NATIONAL RADIO ASTRONOMY OBSERVATORY
Charlottesville, Virginia

January 1, 1984 - March 31, 1984

RESEARCH PROGRAMS

140-foot Telescope		Hours
Scheduled observing		1931.25
Scheduled maintenance and equipment changes		126.25
Scheduled tests and calibration		61.00
Time lost due to:	equipment failure	47.75
	power	8.00
	weather	179.25
	interference	0.00

The following continuum programs were conducted during this quarter.

No.	Observer	Program
U15	J. Uson (Princeton) D. Wilkinson (Princeton)	Measurements at 19.5 GHz of the decrements in the cosmic microwave background toward several galaxies.
W179	R. Willson (Tufts)	Search at 23 GHz for the cooling of microwave background radiation in the direction of X-ray clusters of galaxies.
W185	D. Wilkinson (Princeton) J. Uson (Princeton)	Small-scale anisotropy measurements of the cosmic microwave background at 1.5 cm.

The following line programs were conducted during this quarter.

No.	Observer	Program
B408	W. Batrla R. Gusten (MPIR, Bonn) C. Henkel (MPIR, Bonn)	Observations of 2-cm H_2CO in the determination of H_2 densities in Taurus dark dust clouds.
B416	W. Batrla M. Bird (MPIR, Bonn) J. M. Hollis (Goddard) C. M. Walmsley (MPIR, Bonn)	Observations at 1.3 cm for H_2O and NH_3 in Comet Crommelin.

No.	Observer	Program
G270	R. Gusten (MPIR, Bonn) W. Batrla C. Henkel (MPIR, Bonn)	Observations of the $H_2{}^{12}CO$ (2_{11}-2_{12}) and $H_2{}^{13}CO$ (2_{11}-2_{12}) transitions in molecular clouds near the Galactic Center.
L184	R. Loren (Texas) L. Mundy (Texas) H. A. Wootten	Search at 24.4 and 24.8 GHz for the symmetric top molecules methyldiacetylene and methylcyanoacetylene.
M192	H. Matthews (Herzberg) C. Henkel (MPIR, Bonn)	Observations at 1.6 cm of the J=1→0 lines of SIS, and J=2→1 line of HC_3N in carbon stars.
M210	P. Myers (CFA) E. Churchwell (Wisconsin) D. Wood (Wisconsin)	Studies of the internal motions of dark clouds by observations of the J=2→1 line of HC_3N at 18.2 GHz and the (J,K)=(1,1) line of NH_3 at 23.7 GHz.
R212	M. Roberts R. Whitehurst (unaffiliated)	Spectral-line studies of galaxies, groups, and clusters at 21 cm.
S271	F. P. Schloerb (Massachusetts) W. Irvine (Massachusetts) C. McGunigle (Massachusetts) A. Molloy (Massachusetts)	Observations of 18-cm OH transitions in Comet Crommelin.
V46	P. Vanden Bout (Texas)	Search at 15.5 GHz for interstellar NH_2D emission in OMCI and dark clouds.
V47	P. Vanden Bout (Texas)	Search for 2-cm H_2CO emission from the Orion molecular cloud plateau source.
W180	R. Willson (Tufts) S. Federman (JPL)	Observations at 18 cm of OH in the direction of diffuse clouds.
W186	T. Wilson (MPIR, Bonn) R. Rood (Virginia) E. Wadiak (Virginia)	Observations of 2-cm H_2CO in the determination of H_2 densities in giant molecular clouds.
W188	T. Wilson (MPIR, Bonn) W. Batrla R. Rood (Virginia) E. Wadiak (Virginia)	Observations at 14.488 GHz of H_2CO emission from giant molecular clouds.

The following Very Long Baseline programs were conducted, and the stations used in the observations are coded as follows:

B - Effelsberg MPIR 100 m	I - Iowa 60 ft
C - Algonquin 150 ft	Jb - Jodrell Bank MK II
F - Fort Davis 85 ft	Jm - Jodrell Bank 250 ft
G - Green Bank 85 ft	Km - Haystack 120 ft
H - Hat Creek 85 ft	M - Brazil 20 m

N - NRL Maryland Pt 85 ft
O - Owens Valley 130 ft
R - Crimea USSR 30 m
Sk - Kirunda Sweden 60 ft
Sn - Onsala 20 m
So - Onsala 25 m
Wn - Westerbork n=1-14x26 m
Yn - Socorro n=1-27x25 m

No.	Observer	Program
A5V	W. Alef (MPIR, Bonn) R. Porcas (MPIR, Bonn) J. Romney	Phase reference mapping at 6 cm of two weak radio sources, with telecopes B, G, Km, N, O, Sn, and Wn.
B44V	J. Biretta (Caltech) M. Cohen (Caltech) S. Unwin (Caltech)	Observations at 1.3 cm of the super-luminal radio sources 3C 273 and 3C 279, with telescopes, B, C, G, Km, N, O, Sn, and Yn.
B52V	J. Biretta (Caltech) M. Cohen (Caltech) S. Unwin (Caltech)	Observations at 2.8 cm of the super-luminal radio sources 3C 273, 3C 279, and 3C 345, with telescopes B, F, G, H, Km, M, and O.
B53V	L. Baath (Manchester) R. Booth (Chalmers) D. Jones (Caltech) A. Readhead (Caltech)	Observations at 1.3 cm of the BL Lac objects Mk 421 and 0735+178, with telescopes B, C, G, Km, N, O, R, Sn, and Yn.
B382V	L. Baath (Chalmers) F. Briggs (Pittsburgh) M. Davis (Arecibo) K. Johnston (NRL) D. Jones (Caltech) B. Ronnang (Chalmers) S. Unwin (Caltech) A. Wolfe (Pittsburgh) J. Romney	Monitoring of the 932 MHz redshifted HI absorption line in AO 0235+164, with telescopes A, G, Jm, O, and Sk.
B385V	L. Baath (Chalmers) F. Briggs (Pittsburgh) M. Davis (Arecibo) K. Johnston (NRL) D. Jones (Caltech) B. Ronnang (Chalmers) S. Unwin (Caltech) A. Wolfe (Pittsburgh) J. Romney	Monitoring of low-frequency variables at 932 MHz, with telescopes A, G, Jm, O, and Sk.
C31V	J. Condon J. Broderick (VPI & SU)	Mapping a jet with known orientation in space, at 6 cm, with telescopes G, H, I, Km, N, O, and Yn.

