

NATIONAL RADIO ASTRONOMY OBSERVATORY  
Charlottesville, Virginia

Quarterly Report

July 1, 1982 - September 30, 1982

DEPARTMENT OF THE ARMY  
NATIONAL RADIO ASTRONOMY OBSERVATORY  
CHARLOTTESVILLE, VA.

NOV 02 1982

RESEARCH PROGRAM

<u>140-foot Telescope</u>	<u>Hours</u>
Scheduled observing	1513.00
Scheduled maintenance and equipment changes	237.00
Scheduled tests and calibration	350.50
Time lost due to: equipment failure	74.00
power	3.00
weather	1.00
interference	0.00

The following line programs were conducted during this quarter.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
B-384	M. Bell (Herzberg) H. Matthews (Herzberg) T. Sears (Herzberg)	Observations at 8.3 and 11.0 GHz to search for the molecule C <sub>6</sub> H.
M-193	T. Amano (Herzberg) B. Andrew (Herzberg) M. Bell (Herzberg) P. Feldman (Herzberg) H. Matthews (Herzberg)	Observations at 13.97 GHz to confirm the detection of the HCN dimer.
Z-42	C. Henkel (Calif., Berkeley) R. Saykally (Calif., Berkeley) L. Ziurys (Calif., Berkeley)	Observations in the range 697-726 MHz to detect and study rotationally excited $\Lambda$ doubling transitions of the CH molecule.
G-245	R. Giovanelli (NAIC) M. Haynes	Continued mapping of the southern section of the Magellanic Stream by the measurement of neutral hydrogen.
M-186	I. Mirabel (Puerto Rico) R. Morras (Puerto Rico)	Search for 21-cm hydrogen high-velocity clouds in the declination range $-40^\circ < \delta < -10^\circ$ .
M-189	D. Machnik (Illinois) M. Kutner (Rensselaer)	Continued studies of 3-cm carbon recombination lines in the reflection nebulae.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
H-176	R. Giovanelli (NAIC) M. Haynes	Observations at 21-cm of hydrogen calibration galaxies.
L-150	B. Ganzel (Minnesota) F. J. Lockman	Mapping of neutral hydrogen in the Mon OB1 and OB2 associations.
R-186	L. Rickard (Howard)	Observations at 3265 MHz to search for the $C^{+}200\alpha$ transition.
M-181	J. Bologna (NRL) D. Matsakis (USNO)	Observations at 3.2 GHz to search for red-shifted $CH_2O$ in A0235+164.
R-188	L. Rickard (Howard)	Observations at 1715 MHz to search for the $C^{+}284\alpha$ transition.
W-165	S. Federman (Texas) R. Willson (Tufts)	Observations at 3.335 GHz of CH in the direction of the Pleiades.
R-194	T. Bania (Boston) R. Rood (Virginia) T. Wilson (MPIFR, Bonn)	Continued studies of the $^3He^{+}$ hyper-fine line at 8.7 GHz.
J-170	R. Hobbs (NASA-Goddard) J. Hollis (NASA-Goddard)	Measurements near 10 GHz of QSO spectral lines at 6035 MHz of Comet Austin.

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

A - Arecibo 1000-ft	H - Hat Creek 85-ft
B - Effelsburg MPIFR 100-m	K - Haystack 120-ft
C - Algonquin 150-ft	O - Owens Valley 130-ft
F - Fort Davis 85-ft	So - Onsala 20-m
G - Green Bank 140-ft	Yn - Socorro n = 1 - 27 x 25-m

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
T-1V	J. Taylor (Princeton) J. Weisberg (Princeton)	Observations at 18-cm to measure the parallaxes and proper motions of pulsars, with telescopes A, O, and G.
P-33V	H. Aller (Michigan) R. Mutel (Iowa) R. Phillips (Haystack)	Observations at 6 cm of the apparent superluminal expansion of BL Lac, with telescopes B, F, H, K, O, and G.
M-25V	L. Baath (Chalmers) B. Corey (Haystack) D. Downes (IRAM, France)	Observations at 6 cm--one of the multifrequency sets of observations of the pairs of QSOs 1038 = 528A, B,

