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NATIONAL RADIO ASTRONOMY OBSERVATORY  
Charlottesville, Virginia

Quarterly Report

January 1, 1983 - March 31, 1983

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RADIO ASTRONOMY OBSERVATORY  
CHARLOTTESVILLE, VA.

MAY 04 1983

RESEARCH PROGRAMS

<u>140-foot Telescope</u>	<u>Hours</u>
Scheduled observing	1807.75
Scheduled maintenance and equipment changes	166.00
Scheduled tests and calibration	123.75
Time lost due to: equipment failure	43.75
power	5.00
weather	32.75
interference	12.75

The following line programs were conducted during this quarter.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
A-65	C. Albert (Naval Academy) L. Hobbs (Chicago) F. J. Lockman	Mapping of HI around high latitude stars.
A-66	L. Avery (Herzberg) N. Broten (Herzberg) J. MacLeod (Herzberg)	Observations over the range 19.6 - 21 GHz to search for carbon chain molecules in IRC+10°216.
B-361	W. B. Burton (Leiden) P. Lintel (Leiden)	Sensitive broadband survey of HI at $ b  \leq 20^\circ$ .
G-245	R. Giovanelli (Arecibo) M. Haynes	Continued mapping of the northern section of the Magellanic Stream by the measurement of neutral hydrogen.
G-261	V. Bujarrabal (Madrid) J. Cernicharo (Madrid) M. Guélin (IRAM)	Observations in the range 18.2-23.7 GHz to search for HC <sub>3</sub> N, HC <sub>5</sub> N, C <sub>4</sub> H, and NH <sub>3</sub> in four dense fragments of Heiles Cloud 2.
G-264	M. Gordon	Search for interstellar neutral hydrogen in the Bootes void.
G-266	J. Gallagher (Illinois) D. Hunter (KPNO)	Observations of HI toward a morphologically selected sample of Irr-Sd galaxies.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
H-172	P. Benson (MIT) C. Henkel (Bell Labs) P. Myers (CFA) T. Wilson (MPIR, Bonn)	Studies at 24 GHz of $\text{NH}_3$ , $\text{HC}_5\text{N}$ , and $\text{HC}_7\text{N}$ in the extended Taurus Complex.
H-176	R. Giovanelli (Arecibo) M. Haynes	Observations of hydrogen calibration galaxies at 21 cm.
H-179	R. Gusten (MPIR, Bonn) C. Henkel (Bell Labs)	Studies of $\text{H}_2\text{O}$ in 5 extended galactic molecular complexes at 22.2 GHz.
H-188	M. Haynes	Observations of neutral hydrogen in the vicinity of M95 and M96.
I-2	W. Irvine (Massachusetts) F. Schloerb (Massachusetts)	Observations at 18.398, 19.995, and 20.106 GHz to determine the $(\text{CH}_3\text{CN})/(\text{CH}_3\text{NC})$ and $\text{CH}_3\text{CN}/(\text{NH}_2\text{CN})$ ratios in cold interstellar clouds.
M-191	L. Avery (Herzberg) N. Broten (Herzberg) J. MacLeod (Herzberg)	Observations at 20.357, 20.657, and 24.429 GHz to confirm the detection of a new interstellar molecule $\text{CH}_3\text{C}_3\text{N}$ and to search for $\text{CH}_3\text{C}_4\text{H}$ in TMC-1.
M-192	C. Henkel (Bell Labs) H. Matthews (Herzberg)	Continued studies of SiS in IRC+10°216 at 18.184 GHz.
M-196	H. Matthews (Herzberg) T. Sears (Herzberg)	Studies of the $J = 1 \rightarrow 0$ transition of $\text{CH}_3\text{CN}$ at 18.4 GHz.
M-197	H. Matthews (Herzberg) T. Sears (Herzberg)	Search at 20.1 GHz for the $J = 1 \rightarrow 0$ transition of methyl isocyanide ( $\text{CH}_3\text{NC}$ ).
M-199	J. Dickey (Minnesota) K. Jahoda (Wisconsin) D. McCammon (Wisconsin) F. J. Lockman	Investigation of intermediate hydrogen-emission structure at high galactic latitudes.
M-201	L. Avery (Herzberg) N. Broten (Herzberg) J. MacLeod (Herzberg) H. Matthews (Herzberg)	Studies at 12.16, 19.79, and 24.33 GHz of low-lying rotational states of OCS and a search for $\text{OC}_4\text{S}$ in space.
M-203	M. Bell (Herzberg) H. Matthews (Herzberg) T. Sears (Herzberg)	Observations over a wide range of frequencies at X- and K-bands in an attempt to ascertain the species (possibly CH) responsible for an unusual spectral feature in the direction of Sgr B2.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
P-127	H. Payne	Observations of OH absorption by diffuse cold clouds in the direction of selected extragalactic sources.
R-196	L. Rickard (Howard)	Studies at 4550 MHz of $C^{+}179\alpha$ in bright HII regions.
R-197	L. Rickard (Howard)	Search at 807 MHz for the $C^{+}319\alpha$ transition.
T-158	T. Thuan (Virginia) J. Wadiak (Virginia)	Measurements of the neutral hydrogen content of active galaxies.
W-174	S. Federman (Texas) R. Willson (Tufts)	Observations of the $F = 1-1$ and $2-2$ $\Lambda$ doublet transitions of OH at 1665.4 and 1667.4 MHz toward the Pleiades.