No.	Observer	Program
D3V	P. Diamond (Chalmers) R. Booth (Chalmers) D. Graham (MPIR, Bonn) K. Johnston (NRL) R. Norris (Manchester)	Global VLBI observations at 1.3 cm of the H_2O masers associated with evolved stars, with telescopes B, G, Jb, Km, N, O, R, Sn, and Yn.
H8V	D. Hough (Caltech) A. Readhead (Caltech)	Mapping at 2.8 cm of the central components of the double-lobed quasar 3C 249.1, with telescopes B, F, G, Km, and O.
J28V	D. Jones (Caltech) S. Unwin (Caltech) A. Wehrle (UCLA) J. Wrobel (Caltech)	Very high-resolution observations of NGC 4278 at 1.3 cm, with telescopes B, G, Km, O, Sn, and Yn.
J31V	D. Jones (Caltech)	Observations at 2.8 cm of CTA 21, with telescopes F, G, H, Km, and O.
J32V	D. Jones (Caltech)	Sub-parsec measurements at 1.3 cm of radio structure of NGC 1052, with telescopes B, C, G, Km, N, O, Sn, and Yn.
L28V	J-F. Lestrade (JPL) J. Doiron (Iowa) K. Johnston (NRL) R. Mutel (Iowa) A. Niell (JPL) R. Phillips (Haystack) R. Preston (JPL)	Astrometric observations at 6 cm of a radio star, with telescopes B, G, O, and Yn.
L29V	C. Lawrence (Caltech) B. Burke (MIT) R. Booth (Chalmers) R. Porcas (MPIR, Bonn) R. Preston (JPL) A. Readhead (Caltech) R. Schilizzi (NFRA)	Strong-source survey at 1.35 cm, with telescopes B, G, K, O, Sn, and Yn.
M47V	R. Moore (Caltech) L. Baath (Manchester) A. Readhead (Caltech)	Observations at 1.3 cm of the structure and alignment of 3C 345, with telescopes B, C, G, Km, O, Sn, and Yn.
P44V	I. Pauliny-Toth (MPIR, Bonn) L. Baath (Manchester) R. Porcas (MPIR, Bonn) W. Sheng-Yin (MPIR, Bonn) A. Zensus (MPIR, Bonn) K. Kellermann	Observations of 3C 454.3 at 2.8 cm, with telecopes B, F, G, H, Km, and O.

No.	Observer	Program
P46V	T. Pearson (Caltech) A. Readhead (Caltech)	Second-epoch observations at 6 cm of a complete sample of radio sources > 1.3 Jy and $\delta > +35°$, with telescopes B, F, G, H, I, Km, O, and Yn.
P47V	R. Phillips (Haystack) R. Curry (Kansas) M. Hodges (Iowa) R. Mutel (Iowa)	Observations of CTD 93 at 2.8 cm, with telescopes B, F, G, Km, and O.
P55V	R. Porcas (MPIR, Bonn) F. Owen	Observations at 6 cm of very weak quasar cores, with telescopes B, G, and Yn.
P57V	T. Pearson (Caltech) A. Readhead (Caltech) S. Unwin (Caltech)	Observations at 2.8 cm of sources from the Pearson/Readhead survey, with telescopes B, F, G, H, Km, and O.
P58V	T. Pearson (Caltech) A. Readhead (Caltech)	Second-epoch observations at 6 cm of a complete sample of 20 radio sources, with telescopes B, F, G, H, I, Km, O, and Yn.
P59V	R. Porcas (MPIR, Bonn) I. Fejes (MPIR, Bonn)	Second-epoch observations at 2.8 cm of 1636+47, with telescopes B, G, Km, and O.
R27V	D. Roberts (Brandeis) L. Brown (Brandeis) B. Burke (MIT) D. Gabuyda (Brandeis) R. Potash (Brandeis) A. Rogers (Haystack) J. Wardle (Brandeis)	Linear polarization survey of extra-galactic radio sources at 6 cm, with telescopes B, F, G, Km, O, and Yn.
R28V	L. Rickard (Howard)	Observations at 2.8 cm of UGC 9114, with telescopes B, G, Km, and O.
W29V	J. Wrobel (Caltech) T. Pearson (Caltech) A. Readhead (Caltech)	Observations at 1.3 cm of very compact VLBI survey sources, with telescopes B, G, Km, O, Sn, and Yn.
W32V	G. de Waard (Leiden) G. Miley (Leiden) R. Schilizzi (NFRA)	Observations at 6 cm of jet interactions in the active nuclei of quasars, with telescopes B, G, Jb, O, So, and Yn.
W33V	G. de Waard (Leiden) G. Miley (Leiden) E. Preuss (MPIR, Bonn) R. Schilizzi (NFRA)	Observations at 6 cm of nonthermal/thermal relationships in the active nuclei of selected sources, with telescopes B, G, Jb, O, and So.

No.	Observer	Program
X22V	R. Mutel (Iowa)	Continued monitoring of outbursts from BL Lac at 2.8 cm, with telescopes B, F, G, H, Km, and O.
X23V	M. Claussen (Caltech)	Observations at 1.3 cm to detect water-vapor maser emission from the nucleus of the galaxy M106, with telescopes G, Km, and O.

300-foot Telescope	Hours
Scheduled observing	2057.25
Scheduled maintenance and equipment changes	110.75
Scheduled tests and calibration	0.00
Time lost due to: equipment failure	16.00
power	10.25
weather	6.25
interference	0.00

The following continuum programs were conducted during this quarter.

No.	Observer	Program
A59	H. Aller (Michigan) M. Aller (Michigan) R. Fanti (Bologna) A. Ficarra (Bologna) F. Mantovani (Bologna) L. Padrielli (Bologna)	Observations at 1400 MHz of low-frequency variable sources selected from the Bologna-Michigan program.
A72	D. Altschuler (Puerto Rico) J. Broderick (VPI & SU) B. Dennison (VPI & SU) K. Mitchell (VPI & SU) S. O'Dell (VPI & SU) J. Condon H. Payne	Measurements at 800 and 1400 MHz to determine the low-frequency spectra of compact sources.
B389	J. Broderick (VPI & SU) B. Dennison (VPI & SU) K. Mitchell (VPI & SU) S. O'Dell (VPI & SU) J. Condon H. Payne	Observations at 606, 880, and 1400 MHz of low-frequency variable sources.
B412	B. Burke (MIT) J. Hewitt (MIT) G. Langston (MIT) J. Mahoney (MIT)	Observations at 6 cm to continue the MIT-Green Bank survey at $\delta = 20° < \delta < 45°$.