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
M-25V - continued		
	D. Emerson (IRAM, France) J. Marcaide (MIT) J. Romney (MPIFR, Bonn) G. Seielstad (Caltech) I. Shapiro (MIT) J. Webber (Haystack) W. Cotton	with telescopes B, F, K, O, So, Yn, and G.
J-19V	D. Jones (Caltech)	Observations at 6-cm to search for the superluminal motion in nearby galaxies, with telescopes A, F, K, O, and G.
W-16V	G. Seielstad (Caltech) S. Unwin (Caltech) J. Benson R. C. Walker	Observations at 6 cm of the superluminal motions in 3C 120, with telescopes A, B, F, K, O, So, Yn, and G.
L-16V	R. Linfield (Calif., Berkeley) S. Unwin (Caltech)	Observations at 6 cm to study the jet in 3C 111, with telescopes F, H, K, O, Yn, and G.
C-25V	M. Cohen (Clatech) D. Jones (Caltech) R. Moore (Caltech) T. Pearson (Caltech) A. Readhead (Caltech) G. Seielstad (Caltech) R. Simon (Caltech) S. Unwin (Caltech)	Observations at 6 cm to monitor the superluminal sources 3C 273, 3C 29, and 3C 345, with telescopes B, C, F, H, K, O, and G.
P-34V	R. Porcas (MPIFR, Bonn)	Observations at 2.8 and 6 cm of 3C 179, with telescopes B, K, O, Yn, and G.
U-10V	R. Linfield (Calif., Berkeley) R. Mutel (Iowa) R. Phillips (Haystack) S. Unwin (Caltech)	Observations at 6 cm of the milli-arcsecond structure of 3C 84, with telescopes B, F, K, O, Yn, and G.
Z-2V	R. Porcas (MPIFR, Bonn) A. Zensus (MPIFR, Bonn)	Observations at 2.8 cm of the compact cores associated with quasars 0833+65 and 1732+65, with telescopes K, O, and G.

The following pulsar observation was conducted during this quarter.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
T-166	P. Backus (NASA-Ames) R. Burkhardt (Massachusetts) J. Taylor (Princeton) M. Damashek	Observations in the range 320-400 MHz for an improved northern hemisphere pulsar survey.

The following lunar occultation observation was conducted during this quarter.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
G-254	S. Gottesman (Florida) F. Maloney (Villanova)	Observations at 114 MHz of the lunar occultation of the Crab Nebula.

<u>300-foot Telescope</u>	<u>Hours</u>
Scheduled observing	1983.50
Scheduled maintenance and equipment changes	224.50
Scheduled test and calibration	0.00
Time lost due to: equipment failure	4.25
power	0.00
weather	0.00
interference	0.00

The following line programs were conducted during this quarter.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
L-147	B. Lewis (Carter Obs.) P. Crane	Observations to complete the detection of and to study Shapley Ames Galaxies by the use of hydrogen-line observing techniques.
G-263	E. Grayzeck (Nevada, Las Vegas)	Studies of the hydrogen distribution across OB associations found in the Galaxy.
G-265	R. Giovanelli (NAIC) M. Haynes	Continued observations of hydrogen in galaxies found in clusters and super-clusters.
R-82	A. Rots	Measurements of neutral hydrogen distribution in large spiral galaxies whose angular diameters are $> 9 < 35$ arcminutes.
W-164	J. Dickel (Illinois) H. Rood (Inst. for Advanced Studies) B. Williams	Hydrogen observations of "compact groups" of galaxies.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
L-173	K. Lo (Caltech) W. Sargent (Caltech) K. Young (Caltech)	Attempt to detect hydrogen from dwarf galaxies in nearby groups of galaxies.

The following continuum programs were conducted during this quarter.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
B-339	J. Broderick (VPI & SU) B. Dennison (VPI & SU) J. Ledden (VPI & SU) S. O'Dell (VPI & SU) J. Condon H. Payne	Observations at 900 and 1400 MHz of low-frequency variables.
B-335	T. Balonek (New Mexico) W. Dent (Massachusetts) W. Knizel (Massachusetts) C. O'Dea (Massachusetts)	Polarization and flux-density measurements of variable radio sources at 2695 MHz.
A-59	H. Aller (Michigan) M. Aller (Michigan) R. Fanti (Bologna) A. Ficarra (Bologna) F. Mantovani (Bologna) L. Padrielli (Bologna)	Observations at 2695 MHz of low-frequency variable sources selected from the Bologna-Michigan program.

The following pulsar observations were conducted during this quarter.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
T-166	P. Backus (NASA-Ames) R. Burkhardt (Massachusetts) R. Dewey (Princeton) J. Taylor (Princeton) J. Weisberg (Princeton) M. Damashek	Observations in the range 340-410 MHz for an improved Northern Hemisphere pulsar survey.
C-195	J. Armstrong (JPL) V. Boriakoff (Cornell) J. Cordes (Cornell) J. Weisberg (Princeton) J. Dickey	Interstellar scintillation measurements at 340 MHz of a large sample of pulsars.

