.

<u>Observer(s)</u>	<u>Program</u>
F. J. Lockman	Observations at 1425 MHz of H166 in the galactic plane and in the Rosette Nebulae.
R. Giovanelli (NAIC, Puerto Rico) M. Haynes (NAIC, Puerto Rico)	Observations of 21-cm hydrogen in sections of the northern Magellanic Stream.
B. Balick (Washington) E. Skillman (Washington)	Search for 21-cm hydrogen in emission from Irr I galaxies.
C. Bernes (Stockholm Observatory) A. Sandqvist (Stockholm Observatory) R. Loren (Texas) H. Wootten (Caltech)	Observations of 2-cm H ₂ CO in the molecular clouds ρ Oph and CrA to use in conjunction with 2-mm data to determine the spatial variation of density.
N. Evans (Texas) R. Loren (Texas) R. Snell (Texas) H. Wootten (Caltech)	Studies of the density distribution and mass spectrum of fragments in selected molecular clouds by the observation of 2-cm H ₂ CO.
M. Reid (Center for Astrophysics) P. Bowers	Studies of the time variations of H ₂ O masers in late type stars at 22.4 GHz.

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<u>Observer(s)</u>	<u>Program</u>
M. Cohen (Cornell) B. Turner	Search at 5.625 GHz for H ₂ ¹⁸ O maser emission during the "flare" phase of the Ori (KL) H ₂ O maser.
P. Bowers	Studies of 18-cm OH emission from unidentified Type II OH/IR Stars.
K. Fox (Tennessee) D. Jennings (NASA, Greenbelt)	Observations of interstellar methane and cyanodiacetylene radio emission lines found in the frequency range of 18.5-21.9 GHz.

The following continuum programs were conducted during this quarter.

<u>Observer(s)</u>	<u>Program</u>
C. Crannell (NASA, Greenbelt) R. Hobbs (NASA, Greenbelt) S. Kahler (American Science and Engineering)	Observations at several frequencies between 1-2 GHz of the flare star ZY Canis Minoris, coordinated with other observations.
W. B. Burton (Minnesota) H. Liszt	Observations at 1 GHz to search for evidence of the tilted fundamental inner galaxy gas distribution in thermal and nonthermal radiation.
W. B. Burton (Minnesota) W. Jaffe H. Liszt	Observations at 1 GHz of the galactic disk.
M. Kundu (Maryland) P. Bowers	Search for 1.3-cm radio emission from cool stars.

The following very-long baseline programs were conducted, and the stations used in the experiments are coded as follows:

A - Algonquin, Canada, 150-ft	K - Haystack, 120-ft
B - MPIR, Bonn, FRG, 100-m	O - OVRO, 130-ft
C - Chilbolton, England, 25-m	P - Arecibo, 1000-ft
E - Jodrell Bank, England, 250-ft	R - Simeis, USSR, 22-m
F - Harvard/Fort Davis, 85-ft	S - Onsala, Sweden, 84-ft
G - NRAO, 140-ft	

<u>Observer(s)</u>	<u>Program</u>
M. Claussen (Iowa) J. Fix (Iowa) R. Mutel (Iowa) J. Benson	Observations of 1665, 1667 MHz OH emission from long period variable stars with telescopes F, P, and G.
R. Porcas (MPIR, Bonn)	Observations at 2.8-cm of the quasar 0723+67 with telescopes B, C, K, O, and G.
R. Linfield (Caltech)	Observations at 2.8-cm of the nuclei of radio galaxies with telescopes A, B, F, K, O, and G.
J. Romney (MPIR, Bonn) R. Preston (JPL) R. C. Walker (Caltech)	Observations at 2.8-cm of high redshift QSO's with telescopes B, F, K, O, and G.
K. Kellermann (MPIR, Bonn) B. Geldzahler (Pennsylvania) T. Menon (NASA, Greenbelt)	Observations at 2.8-cm of the nuclear components of Cyg A and 3C 154 with telescopes at B and G.
R. Booth (Jodrell Bank) P. Wilkinson (Jodrell Bank) A. Readhead (Caltech)	Observations at 610 MHz to monitor suspected low-frequency variables and to map selected bright sources with telescopes J, F, O, and G.
L. Kogan (Inst. for Space Research, Moscow) V. Kostenko (Inst. for Space Research, Moscow) L. Matveyenko (Inst. for Space Research, Moscow) B. Ronnang (Chalmers, Sweden) D. Downes (MPIR, Bonn) R. Genzel (Center for Astrophys.) J. Moran (Center for Astrophys.) M. Reid (Center for Astrophys.)	Observations at 22 GHz of proper motions in strong H ₂ O maser sources with telescopes B, R, S, K, O, and G.
K. Kellermann (MPIR, Bonn) I. Pauliny-Toth (MPIR, Bonn) T. Clark (NASA, Greenbelt) R. Coates (NASA, Greenbelt) C. Ma (NASA, Greenbelt) J. Ryan (NASA, Greenbelt) D. Shaffer (Phoenix Corp.)	Observations at 3.6 and 13-cm to test the capabilities of the Mark III VLBI system and to observe the structure of galactic nuclei, low surface brightness objects, radio stars, and to improve astrometric and geodetic measurements with telescopes B, S, K, O, and G.