No.	Observer	Program
B415	J. Broderick (VPI & SU) D. Altschuler (Puerto Rico) B. Dennison (VPI & SU) K. Mitchell (VPI & SU) S. O'Dell (VPI & SU) J. Condon H. Payne	Monitor low-frequency variable sources at 611, 800, and 1400 MHz.
E43	W. Erickson (Maryland) S. Ananthakrishnan (Tata) D. Bagri (Tata) H. Cane (Maryland)	Observations at 100, 200, and 327 MHz to study polarization and flux of low-frequency variable sources employing the interplanetary scintillation technique.
032	C. O'Dea T. Balonek (Williams C.) W. Dent (Massachusetts) W. Kinzel (Massachusetts)	Polarization and flux density measurements of variable sources at 2695 MHz.

The following line programs were conducted during this quarter.

No.	Observer	Program
H186	T. Heckman (Maryland) B. Balick (Washington) T. Carty (Maryland) G. Miley (Leiden) W. van Breugel (Arizona)	Search at discrete frequencies over the range 500-1400 MHz for HI absorption in quasars which have small-scale radio sources.
K289	G. Knapp (Princeton) H. Bushouse (Illinois) J. Gallagher (KNPO) S. Ratcliff (Princeton)	Survey of global HI emission from nearby early-type galaxies.
T159	T. Thuan (Virginia) J. Miller (Virginia)	Observations at 21 cm of the neutral hydrogen content of active galaxies.
T180	L. Ziurys (Berkeley) B. Turner	Search over the range 700-725 MHz for the $\pi_{3/2}$, J = 3/2 multiplet of CH.

The following pulsar program was conducted during this quarter.

No.	Observer	Program
T178	J. Taylor (Princeton) R. Dewey (Princeton) G. Stokes (Princeton) J. Weisberg (Princeton)	Continuation of the northern hemisphere pulsar survey at 390 MHz.

12-Meter Telescope		Hours
Scheduled Observing		1513.75
Scheduled Maintenance and Equipment Changes		303.50
Scheduled Tests and Calibration		342.75
Time Lost Due to:	equipment	64.75
	weather	77.00
	power	0.00
	interference	0.00

The following line programs were conducted during this quarter.

No.	Observer	Program
A68	P. Ade (Queen Mary, UK) J. Radostitz (Oregon) W. Gear (Queen Mary, UK)	Bolometric observations at millimeter wavelengths.
B399	L. Blitz (Maryland) R. Mathieu (Berkeley)	Study of CO 2-1 emission from M31 and M33.
B411	A. Barrett (MIT) P. Ho (CFA) J. Jackson (MIT)	A survey of CO in star burst galaxies.
B413	R. Brown (Monash, Australia) P. Godfrey (Monash, Australia)	Search for interstellar C3O.
D133	W. Dent (Massachusetts) T. Balonek (Williams C.) R. Hobbs (Computer Tech. Assoc.)	Evolution of extragalactic radio sources at millimeter wavelengths.
G267	B. Geldzahler (NRL) H. Kuhr (Arizona)	Observations of the continuum flux of S5 objects.
H182	P. Huggins (New York)	Study of circumstellar envelopes in the 2-1 CO line.
H185	P. Huggins (New York)	Study of circumstellar envelope of IRC+10216.
K250	K. Kellermann A. Witzel (MPIR, Bonn)	Observations of optically bright quasars at 1 mm.
L176	H. Liszt P. Vanden Bout (Texas) R. Loren (Texas)	Search for an isotope of interstellar molecular water.
L180	C. Lada (Arizona) J. Stocke (Arizona)	Study of the molecular flow around AS 353A.
031	S. Odenwald (NRL)	Study of formation efficiency in star burst galaxies.

No.	Observer	Program
R164	L. Rickard (Howard) P. Bowers (NRL)	Search for radio emission at 1 mm from planetary nebulae.
R193	L. Rickard (Howard) P. Palmer (Chicago) M. Morris (UCLA)	Study of 2-1 CO emission from central sources in galaxies.
R202	L. Rickard (Howard) B. Turner	Observations of galaxies at 2-1 CO emission.
S241	S. Spangler (Iowa) W. Cotton S. Allendorf (Iowa)	Continuum observations of low-frequency variables.
S242	S. Spangler (Iowa) W. Cotton S. Allendorf (Iowa)	Continuum observations of low-frequency variables.
S262	H. A. Wootten R. Sahai (Caltech)	Observations of SiS lines in IRC+10216.
T177	J. Turner (Berkeley) W. J. Welch (Berkeley)	Large-scale map of CO outflow around W3(OH).
W175	W. J. Welch (Berkeley) S. Vogel (Berkeley) R. Plambeck (Berkeley) T. Kuiper (JPL) M. Wright (Berkeley)	Zero-spacing data for HCO+ observations of selected sources.
Z38	B. Zuckerman (UCLA)	Study of highly reddened, evolved stars and SS 433 at 1 mm.

VERY LARGE ARRAY

The quarter was scheduled 99.3 percent of the time.

Astronomical	1,607.0 hours	(73.6 percent)
Test	561.0 hours	(25.7 percent)

The average downtime was 4.91 percent.