<u>36-foot Telescope</u>	<u>Hours</u>
Scheduled observing	338.50
Scheduled maintenance and equipment changes	13.25
Scheduled tests and calibration	1856.25
Time lost due to: equipment	2.00
weather	19.25
power	0.00
interference	0.00

The following line programs were conducted during this quarter.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
C-199	F. Clark (Kentucky) T. Troland (Kentucky) D. Johnson (NBS)	Systematic study of SiO maser processes.
D-132	S. DeGuchi (Nagoya) Y. Fukui (Nagoya) H. Suzuki (Kyoto)	Observations of para-formaldehyde in dark clouds.
D-133	W. Dent (Massachusetts) T. Balonek (New Mexico) R. Hobbs (NASA-Goddard)	Evolution of extragalactic radio sources at millimeter wavelengths.
F-084	Y. Fukui (Nagoya) S. DeGuchi (Nagoya) H. Suzuki (Kyoto) H. Ogawa (Nagoya)	Observations of HNC and HC <sub>3</sub> N in galactic molecular clouds.
S-241	S. Spangler W. Cotton	Multi-frequency monitoring of low-frequency variables.
T-162	B. Turner D. DeFrees (Molecular Research Institute) G. Loew (Stanford) S. McLean (IBM)	Search for interstellar HOCO+, HCNH+, and COH+.

#### Very Large Array

The quarter was scheduled 100% of the time.

Astronomical	1,576.2 hours	(71.2%)
Test	637.8 hours	(28.2%)

The average downtime was 5.3%.

The following research programs were conducted with the VLA during this quarter.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AA-17	D. Abbott (Colorado) J. Bieging (Calif., Berkeley) E. Churchwell (Wisconsin)	A distance-limited survey of mass loss from Wolf-Rayet stars. 6 cm.
AB-129	B. Burke (MIT) P. Greenfield (MIT) D. Roberts (Brandeis)	Monitoring double quasar 0957+561. 6 cm.
AB-156	J. Basart (Iowa State) C. Daub (San Diego State)	High-resolution $T_e$ structure of three planetary nebulae. 6 cm.
AB-165	J. Burns (New Mexico) T. Balonek (New Mexico) C. MacCallum (Sandia Labs)	Spectral index and polarization of the wide-angle tailed radio galaxy 1919+479. 6 and 20 cm.
AB-167	R. C. Bignell E. Seaquist	Monitoring the SNR in the galaxy NGC 4449. 6 and 20 cm.
AB-178	B. Balick (Washington) R. Hjellming R. C. Bignell	Planetary nebulae NGC 40, NGC 6543. 6 and 20 cm.
AB-181	J. Burns (New Mexico) J. Basart (Iowa State) D. De Young (KPNO)	Search for radio jets in extended sources with powerful cores. 6 cm.
AB-182	J. Burns (New Mexico) T. Balonek (New Mexico) E. Hummel (New Mexico)	Monitoring the cores of extended radio sources and spiral galaxies. 2, 6 and 21-cm.
AB-184	R. Brown	Recombination-line emission from quasars. 6 cm line.
AB-185	R. Brown	Quasar 3C 245. 6 and 18-cm line.
AB-186	J. Basart (Iowa State) M. Andrews (Iowa State) R. Lamb (Iowa State)	Scaled array observations of the center of W28. 20 cm.
AB-187	J. Bally (Bell Labs) A. Stark (Bell Labs)	21-cm HI emission from high-velocity molecular outflows. 21-cm line.
AB-188	R. Becker (VPI & SU)	Two Crab-like SNRs. 20 cm.
AB-193	B. Baud (Groningen) H. Habing (Leiden) J. Herman (Leiden)	OH/IR stars with very high mass loss rates. 6 cm.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AB-194	B. Burke (MIT) C. Bennett (MIT) C. Lawrence (MIT)	High-resolution observations of faint sources. 6 and 20 cm.
AB-195	V. Boriakoff (Cornell)	Exact position of new pulsar P1848+04. 20 cm.
AB-196	W. Baan (Pennsylvania) J. van Gorkom I. Mirabel (Puerto Rico) A. Haschick (Haystack)	Hydrogen absorption in IC 4553. 21-cm line.
AC-42	E. Churchwell (Wisconsin) D. Abbott (Colorado) J. Biegling (Calif., Berkeley) R. C. Bignell	Variability of fluxes and spectral indices of P Cyg, 9 Sgr, VI Cyg 9. 2 and 6 cm.
AC-52	J. Cordes (Cornell) J. Simonetti (Cornell) S. Spangler (Iowa) I. Wasserman (Cornell)	Rotation-measure fluctuations toward extragalactic radio sources. 6, 18, and 21 cm.
AC-53	J. Condon M. Condon (unaffiliated)	High-resolution radio surface photometry of eight face-on spiral galaxies. 20 cm.
AC-54	T. Cline (NASA-Goddard) U. Desai (NASA-Goddard) B. Teegarden (NASA-Goddard) R. Hjellming	Gamma-ray burst source fields. 6 and 20 cm.
AC-55	F. Cordova (Los Alamos) K. Mason (University College, London) R. Hjellming	Cataclysmic variable stars. 6 cm.
AD-62	I. de Pater (Arizona) D. Hunten (Arizona) J. Caldwell (SUNY, Stony Brook) T. Owen (SUNY, Stony Brook) W. Jaffe (Groningen) S. Gulkis (JPL)	Neptune and Uranus. 1.3 and 2 cm.
AD-70	G. Dulk (Colorado) G. Chanmugam (Louisiana State)	AM Herculis-type binary stars. 2, 6, and 20 cm.
AD-74	I. de Pater (Arizona) W.-H. Ip (MPIPA, Munich)	Radio source occultations by Comet Austin. 2, 6, and 20 cm.