Observer(s)Program

(continued)

N. Vandenberg (NASA, Greenbelt)
 C. Knight (Haystack)
 H. Hinteregger (Haystack)
 E. Nesman (Haystack)
 A. Rogers (Haystack)
 A. Whitney (Haystack)
 W. Cotton (MIT)
 B. Corey (MIT)
 C. Counselman (MIT)
 T. Herring (MIT)
 I. Shapiro (MIT)
 J. Wittels (MIT)
 D. Robertson (NGS, Rockville)
 R. Lacasse
 B. Rayhrer

W. Cotton (MIT)
 M. Gorenstein (MIT)
 J. Marcaide (MIT)
 I. Shapiro (MIT)
 R. Preston (JPL)

K. Kellermann (MPIR, Bonn)
 A. Witzel (MPIR, Bonn)
 M. Reid (Center for Astrophys.)
 D. Shaffer (Phoenix Corp.)
 F. Owen

M. Davis (Center for Astrophys.)
 A. Haschick (Center for Astrophys.)
 A. E. Lilley (Harvard)
 J. Moran (Center for Astrophys.)

T. Pearson (Caltech)
 A. Readhead (Caltech)

M. Cohen (Caltech)
 A. Moffet (Caltech)
 T. Pearson (Caltech)
 A. Readhead (Caltech)
 R. Simon (Caltech)
 G. Seielstad (Caltech)
 R. C. Walker (Caltech)

Observations at 13-cm of the twin
 quasars 0957+56.1 with telescopes B, K,
 O, and G.

Studies at 6-cm of quasar proper motion
 with telescopes B, K, O, and G.

Observations at 6-cm of the small scale
 structure of the twin quasar 0947+56.1
 with telescopes B, K, O, and G.

Observations at 6-cm to continue the
 hybrid mapping of a complete sample of
 sources which may be new superluminal
 sources with telescopes F, H, O, and G.

Observations to monitor superluminal
 sources at 6-cm with telescopes B, F, O,
 and G.

<u>Observer(s)</u>	<u>Program</u>
A. Witzel (MPIR, Bonn)	Observations at 6-cm to investigate the spatial structure of a complete sample of compact radio sources with telescopes B, F, K, N, O, and G.
S. Neff (Virginia)	
K. Johnston (NRL)	
J. Spencer (NRL)	
E. Waltman (NRL)	
R. Brown	
E. Fomalont	
R. Perley	
R. C. Walker	
J. Cordes (Massachusetts)	Observations at 18-cm to test whether 10 selected sources are inhomogeneous synchrotron sources or sources which produce synchrotron radiation from a relativistic Maxwellian electron distribution, with telescopes F, O, and G.
K. Johnston (NRL)	
T. Jones (Minnesota)	
S. Spangler	

<u>300-Foot Telescope</u>	<u>Hours</u>
Scheduled observing	1728.50
Scheduled maintenance and equipment changes	136.50
Scheduled tests and calibration	225.00
Time lost due to: equipment failure	27.25
power	52.75
weather	0.00
interference	0.00

The following line programs were conducted during this quarter.