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

No.	Observer	Program
AA28	D. Abbott (Colorado) H. Lamers (Utrecht) J. Bieging (Berkeley) E. Churchwell (Wisconsin) P. Wesselius (Leiden) F. Olnon (Leiden)	OB stars identified from IRAS and ground-based infrared surveys. 2, 6, and 20 cm.
AA30	H. Aller (Michigan) S. Reynolds	Mapping and polarimetry of 3C 58. 6 and 20 cm.
AA31	J. Armstrong P. Ho (CFA) A. Barrett (MIT) J. Jackson (MIT)	Continuum sources in the Sgr A molecular cloud. 20 cm.
AA33	R. Allen (Groningen) P. Atherton (Groningen) R. Tilanus (Groningen)	Star-formation regions in M83. 21-cm line.
AB129	B. Burke (MIT) J. Hewitt (MIT) D. Roberts (Brandeis)	Monitoring time variations in 0957+561. 2 and 6 cm.
AB167	R. C. Bignell E. Seaquist (Toronto)	Monitoring of the SNR in the galaxy NGC 4449. 6 and 20 cm.
AB182	J. Burns (New Mexico) T. Balonek (Williams C.) E. Hummel (MPIR, Bonn)	Monitoring the cores of extended radio sources and spiral galaxies. 2, 6 and 20 cm.
AB223	A. Bosma (Marseille, France) E. Athanassoula (Marseille, France)	The Sc galaxy NGC 2090. 21-cm line.
AB243	A. Bosma (Leiden) E. Athanassoula (Marseille, France) A. Rots J. van der Hulst (Westerbork) P. Crane	HI in the grand-design spiral galaxy M51 (NGC 5194). 21-cm line.
AB254	R. Becker (VPI & SU) D. Helfand (Columbia)	Supernova remnants far inside the solar circle. 20 cm.
AB257	J. Burns (New Mexico) D. Clarke (New Mexico) E. Feigelson (Penn State) E. Schreier (STSI)	The jet in Centaurus A. 2, 6, and 18 cm.

No.	Observer	Program
AB266	J. Bally (Bell Labs) N. Kylafis (IAS, Princeton)	Magnetic fields in molecular clouds. 6 cm.
AB269	J. Basart (Iowa State) J. Burns (New Mexico) D. De Young (KPNO)	Classical doubles with strong cores. 6 cm.
AB273	D. Branch (Oklahoma) J. Cowan (Oklahoma)	Spectral-index measurements of probable SNR in M83. 6 cm.
AB275	C. Beichman (JPL) C. Wynn-Williams (Hawaii) E. Becklin (Hawaii) G. Neugebauer (Caltech)	Extreme infrared, bright galaxies detected by IRAS. 6 and 20 cm.
AB276	C. Bennett (MIT) C. Lawrence (Caltech) J. Hewitt (MIT) B. Burke (MIT) E. Turner (Princeton)	Variability monitoring of the new gravitational lens 2016+112. 2 and 6 cm.
AB277	I. Browne (Caltech) D. Shone (Manchester) D. Walsh (Manchester) L. Rudnick (Minnesota)	Extended structure associated with the jet in 0800+608. 20 cm.
AB278	B. Burke (MIT) C. Bennett (MIT) J. Hewitt (MIT) C. Lawrence (Caltech)	Spectral indices and polarizations of sources from the MIT 5 GHz survey. 2 and 6 cm.
AC81	M. Claussen (Caltech) K. Lo (Caltech) J. van Gorkom	Monitoring of the flux of the compact source at the galactic center. 1.3, 2 and 6 cm.
AC91	J. Cordes (Cornell) J. Weisberg (Princeton) T. Hankins (Dartmouth)	Pulsar dynamic spectra and waveforms. 21-cm line.
AC93	G. Chanmugam (Louisiana State) G. Dulk (Colorado) T. Bastian (Colorado)	Magnetic white dwarfs in binaries. 2, 6 and 20 cm.
AC95	B. Clark	Search for a stellar wind from Sirius. 6 cm.
AC96	J. Condon P. Coleman (Pittsburgh)	Angular size distribution of sources fainter than S = 1 mJy at 20 cm. 20 cm.

No.	Observer	Program
AC97	P. Crane A. Haschick (MIT) W. Baan (Arecibo)	High-velocity HI clouds in 3C 178/ NGC 2377. 21-cm line.
AC105	R. Cameron (Mt. Stromlo) G. Bicknell (Mt. Stromlo) R. Ekers	Jet radio sources in southern clusters, 0449-17. 6, 18, and 20 cm.
AD86	H. Dickel (Illinois) A. Lubenow (Illinois) W. M. Goss A. Rots	The 2-cm H_2CO absorption toward W3(OH). 2-cm line.
AD90	J. Dickey (Minnesota) R. Perley	Survey of the first quadrant of the galactic plane. 20 cm.
AD94	I. de Pater (Berkeley) K. Weiler (NSF) R. Fanti (Bologna) C. Fanti (Bologna)	Polarization characteristics in variable radio sources. 2, 6, and 21 cm.
AD96	J. Danziger (ESO, FRG) W. M. Goss R. Ekers	PKS0521-36, a BL Lac object with optical jets. 6 cm.
AD100	I. de Pater (Berkeley) W-H. Ip (MPIA, FRG)	Radio-source occultations by Comet Crommelin. 6 and 20 cm.
AD111	I. de Pater (Berkeley) S. Gulkis (JPL) T. Owen (SUNY, Stony Brook) H. Smith (Texas)	Uranus. 2, 6, and 20 cm.
AD112	I. de Pater (Berkeley)	Jupiter patrol. 2, 6, and 20 cm.
AD113	I. de Pater (Berkeley) J. Dickel (Illinois)	Planetary atmosphere: Saturn. 6 cm.
AD114	G. Dulk (Colorado) T. Bastian (Colorado) O. Slee (CSIRO)	Flare stars in stellar clusters. 6 and 20 cm.
AD117	S. Drake (Colorado) J. Linsky (Colorado)	Radio-spectral indices for the giant α Her and β Gem. 1.3, 2, 6, and 20 cm.
AD124	I. de Pater (Berkeley) W-H. Ip (MPIA, FRG) F. P. Schloerb (Massachusetts)	Radio sources occulted by comets. 20 cm.