<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AD-78	J. Dickey	HI absorption in bright spiral galaxies. 21-cm line.
AD-80	J. Dickel (Illinois) R. Fesen (NASA-Goddard) W. Straka (Jackson State)	Filaments in the Cygnus Loop. 18-cm line.
AD-81	J. Dickel (Illinois) S. D'Odorico (ESO, FRG)	Supernova remnants in M31. 6 cm.
AD-82	I. de Pater (Arizona)	Jupiter patrol. 6 and 20 cm.
AE-13	J. Eilek (NMIMT) F. Owen J. Burns (New Mexico) C. O'Dea (Massachusetts)	Wide-angle tail radio galaxies: 3C 465. 6 cm.
AE-15	R. Ekers C. Fanti (Bologna) R. Fanti (Bologna) P. Parma (Bologna)	Low-luminosity radio galaxy B2 1637+29. 20 cm.
AE-16	R. Ekers N. Killeen (Mt. Stromlo) G. Bicknell (Mt. Stromlo)	Jet radio galaxy 1333-33. 6 and 20 cm.
AF-46	E. Feigelson (MIT) G. Clark (MIT) J. Dreher (MIT)	Hercules A = 3C 348. 6 and 20 cm.
AF-50	E. Fomalont E. Feigelson (MIT) G. Miley (Leiden) C. Canizares (MIT)	3C 318.1, a steep spectrum, extended source. 6, 18, and 20 cm.
AF-53	E. Feigelson (MIT) H. Bradt (MIT)	Spectrum of an unusual X-ray object, H0323+022. 1.3, 2, 6, and 20 cm.
AG-85	D. Garrett (Texas) J. Douglas (Texas)	Low radio-frequency variables from the Texas survey. 6 cm.
AG-95	A. Gower (Victoria, Canada)	Halo of quasar 4C18.68. 20 cm.
AG-97	R. Gaume (Iowa) R. Mutel (Iowa) J. Fix (Iowa)	Dynamics of the star formation region G351.78-0.54. 1.3 and 6-cm line.
AG-98	S. Guilloteau (Grenoble) D. Downes	Ammonia absorption toward W3(OH). 1.3 cm line.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AG-100	D. Gibson (NMIMT) P. Palmer (Chicago) C. Wade T. Bania (Boston) L. Snyder (Illinois)	Continuum and OH observations of Comet Austin. 1.3, 2, 6, and 18 cm and 6 and 18-cm line.
AH-80	E. Hummel (New Mexico) M. Zeilik (New Mexico)	A selected area in M31. 20 cm.
AH-89	P. Ho (Calif., Berkeley) A. Haschick (Haystack) J. Moran (CFA) L. Rodriguez (Mexico)	Position and proper motion of H <sub>2</sub> O masers associated with Herbig-Haro 1. 1.3-cm line.
AH-98	B. Hine (Minnesota) A. Rots	High-resolution HI observations of M81. 21-cm line.
AH-99	R. Hjellming R. Newell	Sco radio source. 6 (20, 2) cm.
AH-102	E. Hummel (New Mexico) C. Kotanyi (ESO, FRG) J. van Gorkom M. Philips (CTIO, Chile) A. Turtle (Sydney)	Peculiar radio structure in the spiral galaxies N2992 and N4388. 20 cm.
AH-103	C. Henkel (Calif., Berkeley) T. Wilson (MPIR, Bonn)	H <sub>2</sub> CO absorption toward W51 (G49.5-0.4). 6-cm line.
AI-13	F. Israel (ESTEC, Netherlands) J. van der Hulst (NFRA, Netherlands) K. Edgar (Minnesota)	The peculiar galaxy NGC 1569 (VII Zw 16). 6 and 20 cm.
AJ-73	D. Jaffe (Chicago) C. Telesco (Hawaii)	Nearby spiral galaxies. 20 cm.
AK-47	S. Kwok (NRC, Canada) R. C. Bignell	AFGL 618--monitoring. 1.3, 2, 6, and 20 cm.
AK-63	G. Knapp (Princeton) D. Spergel (Princeton)	Monitoring of continuum flux of IRC+10216. 6 cm.
AK-68	A. Kafatos (George Mason) A. Michalistianos (NASA-Goddard) J. Hollis (NASA-Goddard)	R Aquarii. 6 cm.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AK-69	M. Kundu (Maryland) D. McConnell (Maryland) E. Schmahl (Maryland)	Solar active regions and flares. 2 and 6 cm.
AL-43	R. Laing	Hot spots in luminous extragalactic radio sources. 2 and 6 cm.
AL-45	K. Lang (Tufts) R. Willson (Tufts)	Coronal loops and decimetric bursts. 20 cm.