<u>Observer(s)</u>	<u>Program</u>
R. Terlevich (Inst. of Astronomy, Cambridge)	Measurements of the 21-cm hydrogen content of blue compact objects discovered on the 1.2 meter U.K. Schmidt objective prism plates.
C. Hazard (Inst. of Astronomy, Cambridge)	
T. Thuan (Virginia)	
G. Martin (Virginia)	
L. Davis (Toronto)	Studies of 21-cm hydrogen in isolated and interacting galaxies.
E. Seaquist (Toronto)	
D. Burstein	Survey the thinnest galaxies found in the Uppsala General Catalog for 21-cm hydrogen.
K. Lo (Caltech)	Studies of 21-cm hydrogen in dwarf galaxies.
C. Kowal (Caltech)	
J. Pier (Caltech)	
W. Sargent (Caltech)	

<u>Observer(s)</u>	<u>Program</u>
W. Ford (DTM) V. Rubin (DTM) N. Thonnard (DTM)	Studies of the extent of 21-cm hydrogen in high luminosity spiral galaxies.
B. M. Lewis (Carter Observatory, New Zealand)	Observations of 21-cm hydrogen in Shapley Ames and other galaxies.
D. Hogg	Mapping of 21-cm hydrogen surrounding three Wolf-Rayet N-type stars.
T. Bania (NAIC, Puerto Rico) F. J. Lockman	Measurements of the scale height of galactic HI.

The following continuum programs were conducted during this quarter.

<u>Observer(s)</u>	<u>Program</u>
T. Balonek (Massachusetts) W. Dent (Massachusetts) C. O'Dea (Massachusetts)	Polarization and flux density measurements of variable radio sources at 2695 MHz.
C. Crannell (NASA, Greenbelt) R. Hobbs (NASA, Greenbelt) S. Kahler (American Science and Engineering)	Observations at 4 four discrete frequencies between 250 and 500 MHz of the flare star ZY Canis Minoris coordinated with other observations.
J. Cordes (Cornell) J. Dickey	Interstellar scintillation measurements of compact sources at 850 MHz.

The following pulsar programs were conducted during this quarter.

<u>Observer(s)</u>	<u>Program</u>
P. Backus (Massachusetts) J. Taylor (Massachusetts) M. Damashek	Observations at 410, 610, and 850 MHz to determine periods, period derivatives, positions and dispersion measures of known pulsars.
J. Taylor (Massachusetts) M. Damashek	Observations to complete a Northern Hemisphere pulsar search at 410 MHz.

36-Foot Telescope

	<u>Hours</u>
Scheduled observing	1965.50
Scheduled maintenance and equipment changes	94.50
Scheduled tests and calibration	100.00
Time not scheduled	48.00
Time lost due to: telescope	5.50
equipment	45.00
weather	53.50
power	2.00
interference	0.00

<u>Observer(s)</u>	<u>Program</u>
A. Barrett (MIT) R. Buxton (MIT)	Study of CO in small reflection nebulae.
W. B. Burton (Minnesota) H. Liszt	Study of the thickness of CO in the inner galaxy.
E. Churchwell (Wisconsin) C. Winnewisser (MPIR) C. Walmsley (MPIR)	Observations of methyl formate at 90 GHz.
W. Dent (Massachusetts) R. Hobbs (NASA, Greenbelt)	Evolution of extragalactic radio sources at millimeter wavelengths.
L. Denoyer (Cornell)	Study of shocked CO within the supernova remnant IC 443.
L. Denoyer (Cornell)	Search for shock excited molecules near supernova remnants.
D. Dickinson (JPL)	Observations of chemistry in the regions of interstellar shock waves.
P. Jackson (Maryland) J. Sewall (Maryland)	Study of molecular clouds near HII regions that are distant from the galactic center.
D. Jaffe (Center for Astrophys.) G. Fazio (Center for Astrophys.)	Continuation of CO survey of IR sources in the galaxy.
D. Jaffe (Center for Astrophys.) G. Fazio (Center for Astrophys.) B. McBreen (Center for Astrophys.)	Determination of distance of IR sources by their CO emission.