No.	Observer	Program
AD125	J. Dickel (Illinois) S. D'Odorico (ESO, FRG) A. Silverman (Illinois)	SNR in IC 613, NGC 6822, NGC 185. 6 and 20 cm.
AD126	S. Drake (Colorado) J. Linsky (Colorado)	Mass-loss rates from red giants and supergiants. 6 cm.
AD128	J. Dreher (MIT) W. J. Welch (Calif., Berkeley)	W43 and W51. 6 cm.
AD132	S. Drake (Colorado) J. Linsky (Colorado)	Long-period RS CVn binaries. 2 and 6 cm.
AE28	V. Escalante (CFA) P. Ho (CFA) A. Haschick (Haystack) L. Rodriguez (Mexico)	Accurate positions of H_2O masers associated with young objects. 1.3 cm line.
AE29	M. Elitzur (Kentucky) S. Drake (Colorado) J. Linsky (Colorado)	Search for warm chromospheric plasma in SiO maser stars. 6 cm.
AE30	R. Elston (Arizona)	Three interacting galaxies with extended radio emission. 20 cm.
AE31	R. Ekers W. M. Goss	NGC 5419 (1401-33). 2, 6, and 20 cm.
AF74	L. Feretti (Bologna) G. Giovannini (Bologna) L. Gregorini (Bologna)	The new, wide angle tail galaxy in A115. 20 cm.
AF76	E. Feigelson (Penn State)	Monitoring the enigmatic object H0323-022. 1.3, 2, 6, and 20 cm.
AF77	E. Feigelson (Penn State) J. Dreher (MIT)	Hercules A. 6 cm.
AG105	F. Gardner (CSIRO) J. Whiteoak (CSIRO) P. Palmer (Chicago)	Excited OH towards Sgr B2 and W49. 6-cm line.
AG115	G. Garay (Chile) L. Rodriguez (Mexico) J. van Gorkom	Two compact HII regions with very large radio recombination-line widths. 1.3 and 2-cm line.
AG116	D. Gibson (Colorado) W. Priedhorsky (LANL)	Monitoring Cyg X-1. 2, 6 and 20 cm.
AG125	B. Geldzahler (NRL) B. Rust (NBS)	Possible complementary QSOs. 6 cm.

No.	Observer	Program
AG126	F. Gardner (CSIRO) J. Whiteoak (CSIRO) V. Pankonin (NSF)	Continuum and H_2CO transition towards Sgr B2. 2-cm line.
AG136	E. Greisen H. Liszt	Galactic HI absorption toward extra-galactic continuum sources. 20-cm line.
AG139	D. Gibson (Colorado) D. Gary (Caltech)	Coordinated radio, optical and UV observations of three active stars. 2, 6, and 20 cm.
AG143	G. Giovannini (Bologna) L. Feretti (Bologna)	Nearby elliptical galaxies. 6 and 20 cm.
AG144	W. M. Goss S. Guilloteau (Grenoble) A. Baudry (Bordeaux, France)	2-cm formaldehyde in G10.6-0.4. 2-cm line.
AG152	R. Gaume (Iowa) R. Mutel (Iowa) J. Fix (Iowa)	Map of water-vapor masers toward G351.8-0.5. 1.3 cm.
AH100	T. Heckman (Maryland) B. Balick (Leiden) W. van Breugel (Berkeley) G. Miley (Leiden) J. Dickey (Minnesota)	HI in absorption and emission in NGC 3801 = 4C 17.52. 21-cm line.
AH119	J. M. Hollis (Goddard) A. Michalitsianos (Goddard) M. Kafatos (George Mason)	Temporal variations of R Aquarii radio jet. 2, 6, and 20 cm.
AH128	P. Ho (CFA) T. Rengarajan (CFA/Tata)	Thermal emission from luminous infrared sources. 1.3 and 2 cm.
AH134	L. Higgs (DRAO) T. Landecker (DRAO)	Spectral-index mapping of γ-Cygni nebula. 20 cm.
AH135	V. Hughes (Queen's)	Star-forming regions. 6 and 20 cm.
AH146	E. Hummel (MPIR, Bonn) P. Crane	Extended emission near compact core sources in spiral galaxies: NGC 5635 and NGC 6500. 6 and 20 cm.
AH147	L. Higgs (DRAO) J. Vallee (Herzberg)	A remarkable arc-like source in the galactic plane. 6 and 20 cm.
AH149	P. Hintzen (Goddard) F. Owen	Physically large QSO radio sources. 6 cm.

No.	Observer	Program
AH150	P. Ho (CFA) A. Haschick (Haystack)	NH_3 line studies of OB cluster G10.6-0.4. 1.3 cm line.
AH152	E. Hummel (MPIR, Bonn) W. Keel (KPNO)	The active central region of the spiral galaxy NGC 2655. 6 and 20 cm.
AH153	E. Hummel (MPIR, Bonn) C. Kotanyi	The central radio sources in NGC 4636 and NGC 4710. 20 cm.
AH154	S. Habbal (CFA) G. Withbroe (CFA) M. Kundu (Maryland) R. Shevgaonkar (Maryland)	Coronal bright point emission. 6 and 20 cm.
AH155	J. Hewitt (MIT) B. Burke (MIT) C. Lawrence (Caltech) C. Bennett (MIT) E. Turner (Princeton)	Two-frequency observations of gravitational lens candidates. 2 and 6 cm.
AJ101	W. Jaffe (STSI) T. Owen (SUNY, Stony Brook) J. Caldwell (SUNY, Stony Brook)	Thermal radiation from Titan. 2 cm.
AJ105	N. Jeske (Berkeley) M. Davis (Berkeley) M. Stevens (Berkeley)	Ring galaxies. 20 cm.
AJ107	N. Jeske (Berkeley) C. Heiles (Berkeley)	HI mapping of a supershell in NGC 55. 21-cm line.
AK81	M. Kundu (Maryland) R. Shevgaonkar (Maryland) E. Schmahl (Maryland)	Solar flares and active regions. 2 and 6 cm.
AK86	W. Keel (KPNO)	Galaxies with optically-selected jets. 6 and 20 cm.
AK90	P. Kronberg (Toronto) R. Sramek	Monitoring variable sources in M82. 2, 6, and 20 cm.
AK100	S. Kulkarni (Berkeley) A. Purvis (Cambridge, UK) W. M. Goss J. van Gorkom	Search for potential fast pulsar candidates. 20 cm.
AK101	U. Klein (MPIR, Bonn)	Radio morphology of blue compact dwarf galaxies. 6 and 20 cm.