AL-47	R. Laing G. Pooley (Cambridge) J. Riley (Cambridge)	Rotation measure variations in the radio galaxy 3C 452. 17 and 22 cm.
AL-49	D. Lynden-Bell (Cambridge) G. Pooley (Cambridge) G. Reid (Cambridge)	The very rich cluster Abell 1689. 6 and 20 cm.
AL-50	L. Feretti (Bologna) P. Parma (Bologna)	Extended quasar B2 1320+29. 6 and 20 cm.
AM-39	L. Molnar (CFA) M. Reid (CFA) R. C. Bignell	Monitoring polarization of BL Lac objects. 2 and 6 cm.
AM-54	B. McLean (Queen's) V. Hughes (Queen's)	W U Ma stars. 2 and 6 cm.
AM-59	G. Miley (Leiden) T. Heckman (Maryland) W. van Breugel (KPNO) M. Ulrich (ESO, FRG)	Bright radio galaxies. 6 cm.
AM-60	R. Mutel (Iowa) D. Doiron (Iowa)	Polarization properties of RS CVn binaries. 6, 18, and 20 cm.
AM-62	J. Moran (CFA) L. Rodriguez (Mexico)	Positions of H <sub>2</sub> O masers in regions of mass loss outflow. 1.3 cm.
AM-63	M. Morris (Columbia) F. Youssef Zadeh (Columbia) D. Chance (Columbia)	Compact galactic center sources in the continuum arc. 2 and 6 cm.
AM-66	J. Moran (CFA) L. Rodriguez (Mexico) D. Backer (Calif., Berkeley)	Hydrogen absorption in NGC 6334B. 21 cm.
AM-69	P. Myers (CFA) P. Schwartz (NRL)	Stellar objects in Taurus molecular clouds. 6 cm.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AN-12	Nguyen-Q-Rieu (Meudon) A. Winnberg (Chalmers)	OH absorption in the continuum spectra of 3C 111 and 3C 123. 18-cm line.
AO-31	C. O'Dea F. Owen	Narrow angle tailed radio sources. 20 cm.
AO-33	M. Ondrechen (Minnesota) J. van der Hulst (NFRA, Netherlands)	Barred spiral galaxies NGC 1097, NGC 5236 (M83). 20 cm.
AO-34	F. Owen R. White (NASA-Goddard) J. Burns (New Mexico) C. O'Dea (Massachusetts)	Abell clusters of galaxies. 21 cm.
AP-57	G. Pooley (Cambridge) J. Leahy (Cambridge)	The extended radio galaxy 3C 66 B-polarization. 2, 6, and 20 cm.
AP-58	F. Gardner (CSIRO) J. Whiteoak (CSIRO)	Excited OH in the compact HII regions W3 (OH) and DR 21. 6-cm line.
AP-59	G. Pooley (Cambridge) J. Leahy (Cambridge) J. Riley (Cambridge)	Fine-scale structure in the galactic Faraday medium. 18 and 20 cm.
AP-60	P. Parma (Bologna) C. Fanti (Bologna) R. Fanti (Bologna) H. de Ruiter (Bologna)	Low-luminosity radio galaxies with small angular sizes. 20 cm.
AP-61	P. Palmer (Chicago) R. Rubin (NASA-Ames)	K3-50A. 1.3 and 2-cm line.
AR-67	L. Rudnick (Minnesota) T. Jones (Minnesota) J. Pedelty (Minnesota)	Compact sources--the effects of luminosity and spectral shape. 2 and 6 cm.
AR-68	A. Rots J. Forster (CSIRO) J. Whiteoak (CSIRO)	Ultra compact HII regions. 1.3, 2, and 6-cm line.
AS-79	S. Spangler (Iowa) W. Cotton	Monitoring low-frequency variables. 5, 14, 15, and 20 cm.
AS-80	R. Sramek J. van der Hulst (NFRA, Netherlands) K. Weiler (NSF)	Supernovae SN 1980 in NGC 6946 and SN 1979c in M100. 2, 6, and 20 cm.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AS-88	K. Sellgren (Caltech) R. White (Calif., Los Angeles) R. Becker (VPI & SU) S. Pravdo (Caltech)	Reflection nebulae. 6 and 20 cm.
AS-102	S. Spangler (Iowa) R. Laing	Radio galaxy 3C 192. 20 cm.
AS-109	M. Stevens (Calif., Berkeley) S. Kulkarni (Calif., Berkeley) C. Heiles (Calif., Berkeley)	Galactic magnetic field structure determined from extragalactic source rotation measures. 21-cm line.
AS-111	S. Spangler	Double radio sources. 6 cm.