<u>Observer(s)</u>	<u>Program</u>
D. Johnson (Florida) S. Gottesman (Florida)	Confirmation of the detection of CO in NGC 185.
M. Kutner (Rensselaer) N. Evans (Texas) K. Tucker (Fordham)	Study of formaldehyde isotopic abundances at 2 millimeters.
M. Kutner (Rensselaer) N. Evans (Texas) K. Tucker (Fordham)	Testing fractionation effects in NGC 1977 using DCO^+ and $^{13}\text{CO}^+$.
M. Kutner (Rensselaer) N. Evans (Texas) K. Tucker (Fordham)	Study of H_2CO and H_2^{13}CO .
M. Kutner (Rensselaer) K. Tucker (Fordham)	Study of methane isotopes at 2 millimeters.
M. Kutner (Rensselaer) D. Machnik (Rensselaer)	High resolution maps of dense molecular clouds in Canis Majoris.
M. Kutner (Rensselaer) D. Machnik (Rensselaer) K. Tucker (Fordham) C. Leung (Rensselaer)	Studies of broad CO lines in T Tauri stars.
R. Levreault (Texas) N. Evans (Texas) R. Loren	Study of CO line profiles toward FU Ori, variable stars and other objects.
K. Mattilla (Helsinki Observatory) L. Malkamaki (Helsinki Observatory) G. Snadell (Chalmers)	Mesurements of CO and ^{13}CO in five dark nebulae.
M. Morris (Columbia) B. Elmegreen (Columbia) D. Elmegreen (Hale Observatories)	Study of CO in selected irregular galaxies.
P. Myers (MIT) R. Buxton (MIT)	Study of gas motions in dark clouds by CO emission.
R. Plambeck (Calif., Berkeley) R. Loren (Texas) R. Snell	Mesurement of CO 1-2 for comparison with measurements at Texas of the 2-1 CO lines.
L. Rickard P. Palmer	Continuation of the search for extended CO emission in spiral galaxies.

<u>Observer(s)</u>	<u>Program</u>
L. Rudnick (Minnesota) T. Jones (Minnesota) R. Fiedler (Minnesota) J. Puschell (Minnesota)	Polarization observations of extra-galactic radio sources.
P. Schwartz (NRL)	Observations of thermal emission from dust at 2 millimeters.
B. Wilking (Arizona) C. Lada (Arizona)	Study of self reversed CO lines from dark clouds.
E. Wright (MIT)	Maps of CO emission from far IR sources.
B. Zuckerman (Maryland)	Search for CO emission from stars in the IR 2 micron catalogue.

The Very Large Array

The array was scheduled for observations 55 percent of the time in the fourth quarter of 1979. Forty-one percent of the time was devoted to astronomical observing and the remaining 14 percent to instrumental development and tests. Approximately 19 percent of the observing time was lost to instrumental problems. The following research programs were conducted with the VLA during this quarter.

<u>Observer(s)</u>	<u>Program</u>
B. Balick (Washington) P. Crane T. Heckman (NFRA, Leiden)	Synthesis of Seyfert galaxies. 6 and 20 cm.
R. Becker (NASA, Greenbelt)	SNR G21.5-09. 6 and 21 cm.
R. C. Bignell E. R. Seaquist (Toronto)	SNR in NGC 4449. 2, 6, and 21 cm
A. Bridle (Queen's) E. Fomalont J. Hogbom (Stockholm Observatory) A. Willis (NFRA, Zwiggelte)	3C 315. 2 cm.
B. Burke (MIT) D. Roberts (MIT)	Double quasar 0957+561. 2, 6, and 20 cm.
J. Burns S. Gregory (Bowling Green SU)	4C sources in poor Zwicky clusters. 20 cm.

<u>Observer(s)</u>	<u>Program</u>
J. Condon J. Mitchell (Penn State) P. Usher (Penn State)	Optically selected QSO's; K optical variables. 6 cm.
M. Felli (Arcetri) N. Panagia (Laboratorio di Radio Astronomia, Bologna)	Massive stars undergoing mass loss. 6 cm.
E. Fomalont A. Bridle (Queen's)	X-ray cluster Abell 2256. 6 and 20 cm.
B. Geldzahler (MIT) E. Fomalont	Central region of Fornax A. 6 and 20 cm.
R. Genzel (Center for Astrophys.) J. Moran (Center for Astrophys.) D. Downes (MPIR) M. Reid (Center for Astrophys.)	Very compact HII regions towards OH/H ₂ O maser sources. 6 and 2 cm.
D. Gibson (New Mexico Tech)	Antares. 6 and 20 cm.
A. Haschick (Center for Astrophys.) P. Crane J. van der Hulst (Minnesota)	Neutral hydrogen absorption in NGC 1275. 21 cm line.
D. Heeschen J. Wrobel (Toronto)	Active E/SO galaxies. 2, 6 and 21 cm
D. Heeschen D. Hogg H. Arp (Hale Observatories)	Maps of fields around seven interesting galaxies. 6 and 21 cm.
R. Hjellming G. Miley (NFRA, Leiden)	Moving jets in SS 433. 1.3, 2, 6, and 20 cm.
P. Ho (Calif., Berkeley) A. Haschick (SAO)	Low mass star formation near HII regions. 6 and 20 cm.
W. Jaffe C. Perola (Milano, Italy) G. Gavazzi (Milano, Italy)	Bright spiral galaxies in nearby rich clusters. 21 cm.
H. Johnson (Lockheed) W. Cash (Calif., Berkeley)	Radio star astrometry. 6 cm.