No.	Observer	Program
AL68	K. Lang (Tufts) R. Willson (Tufts)	Coronal loops magnetic structure cyclotron lines and the triggering and evolution of bursts. 20 cm.
AL74	D. Lester (Texas) H. Dinerstein (Texas)	Hydrogen-poor planetary nebulae: Abell 30. 6 cm.
AL75	K. Lang (Tufts) R. Willson (Tufts) R. Pallavicini (Arcetri)	Thermal gyroresonance vs nonthermnal radio emission from active solar-type stars. 2, 6, and 20 cm.
AL77	C. Lonsdale (Penn State)	X-ray selected Abell clusters. 20 cm.
AM67	D. Meier (JPL) M-H. Ulrich (ESO, FRG) R. Preston (JPL) A. Wehrle (UCLA)	The central regions of extended radio galaxies. 2 cm.
AM71	I. Mirabel (Puerto Rico) A. Wilson (Maryland)	HI absorption and emission in highly inclined active galaxies. 20-cm line.
AM91	K. Meisenheimer (MPIR, FRG) H. Roeser (Arizona) M. Hawkins (Royal Obs.)	Sources from optical polarization studies. 2, 6, and 20 cm.
AM97	R. Mutel (Iowa) J-F. Lestrade (JPL)	Search for VLBI calibrator sources near radio stars. 6 and 20 cm.
AM104	M. Malkan (Caltech) G. Kojoian (Wisconsin) V. Yu. Terebizh (Sternberg) D. Dickinson (ITEK) M. Bicay (Stanford)	A complete sample of Markarian and Arakelian radio galaxies. 6 cm.
AM106	D. Muhleman (Caltech) G. Berge (Caltech)	Titan microwave spectrum. 1.3, 2 and 6 cm.
AM108	T. Menon (British Columbia)	Radio sources in compact groups of galaxies. 6 and 20 cm.
AM110	D. Murphy (MIT) P. Ho (CFA)	Mainline OH-maser survey of the galactic plane. 18-cm line.
AM111	J. Mariska (NRL) R. Stein (Michigan) G. Withbroe (CFA) M. Kundu (Maryland) P. Shevgaonkar (Maryland)	Solar chromospheric network elements. 2 and 6 cm.

No.	Observer	Program
AM112	I. McHardy (Leicester, UK) A. Smith (ESTEC, Netherlands) R. Perley	Simultaneous radio, infrared, optical and X-ray monitoring of X-ray selected active galaxies. 1.3, 2, 6, and 20 cm.
AM113	L. Miller (Royal Obs.) M. Hawkins (Royal Obs.)	A new sample of optically-selected QSOs. 6 cm.
AM114	S. Mufson (Indiana) M. McCollough (Indiana) J. Dickel (Illinois)	Filamentary structure in IC 443 and W44. 18 cm.
AM115	D. Muhleman (Caltech) G. Berge (Caltech) D. Rudy (Caltech) A. Niell (JPL)	Astrometric and physical observations of the Galilean satellites, II. 2 and 6 cm.
AN24	J. Nousek (Penn State)	E2000+223: a new SNR? 6 and 20 cm.
A045	S. Odenwald (NRL) K. Johnston (NRL)	The SNR-HII region association IC 433/S 249. 2 and 6 cm..
A047	C. O'Dea F. Owen	Constraints on the properties of bent beams. 6 cm.
A049	F. Owen C. O'Dea J. Burns (New Mexico) L. Smarr (Illinois)	Wide-angle tail sources. 6 cm.
AP65	M. Phillips (CTIO) J. Baldwin (CTIO) A. Wilson (Maryland) A. Turtle (Sydney)	The Seyfert galaxy NGC 5728. 6 and 20 cm.
AP71	R. Perley J. Dreher (MIT)	Cygnus A. 6 cm.
AP74	B. Peterson (Mt. Stromlo)	Complete QSO samples. 20 cm.
AP75	P. Palmer (Chicago) I. de Pater (Berkeley) C. Wade M. Schenewerk (Illinois) L. Snyder (Illinois) W. Altenhoff (MPIR, Bonn)	Search for OH emission from comet Crommelin. 18-cm line.
AR96	L. Rodriguez (Mexico) J. Canto (Mexico) J. Moran (CFA) G. Garay (Chile)	Spectral indices of compact radio sources associated with energetic outflows. 1.3, 2, and 6 cm.

No.	Observer	Program
AR100	S. Reynolds D. Gilmore (Massachusetts)	Filamentary stucuture in SN1006. 18 and 22 cm.
AR101	L. Rudnick (Minnesota) M. Sitko (Minnesota)	Radio spectra of non-polarized extra-galactic variables. 2, 6, and 20 cm.
AR103	R. Rusk (Toronto) E. Seaquist (Toronto) A. Yen (Toronto)	Brightness and polarization structure of sources with highly polarized compact cores. 6 and 20 cm.
AS79	S. Spangler (Iowa) W. Cotton S. Allendorf (Iowa)	Monitoring low-frequency variables. 1.3, 2, 6, and 20 cm.
AS80	R. Sramek J. van der Hulst (Westerbork) K. Weiler (NSF)	Monitoring SN 1980k in NGC 6946 and 1979c in M100. 6 and 20 cm.
AS166	J. Sulentic (Alabama) G. Byrd (Alabama) M. Valtonen (Alabama/Turku, Finland) S. Haarala (Turku, Finland)	Mapping of NGC 4319 and Markarian 205. 20 cm.
AS174	J. Simonetti (Cornell) J. Cordes (Cornell) S. Beckwith (Cornell) I. Wasserman (Cornell)	Faraday rotation through the molecular cloud L1551. 6 and 20 cm.
AS176	J. Simonetti (Cornell) J. Cordes (Cornell) S. Beckwith (Cornell) I. Wasserman (Cornell)	Faraday rotation through the molecular cloud near Cep A. 6 and 20 cm.
AS178	E. Seaquist (Toronto) M. Bell (Herzberg)	Recombination lines in Mkr 668 (=0Q208). 2 and 6 cm.
AS179	J. Stocke (Arizona) W. Christiansen (N. Carolina) C. Foltz (Illinois)	A search for environment effects on luminous radio galaxies. 6 and 20 cm.
AS184	E. Sadler (ESO, FRG) C. Kotanyi C. Jenkins (Royal Greenwich Obs.)	Survey of a complete sample of southern E and SO galaxies. 6 cm.
AS187	E. Seaquist (Toronto) A. Taylor (Toronto)	OH in symbiotic stars. 18-cm line.
AS189	R. Strom (NFRA)	The flat spectrum component in CTB 80. 2, 6, and 20 cm.