AS-113	E. Seaquist (Toronto) M. Bell (NRC, Canada) R. C. Bignell	Stimulated recombination lines in M82 and NGC 253. 6 and 21-cm line.
AS-125	E. Skillman (Washington) B. Balick (Washington)	Nuclei of giant extragalactic HII regions. 6 cm.
AS-127	E. Seaquist (Toronto)	Symbiotic star survey. 6 and 20 cm.
AS-128	E. Seaquist (Toronto) N. Duric (Toronto) P. Crane R. C. Bignell L. Davis (KPNO)	NGC 3079. 6 and 20 cm.
AS-130	J. Stocke (Arizona) J. Burns (New Mexico)	B20800+24: A head-tail radio source in an extremely sparse region. 6 and 20 cm.
AS-131	R. Sopka (Maryland) B. Zuckerman (Maryland)	R Aquarii jet. 20 cm.
AS-132	R. Sramek L. Bothune (CFA) B. Balick (Washington)	0351+026, a Seyfert I? with strong neutral hydrogen. 20-cm line.
AS-133	A. Sandquist (Stockholm) P. Lindblad (Stockholm) S. Jorsater (Stockholm)	Weak radio galaxies: barred spiral NGC 1365 and cluster ellipticals 3309/11. 6 cm.
AS-135	D. Saikia (Tata Institute) C. Salter (Tata Institute) V. Kapahi (Tata Institute)	D2 doubles; classification checks. 2 and 6 cm.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AT-24	B. Turner H. Matthews (NRC, Canada) S. Kwok (NRC, Canada) A. Winnberg (Chalmers)	Central cavities in ultracompact HII regions. 2 cm.
AT-25	J. Turner (Calif., Berkeley) P. Ho (Calif., Berkeley)	Massive star formation regions in nearby spiral nuclei. 6 cm.
AU-12	J. Ulvestad A. Wilson (Maryland)	Narrow emission line X-ray galaxy NGC 2110. 2 cm.
AU-13	J. Ulvestad	3C 459, an N galaxy with young stars. 2, 6, and 20 cm.
AV-71	W. van Breugel (KPNO) G. Miley (Leiden) H. Butcher (KPNO) T. Heckman (Maryland) M. Ulrich (ESO, FRG)	Associated extended optical line emission with the radio galaxies NGC 708 and 3C 445. 6 and 20 cm.
AV-73	P. Veron (ESO, FRG) J. Roland (I.A.P., France)	Evolved steep spectrum radio galaxies. 20 cm.
AV-76	J. van der Hulst (NFRA, Netherlands) P. Crane D. Lawrie (Ohio State) H. Ford (Johns Hopkins)	Supernova remnant candidate near the nucleus of M51. 6 cm.
AW-56	C. Wade M. Perley	Monitoring optically flaring quasars 1156+295 = 4C 29.45. 1.3, 2, 6, and 20 cm.
AW-59	D. Weedman (Penn State) R. Sramek	Star burst objects. 6 cm.
AW-66	B. Wills (Texas) D. Wills (Texas)	Structures of broad emission line objects. 6 cm.
AW-70	J. Whiteoak (CSIRO) F. Gardner (CSIRO)	Formaldehyde clouds associated with Sgr B2. 6-cm line.
AW-73	J. Whiteoak (CSIRO) F. Gardner (CSIRO)	1612 and 1720 MHz OH absorption associated with the molecular cloud of Sgr B2. 18-cm line.
AW-76	G. Wynn-Williams (Hawaii) E. Becklin (Hawaii) N. Scoville (Massachusetts)	The 3-kpc disk of NGC 1068. 6 and 20 cm.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
VL-17	R. Linfield (Calif., Berkeley) S. Unwin (Caltech)	The 3C 111 jet. 6 cm. Single antenna VLB.
VM-25	J. Marcaide (MIT) I. Shapiro (MIT) B. Corey (Haystack) J. Webber (Haystack) D. Downes (IRAM, France) D. Emerson (IRAM, France) L. Baath (Chalmers) W. Cotton J. Romney (MPIR, Bonn) G. Seilestad (Caltech)	The QSO pair 1038+528A,B. 6-cm phased array VLB Mk III.
VP-34	R. Porcas (MPIR, Bonn)	Superluminal source 3C 179. 6-cm phased array VLB.
VU-10	S. Unwin (Caltech) R. Mutel (Iowa) R. Phillips (Kansas) R. Linfield (Calif., Berkeley)	3C 84--variations. 6-cm single antenna VLB.
VW-16	R. C. Walker G. Seielstad (Caltech) S. Unwin (Caltech) J. Benson	3C 120, superluminal motions. 6-cm phased array VLB.