<u>Observer(s)</u>	<u>Program</u>
K. Johnston (NRL) C. Wade D. Gibson	Radio star astrometry. 6 cm.
K. Johnston (NRL) S. Wyckoff (Arizona State) L. Rudnick (Minnesota) F. Ghigo (Minnesota)	Comparison of optical and radio structure of 3 low-redshift QSO's--0837-12, 0812+020 and 0736+014. 2, 6, and 20 cm.
P. Kronberg (Toronto) P. Biermann (MPIR)	High-z QSO's 0225-014 and 0642+44. 6 and 20 cm.
M. Kundu (Maryland) A. Rao (Maryland)	Solar active regions--simultaneous radio and x-ray observations. 6 and 21 cm.
M. Kundu (Maryland) E. Schmahl (Maryland) T. Velusamy (Maryland)	Gradual and rapid evolution of solar active regions. 6 and 20 cm.
K. Lang (Tufts) R. Willson (Tufts)	Solar active regions. 2, 6, and 20 cm.
P. Lindblad (ESO, Switzerland) A. Sandqvist (Stockholm Observatory) S. Jorsater (Stockholm Observatory)	Continuum study of barred galaxy NGC 1365. 6 and 20 cm.
K. Lo (Caltech) R. Brown K. Johnston (NRL)	Galactic center, the compact object. 6 and 20 cm.
C. Masson (Caltech)	Clusters of galaxies with complicated 151 MHz structure. 6 and 21 cm.
J. Moran (Center for Astrophys.) L. Rodriguez (Mexico)	NGC 6334S. 6 and 20 cm.
S. Neff (Virginia) R. Brown	Optical spectra vs radio structure of QSO's. 6 and 18 cm.
R. Newell (New Mexico Tech) R. Hjellming	Mapping of thermal star shells. 2 and 6 cm.
R. Perley A. Willis (NFRA, Zwiggelte)	NGC 6251. 20 cm.

<u>Observer(s)</u>	<u>Program</u>
R. Perley K. Johnston (NRL) P. Crane	Halo of Perseus A. 20 cm.
R. Potash (Brandeis) J. Wardle	4C 32.69--a quasar with a beam. 2 cm.
A. Readhead (Caltech) P. Wilkinson (Jodrell Bank) P. Napier R. C. Bignell	3C 48, 3C 138, 3C 147, 3C 245, 3C 309.1, 3C 380, and 3C 454.3. 1.3, 2, and 6 cm.
J. Roberts (Calif., Berkeley) R. C. Bignell G. Berge (Caltech)	Jovian Radiation Belts. 21 cm.
E. Seaquist (Toronto) W. Gilmore (Toronto)	SS 433. 1.3, 2, 6, and 20 cm.
D. Shaffer (Phoenix Corp.) R. Green (Caltech) M. Schmidt (Caltech)	Optically discovered quasars. 6 cm.
R. Sinha V. Rubin (DTM)	NGC 6217, a barred spiral. 20 cm.
J. Vallee (Queen's) A. Bridle (Queen's)	X-ray galaxy NGC 3862 = 3C 264. 20 cm.
J. van der Hulst (Minnesota) A. Rots	Stephan's Quintet. 21 cm.
J. van der Hulst (Minnesota) J. Young (Massachusetts) P. Freier (Minnesota)	z-distribution of nonthermal continuum radiation of edge-on galaxies. 20 cm.