No.	Observer	Program
AS190	J. Schmitt (CFA) J. Bookbinder (CFA) L. Golub (CFA)	Identification of radio sources in the Pleiades Cluster. 20 cm.
AT41	B. Turner H. A. Wootten	Molecular jets from ultracompact thermal shell sources. 18-cm line.
AT46	J. Turner (Berkeley) W. J. Welch (Berkeley)	High-velocity water masers toward W3(OH). 1.3-cm line.
AT48	A. Taylor (Toronto) E. Seaquist (Toronto)	A radio jet in the symbiotic star SS96. 2 cm.
AU17	S. Unger (NRAL, UK) A. Pedlar (NRAL, UK)	The SO galaxy NGC 1218 (3C 78). 20 cm.
AU19	S. Unger (Manchester, UK) A. Pedlar (Manchester, UK)	NGC 6500 and NGC 5506. 20 cm.
AU20	J. Ulvestad A. Wilson (Maryland)	Seyfert 1.9 galaxies. 20 cm.
AV84	W. van Breugel (Arizona) R. Strom (NFRA) J. Dickel (Illinois)	Radio polarimetry of Tycho's SNR. 20 cm.
AV86	W. van Breugel (Arizona) T. Heckman (Maryland) G. Miley (Leiden) M. Ulrich (ESO, FRG)	Optical-line emission along the radio axes of two classical doubles. 20 cm.
AV91	W. van Breugel (Calif., Berkeley) P. Barthel (Leiden) W. Jaegers (Leiden)	The giant quasar 4C 34.47. 20 cm.
AV95	P. Vanden Bout (Texas)	6-cm H_2CO observations of the S88 molecular cloud. 6-cm line.
AV96	J. van der Hulst (Westerbork) R. Sramek K. Weiler (NSF)	Monitoring radio supernova in NGC 4258. 6 and 20 cm.
AV100	W. van Breugel (Berkeley) E. Fomalont R. Ekers	Fine structure in Fornax A. 20 cm.

No.	Observer	Program
AV102	W. van Breugel (Berkeleyd) T. Heckman (Maryland) G. Miley (Leiden) M. Ulrich (ESO, FRG)	Minkowski's object, working surface of a jet? 6 and 20 cm.
AV104	T. Velusamy (Tata)	The jet in the Crab nebula. 20 cm.
AW48	C. Wade K. Johnston (NRL) P. Seidelmann (USNO) G. Kaplan (ULSNO)	Astrometric observations of minor planets. 2 and 6 cm.
AW78	J. Wardle (Brandeis) R. Laing (Royal Greenwich Obs.)	Monitoring variability of the central components of extended radio sources. 2 and 6 cm.
AW85	A. Wilson (Maryland) J. Ulvestad	The magnetic field in the nuclear regions of NGC 1068 (3C 71). 2 cm.
AW95	A. Winnberg (Onsala) B. Baud (Groningen) H. Habing (Leiden) F. Olnon (Leiden) H. Matthews (Herzberg)	Survey of OH/IR stars close to the galactic center. 18-cm line.
AW98	J. Whiteoak (CSIRO) F. Gardner (CSIRO)	Mechanisms for populating the λ-doublet ground-state energy levels of OH in I.S. molecular clouds. 18-cm line.
AW105	R. Warwick (Leicester, UK) V. Stanger (Leicester, UK) J. Schwarz (CFA)	The early-type galaxies NGC 4636 and NGC 4649. 20 cm.
AW107	H. A. Wootten F. Bruhweiler (Catholic) R. Clegg (University College, UK)	Neutral circum-nebular gas in planetaries. 21-cm line.
AW108	A. Wehrle (UCLA) M. Morris (UCLA)	Vertical radio structure in the nuclei of normal spiral galaxies. 2 cm.
AY4	F. Yusef-Zadeh (Columbia) M. Morris (UCLA) D. Chance (Columbia)	The galactic center region. 6 and 20 cm.
VB54	D. Backer (Berkeley) R. Sramek	Compact sources near Sgr A. 6 cm.

ELECTRONICS DIVISION

Charlottesville

The development of a prototype 8.3 GHz VLBA front-end is proceeding with design of a cooled FET amplifier, cryogenics dewar, and control circuitry. Completion of the prototype is July 1, as expected.

A 115-GHz Schottky diode receiver has been completed and shipped to Tucson; a 230 K SSB receiver noise temperature is expected. Development of a 115-GHz superconducting junction receiver and mixers and frequency multipliers for 240 to 350 GHz is proceeding.

Development of a 12 Mb/s VLBA cassette recorder system continues.

Green Bank

Design continued for the spectral processor in the areas of single sideband mixers and the DFT pipeline. Evaluation tests were started on mixer components, flash analog/digital converters and fast RAMs. Arithmetic logic unit and multiplier chips were ordered for evaluation tests.

The MASSCOMP computer and hardware/peripheral options for the 300-foot project control computer were selected and will be ordered soon.

The last of three L-band receiver feeds was scaled for 1.30-1.36 GHz and is being fabricated by the Green Bank shop.

Assembly of the 2-5 GHz receiver reached about 40% of completion. The shop completed fabricating the 3.15-3.45 GHz feed for this receiver. Development continued on the 3-GHz FET amplifiers.

The system block diagram for the 5-GHz, 7-feed receiver, a dewar mockup, and some circuit design were completed. Major receiver components for several of the 14 channels will be ordered soon.

The 17-GHz link to the Monterville 14-meter element of the USNO interferometer has performed excellently. Assembly of the similar link to the Huntersville 45-foot element continued. A design study for a proposed tape, disc and computer replacement for the interferometer started this quarter and will end soon with a formal proposal to NRAO.

VLBA effort continued with preliminary LO design, L-band dewar design and ordering of some receiver parts and the orthomode transducers. The cooled amplifier development/test station was completed and used. A system to test five refrigerators and dewars for reliability was designed and parts were ordered.

Investigations into computer-aided design software for drafting, schematic and wiring list generation, and circuit design continued. After much effort, the microwave design program FARANT successfully transported to the lab MASSCOMP computer, which was installed this quarter.