#### ELECTRONICS DIVISION

Charlottesville - Construction of 15 GHz and 1.5 GHz amplifiers for the VLA continues. A new transistor, which has recently become available, has provided a 15 K reduction of noise temperature at 15 GHz; a noise temperature of 35 K is measured at band center for cooled amplifiers. Development of 23 GHz amplifiers has resulted in 50 K noise temperature and 7 dB gain for a single-stage amplifier at mid-band. A noise temperature of 100 K is expected for multiple-stage amplifiers over the 22.2 to 23.7 GHz band. A varactor-tuned, 4.9-6.1 GHz amplifier for VLBA use is under development in collaboration with F. Zea of the University of Madrid.

The eight-mixer, cooled 200-350 GHz receiver for the 12 meter telescope is being tested. The cryogenic performance of the separable cooled module system is satisfactory.

A noise temperature of 200 K, with 6 dB conversion loss, has been measured at approximately 115 GHz with superconducting tunnel junctions.

The design of an archives data storage facility for the VLA continues, along with the development of a high-density data recording system for the VLBA.

During this quarter ten visitors, including seven from foreign countries, visited the laboratory to discuss our work.

Green Bank - Construction of the four-feed 21-cm receiver, using room temperature FET's, is essentially complete. The receiver system is undergoing final test and will be installed on the 300-foot telescope early in the fourth quarter.

The 256-channel, 2 MHz per channel filter banks are complete. One unit has been delivered to Tucson; the other is being withheld in Green Bank pending tests of the Tucson unit. A report on these units is in press.

ERA Technology has delivered the two long-awaited ortho-mode transitions (OMT). We are pleased with the performance of the devices; however, there is some concern that teflon inserts used to trim the devices to specification may prove unreliable in thermal cycling. One of these devices will be integrated into a 3.3 GHz receiver during the next few quarters. A thermal transition for the OMT has been designed, constructed, and tested. The loss of this transition was not measurable.

The waveguide to coax transition of the above OMT, scaled to L-band, was tested. Isolation between the two polarizations was greater than 35 dB from 1.3 to 1.8 GHz.

All logic cards for the updated version of the digital continuum receiver have been built and tested. The digital and IF hardware will be integrated in the next two quarters. Software development on the HP 9826 for this project is in progress. The software system should also be ready in the first quarter of next year.

All RF components for the holographic measurement system are on order. Evaluation of various techniques for the back-end is in progress.

Design and construction of the interferometer RF and digital links is continuing.

Approximately 70% of the electrical design for the beam splitter for the 140-foot telescope is completed. This includes a Fortran program for analysis of the scattering as well as some preliminary tests of polarizing materials.

A workshop on interference control was held in September. It proved to be a useful forum for exchanging and generating thoughts on monitoring and living with interference.

Support for the installation of the new inter-site communication system was provided.

Construction and testing are continuing on the 5-25 GHz upconverter-maser receiver and on the inductosyn upgrade to the interferometer.



Socorro - The new design sub-reflector control system installed on antenna 12 last quarter is working and will be evaluated in 1983. Preliminary tests of the 327 MHz feed also installed on antenna 12 last quarter show that the beam size and location are as expected. Tests of interference in this frequency range show some signals generated by on-site computer terminals and sporadic short-duration bursts of external interference which become less frequent during the night. A retrofit program of the front-end dewar assembly to incorporate the 2 cm and 21 cm GASFET amplifiers constructed and tested in Charlottesville has been implemented, with five antennas completed this quarter. This retrofit program will continue through mid 1983. The K-band system is in the process of being retuned to optimize system performance at the  $\text{NH}_3$  line at 23.7 GHz. This project will be completed by the end of October. Excess attenuation in the west arm waveguide has been traced to previously damaged sections which have now been replaced.