ELECTRONICS DIVISION

Charlottesville

Work has commenced on millimeter-wave frequency doublers and one unit providing a minimum 2.5 mW from 140 to 150 GHz has been shipped to Tucson. A model of the multiplier operating at an input frequency of approximately 2 GHz has been constructed and is being evaluated to gain an understanding of the device. The goal of this project is to provide doublers giving sufficient power (>2 mW) for local oscillator use with cooled mixers in the 115-260 GHz range.

Work continues on both construction and development of cryogenically-cooled GASFET amplifiers in the 5 GHz range. Several units have been shipped to the VLA for second-stage use and more units are under construction for use at the VLA, Tucson, Green Bank, and Fort Davis, Texas. A noise temperature of 19 K, including an input isolator, has been achieved in a two-stage amplifier.

Investigation of a mathematical analysis method for evaluation of mixers by back-short vs. diode current data is continuing along with the investigation of improved mixers for the 70 to 115 GHz band.

Expansion of the VLBI Mark II processor and construction of the Model IV autocorrelator are continuing.

Green Bank

The 5-25 GHz upconverter/maser receiver for the 140-foot telescope is nearing completion. The dewar and cryogenic components have been assembled and cryogenic tests are in progress to determine the thermal load on the refrigerator and cool down time. The installation at the Cassegrain focus is planned for summer 1980.

The 300-1000 cooled upconverter/GASFET amplifier receiver for the 300-foot telescope is progressing and should be ready for use on the 300-foot telescope during the summer of this year.

The development of a maser for 40-50 GHz is continuing. A more suitable superconducting magnet has been designed and is being manufactured.

The 22 GHz focal plane measurement receiver is now almost assembled and will be evaluated on the 140-foot telescope for antenna surface measurements.

The IF section of the Model IV correlator is now complete and will be tested in conjunction with the digital section during February in Charlottesville. The current plan is to move both sections to Green Bank during March.

Tucson Electronics

New diodes for the 70-115 GHz band have been installed during this quarter. The receiver noise temperature over the band varies from 284 K SSB to 450 K SSB. We believe that the 284 K is the lowest receiver temperature obtained for a resistive mixer at 100 GHz.

During this quarter a path length modulator has been added to the system to suppress the standing waves that are troublesome in spectral line work. As a result we are able to frequency switch for small (up to 10 MHz) excursions in frequency. Residual baseline effects due to the receiver remain when frequency switching, and we hope to cure these in the near future.

The new cooled 2-mm receiver was tested on the telescope during this quarter. The noise temperature was 800 K SSB and the stability both for continuum and spectral line work was good. We now have a doubler that will give us coverage from 140-155 GHz, and this will enable us to abandon klystrons in this frequency range.

The He³ bolometer system has been delayed owing to a series of small vacuum leaks. The quasi optical bandpass filters that are essential for the optimum performance of this receiver are finished and have been tested. We have filters for the 1 mm, 2 mm and 3 mm atmospheric windows. The transmission of the filters varies from 0.9 for the 3 mm to 0.65 for the 1 mm. A new beam switching mechanism has been fabricated for this receiver and will shortly be tested.

ENGINEERING DIVISION

Design of a new spoiler reflector for the 140-foot Cassegrain house was completed and drawings sent to the shop for fabrication. Drawings for the 300-foot traveling feed system were completed and sent to the shop for fabrication. Additional checks and studies were made on the springs for the 140-foot brakes. Modifications to the deformable subreflector were completed and the unit was put in operation. The prototype cast aluminum surface plate was re-measured and the results evaluated. Assistance was provided in negotiating a contract for a new cover for the proposed 25-meter millimeter wave telescope. Routine engineering assistance was provided to operations and maintenance in Charlottesville, Green Bank, Tucson, and the VLA.

COMPUTER DIVISION

IBM 360/65

A new Memorex disk controller has arrived and will be installed soon. This will connect two I/O channels to four disks each rather than the present system of one channel to eight disks, plus another channel for error re-try.

VLA Post Processing

The Digital Equipment Corporation VAX 11/780 digital computer has been installed at the Edgemont Road building in Charlottesville and has been accepted. Post processing programs for the VLA and VLBI are being developed.

The post processing group's contingent of eight persons is complete, with people already at Charlottesville or offers accepted.