Routine and unscheduled maintenance and RFI suppression at the telescopes, lab and site continued as a significant effort.

Tucson

During this quarter the 12-m telescope was returned to routine observing and the efforts of the electronics group have concentrated on support of the telescope.

The first observers to use the dual-channel, 230 GHz cooled-mixer receiver with the broad-band spectral-line system were plagued by bad baseline problems. The major cause of the problems was found to be noise on the local oscillator at the signal frequency. This noise was not terminated within the local oscillator injection system and was being radiated from the receiver towards the subreflector. A fraction of this noise power was scattered back into the receiver, interfering with the original noise, producing the strong baseline effects. A temporary solution was affected by modulating the path length between the subreflector and the receiver smearing the undesired effects over an integration period. A more permanent solution is being implemented in which the noise from the local oscillator at the signal frequency is terminated within the diplexer.

The 200-240 GHz receiver has been modified during this quarter to operate up to 270 GHz. Work is in progress to extend the range of the receiver to 300 GHz over the next six months.

The inductosyn electronics is nearing completion and will be installed during summer shutdown.

During this quarter, further mechanical and holographic measurements have been made on the antenna. The results of these measurements are being analyzed at the present time and further surface adjustments of the telescope are planned for May.

Due to a heavy workload, no progress has been made on either the 130-170 GHz cooled-mixer receiver or the new 90-120 GHz cooled-mixer receiver.

Socorro

The construction of one-half of the second master, local-oscillator system is complete. The new design subreflector drive system testing on Antenna 12 will continue into next quarter.

A 327-MHz, on-axis feed system and a new 327-MHz receiver utilizing the room temperature GaAsFET amplifiers received from the NRAO Central Development Lab were installed on Antenna 15. Testing of this new 327-GHz system is almost complete, and a review of some preliminary data indicates that the system performance will be acceptable.

Plans are being formulated for installation of a prototype 8 GHz receiver system for JPL's Voyager project.

Construction of the new antenna transporter maintenance facility is continuing and nearing completion. Ten antennas now have insulation installed to improve their pointing performance.

ENGINEERING DIVISION

An inhouse design and specification for a VLBA antenna were completed. Design and studies for mechanical modifications to the 140-foot telescope continued. Assistance was provided in the selection of materials and their installation to reduce the noise level in the 140-foot control room.

A contract for a new deformable subreflector for the 140-foot telescope was issued.

Final design for a limited north-south travel of the movable feed support system on the 300-foot telescope continued.

Assistance was provided the interferometer in bringing on-line the new 14.2-m telescope.

Data files and studies of prospective VLBA sites were expanded.

COMPUTER DIVISION

Interferometer - Work on integrating the 14.2-meter telescope is now complete. The software part of this work was done under contract.

AIPS Manual - A programmer's manual entitled "Going AIPS" has been nearly completed and exists in draft form. Bound copies should be available in the upcoming quarter.

Mass Store Device - A mass store system has been developed in which VLBA data may be put on video tapes in a way similar to that done in VLBI. The system is considered experimental. The software is currently being developed.

Digital Switch - A digital switch has been developed and is currently being installed in Charlottesville. The switch automatically switches a given terminal to the desired computer system at the appropriate site. One of these switches will probably eventully be installed at all NRAO sites.

Socorro

In the synchronous system, the system temperature correction for spectral-line data has been fully implemented. In additon, there is now a new observing mode available on-line to measure the extinction at K-band by using a tipping curve procedure.

For very weak sources, negative artifacts have been present in final images. This was due to the truncation of data in various programs and has now been completely corrected.

All of the existing mapping problems with the pipeline have been fixed. Several visiting observers have successfully made large numbers of spectral-line maps using the pipeline software. It is expected to use the pipeline as the default data path for observations early in the next quarter. The UVFITS program is now fully implemented, so now calibrated spectral-line data can be transferred to the AIPS systems much more conveniently and much faster than previously.

A new version of the DEC-10 operating system has been installed to make proper use of the new lineprinter. This has changed the control procedure for batch and tape handling, and the relevant changes to the user documentation are being made as quickly as possible.

VERY LONG BASELINE ARRAY

The decision has been made and approved to locate the VLBA Operations Center in Socorro, New Mexico. Studies and preliminary planning of building layout, location and cost are currently underway.

The decision has been made to locate the first antenna at Pie Town, New Mexico. The Pie Town site has been selected on land controlled by the Bureau of Land Management (BLM). The necessary steps to acquire a right-of-way from the BLM are being taken. Research and data collection are continuing for other sites.

A request for proposals (including specifications and drawings) for the design, manufacture, erection and testing of the ten antennas has been prepared and distributed to interested firms. Proposals are due in June, 1984.

Contract negotiations have been undertaken with the Northeast Radio Observatory Corporation (NEROC) for the design and prototype of the data acquisition and playback system for the VLBA. Contract negotiations are also underway with the California Institute of Technology for the VLBA correlator design and prototype.

PERSONNEL

New Hires

L. W. Batrla	Visiting Systems Scientist	01/03/84
G. A. Seielstad	Assistant Director, Green Bank Operations	01/10/84
J. J. Johovich	Scientific Programmer I	03/15/84

Rehires

R. F. Bradley	Electronics Engineer II	01/09/84
M. W. Pospieszalski	Visiting Electronics Engineer I*	01/16/84
R. H. Hill	Electronics Engineer III	03/05/84
A. N. Lasenby	Visiting Electronics engineer I	03/05/84

* Hired part time; full-time status expected mid May.

Terminations

R. J. Howard	Electronics Engineer I	01/20/84
J. M. Torson	Scientific Prog. Analyst II	02/17/84
R. H. Miller	Visiting Scientist	03/23/84

Change in Status

C. P. O'Dea	Research Assistant/Research Assoc.	02/06/84
F. Bierer	Plant Maintenance Supervisor/ Head, Plant Maintenance	02/01/84
R. L. Fleming	Purchasing Property Officer/ Business Manager, Green Bank Operations	02/01/84

Leave of Absence

M. A. Gordon	Assistant Director, Tucson Operations	02/01/84
R. J. Lacasse	Electronics Engineer I/Associate Division Head	03/01/84