Tucson - During this quarter the efforts of the electronics group have been mainly directed towards supporting the resurfacing project. During this period the telescope and control room have been recabled, the sterling mount has been provided with a linear servo and new subreflector, and simple, prime focus receivers at 3 and 1-2 mm have been fabricated to enable the first evaluation of the antenna.

The repackaging of the  $\text{H}_2^3$  bolometer system is progressing well, and the new 200-300 GHz receiver packaging has been started.

#### ENGINEERING DIVISION

The trial assembly of and modifications to the back-up structure for the new 12-meter surface was completed in Green Bank. The structure was disassembled and shipped to Tucson and assembled on the existing 36-foot pedestal.

Testing and modifications to the measuring template and reference jig were completed in Green Bank and the equipment and instruments shipped to Tucson for use in installing and setting the new 12-meter surface.

Design drawings for the mirrors and selection system for the 12-meter optic system were completed and turned over to the shop for fabrication and assembly.

Detail analysis of the 12-meter back-up structure, using test data, continued for use in setting the 12-meter surface.

Installation of the passive repeaters for the interferometer addition was completed. The antenna structure was delayed and is now scheduled for delivery during the next quarter.

## COMPUTER DIVISION

Charlottesville

Data Communications - The new digital communications system has been installed and is working between Charlottesville and Green Bank and between the VLA site and Socorro. Linkages between other NRAO sites are not yet available, nor is data routing through one of the presently working sites to a third site. Work is proceeding in clearing up existing problems and completion of installation.

IBM - UNIX is being investigated for use on the IBM. At present UNIX runs under IBM's VM system and along side a version of OS (IBM batch system) and CMS (IBM's interactive system).

UNIX may be attractive both for supporting general computing and also for running AIPS. Large parts, but not all, of AIPS currently run on the IBM under OS. Its support is difficult. UNIX may be more attractive for this. AIPS currently runs under UNIX at the University of Texas; we have obtained a copy of their version.

POPS - Work continues on making POPS available on the IBM computer. This task is 75-80% complete.

AIPS - On September 15, 1982, the AIPS group initiated a software update schedule tied to the publication dates of the AIPSLETTER. Every other month on the 15th, the software in the Charlottesville test areas ("NEW") will be copied to the "OLD" areas in Charlottesville and the "NEW" areas at the VLA. After about ten days of additional testing to correct any major bugs, this copied version will be frozen and used as the version to be transported to any non-NRAO sites requesting a current copy of AIPS. The new update system provides numerous benefits, including better documentation, better agreement between the versions running on NRAO's various computers, and better definition of the versions running at the non-NRAO sites.

Socorro

It is now possible to write a database on the PDP-11/70 (SORTER) using the archive tape created on the synchronous system. This is available for testing purposes for both continuum and spectral-line data. It is now possible, therefore, to make maps using most of the software and hardware that will eventually be used in the final pipeline system. The utility to back-up and restore the SORTER databases has also been implemented.

Also on the pipeline project, the preliminary development of the graphics system has begun. The image display device for this has been received.

Two of the changes to AIPS have helped the operation at the VLA. A gripe facility available to the astronomical user eases the problem of communication with the programmers. The tasks which make heavy use of the array processor on the VAX have been modified to improve the scheduling of this device.

## PERSONNEL

New Hires

Edsko Hummel	Visiting Research Associate	06/30/82*
Adair P. Lane	Research Associate	07/12/82
Dan R. Stinebring	Research Associate	07/27/82
Stephen P. Reynolds	Research Associate	08/02/82
Graham G. Moorey	Visiting Electronics Engineer I	08/16/82

Terminations

Magne B. Hagstrom	Electronics Engineer I	07/20/82
David Burstein	Research Associate	07/23/82
Alan Tubbs	Research Associate	08/13/82
Steven R. Spangler	Associate Scientist	08/20/82
Alan H. Bridle	Visiting Scientist	08/20/82
Willem A. Baan	Visiting Assistant Scientist	08/31/82
John R. Dickey	Associate Scientist	08/31/82
Edwin Grayzeck	Visiting Associate Scientist	09/01/82
Jerzy Machalski	Visiting Scientist	09/10/82

Return from Leave of Absence

Walter Jaffe	Systems Scientist	08/02/82
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\*not included in previous report