Green Bank

A "Pandora" terminal has been installed at Green Bank, connecting users there directly to the Pandora text editing facility of Charlottesville's IBM 360 computer. A Mod Comp Model II/25 digital computer with 64k 16 bit words of storage has been installed at the Green Bank lab building. This computer will be available to telescope users for further data analysis.

VERY LARGE ARRAY

The array was scheduled for observations and tests for approximately 55 percent of the time during the third quarter. The maximum number of antennas used for an astronomical observing program during the month of December was 19, increasing the number of interferometer baselines to 171. To date, 23 antennas have obtained first fringes. Our longest astronomically usable baseline is approximately 24 km. During the quarter the first VLA scientific spectral line research observation was completed.

On November 9, 1979, Antenna No. 28 was accepted from E-Systems. The completion of this phase of the construction was three weeks ahead of the schedule established in July 1976, and 16 months ahead of the original subcontract schedule.

Retrofitting of the new spectral line baseband systems was completed on the East arm and all but one rack on the North arm. The first retrofit of the new front end IF subsystem was started on Antenna 13 and will be implemented on all other antennas in 1980.

Procurement of additional terminals was started, for use with the Modcomp on-line systems in implementation of the final control center/maintenance center display system. The CLEAN algorithm, as implemented on the PDP-11/70, is proving a very successful system and is in heavy use. Procurement process is in the first stages for tape drives for the PDP-11 computers.

By the end of the fourth quarter of 1979, Phase IV Site & Wye construction work was 97 percent complete, and Phase V Site and Wye work was 75 percent complete.

The condemnation lawsuit for land acquisition was finally settled on November 20th by the payment of \$205,400 to the Registry of the U.S. Court.

PERSONNEL

Appointments

Jeffrey J. Puschell	Research Associate	10-01-79
Roger D. Blandford	Visiting Scientist	10-03-79
John M. Dickey	Assistant Scientist	10-15-79
Galen R. Gisler	Assistant Scientist	11-01-79
R. Craig Walker	Assistant Scientist	11-13-79

Terminations

Malcolm W. Sinclair	Electronics Engineer I	10-05-79
Bobby L. Ulich	Electronics Engineer I/ Head, Telescope Operations Division	12-07-79
Roger D. Blandford	Visiting Scientist	12-18-79

A list of Observatory reprints issued since January 1, 1979.

Series A

No.	Title	Author(s)	Journal
907	Isotope Abundance Anomalies in IRC +10216	P.G. Wannier R.A. Linke	<u>Astrophys. J.</u> , <u>225</u> , 130-137, 1978.
908	Neutral Hydrogen Absorption Within the Radio Galaxy 3C 178	A.D. Haschick W.A. Baan B.F. Burke	<u>Astrophys. J.</u> , <u>225</u> , 343-345, 1978.
909	Effects of Expanding Compact H II Regions upon Molecular Clouds: Molecular Dissociation Waves, Shock Waves, and Carbon Ionization	J.K. Hill D.J. Hollenbach	<u>Astrophys. J.</u> , <u>225</u> , 390-404, 1978.
910	Radiative-Transfer Effects and the Interpretation of Inter- stellar Molecular Cloud Obser- vations. I. Basic Physics of Line Formation	C.M. Leung	<u>Astrophys. J.</u> , <u>225</u> , 427-441, 1978.
911	VLBI Observations of III Zw 2	J.J. Wittels W.D. Cotton I.I. Shapiro	<u>Astrophys. J.</u> , <u>225</u> , L47-L48, 1978.
912	Observations of Strongly Deuterated Molecules: Impli- cations for Interstellar Chemistry	B.E. Turner B. Zuckerman	<u>Astrophys. J.</u> , <u>225</u> , L75-L79, 1978.
913	Star Formation in the Bright- Rimmed Molecular Cloud IC 1848 A	R.B. Loren H.A. Wootten	<u>Astrophys. J.</u> , <u>225</u> , L81-L84, 1978.
914	A Search for HDCO in Dark Clouds	P.E. Angerhofer G.S. Rossano W.T. Vestrand	<u>Astron. J.</u> , <u>83</u> , 1417- 1419, 1978.
915	Radio Sources in Globular Cluster Fields	R.T. Rood K.C. Turner S.J. Goldstein	<u>Astrophys. J.</u> , <u>225</u> , 804-807, 1978.
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