The following continuum programs were conducted during this quarter.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
D-134	L. De Noyer (Colgate) J. Dodd (Colgate)	Observations at 320 and 360 MHz to obtain rotation measures of extragalactic radio sources and pulsars.
W-167	J. Uson (Princeton) D. Wilkinson (Princeton)	Measurements at 1.5 cm of the small-scale anisotropy of the cosmic microwave background.

The following occultation program was conducted during this quarter.

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

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

A - Arecibo 1000 ft	N - NRL 85 ft
B - Effelsberg MPIR 100 m	O - Owens Valley 130 ft
C - Algonquin 150 ft	P - Penticton, B.C. 85 ft
F - Fort Davis 85 ft	Sk - Kirunda, Sweden 60 ft
G - Green Bank 140 ft	Sn - Onsala 20 m
H - Hat Creek 85 ft	So - Onsala 25 m
I - Iowa 60 ft	Wd - Dwingeloo 25 m
Jm - Jodrell Bank 250 ft	Ws - Westerbork, 1 - 14x25 m
K - Haystack 120 ft	Yn - VLA, n = 1 - 27x25 m

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
B-382V	L. Baath (Chalmers) F. Briggs (Pittsburgh) M. Davis (Arecibo) D. Jones (Caltech) K. Johnston (NRL) J. Romney (MPIR) R. Ronnang (Chalmers) S. Unwin (Caltech) A. Wolfe (Pittsburgh)	Monitoring of the 932 MHz absorption line in AO 0235+164, with telescopes A, G, O, and Sk.
B-385V	L. Baath (Chalmers) F. Briggs (Pittsburgh) M. Davis (Arecibo) D. Jones (Caltech) K. Johnston (NRL) J. Romney (MPIR) B. Ronnang (Chalmers) S. Unwin (Caltech) A. Wolfe (Pittsburgh)	Monitoring of low-frequency variables at 932 MHz, with telescopes A, B, G, O, and Sk.
C-27V	J. Biretta (Caltech) M. Cohen (Caltech) D. Jones (Caltech) K. Lind (Caltech) R. Moore (Caltech) G. Seielstad (Caltech) S. Unwin (Caltech)	Monitoring at 2.8 cm superluminal sources, with telescopes B, F, G, H, I, K, O, and Yn.
E-4V	A. Eckart (MPIR, Bonn) K. Johnston (NRL) I. Pauliny-Toth (MPIR, Bonn) A. Witzel (MPIR)	High-resolution observations at 1.3 cm of 0212+73, 0454+84, 0716+71, 0836+71, with telescopes B, G, K, O, and Sn.
G-24V	B. Geldzahler (NRL)	Observations at 2.8 cm to monitor the position angle of the orientation of two objects in G127.11+0.54, with telescopes B, C, G, K, N, and O.
G-25V	B. Geldzahler (NRL) K. Johnston (NRL) J. Spencer (NRL)	Observations at 18 cm of the compact source at the galactic center, with telescopes G, K, N, and Yn.
H-5V	D. Hough (Caltech) A. Readhead (Caltech)	Mapping at 2.8 cm of the central components of the double-lobed quasars 3C 207, 3C 212, 3C 245, 3C 249.1, and 3C 334, with telescopes B, F, G, K, and O.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
J-24V	L. Baath (Chalmers) M. Cohen (Caltech) M. Ewing (Caltech) D. Fort (NRC) J. Galt (NRC) D. Jones (Caltech) R. Linfield (Caltech) R. Mutel (Iowa) I. Pauliny-Toth (MPIR, Bonn) T. Pearson (Caltech) R. Phillips (Haystack) A. Readhead (Caltech) J. Romney (MPIR, Bonn) R. Schilizzi (NFRA) R. Simon (NRL) S. Unwin (Caltech) P. Wilkinson (Manchester) A. Witzel (MPIR, Bonn) R. C. Walker	Observations at 18 cm to map NGC 6251 to search for a near nuclear counter-jet, with telescopes B, C, F, G, H, I, Jm, K, N, O, P, So, Wd, Ws, and Yn.
J-26V	B. Geldzahler (NRL) K. Johnston (NRL) R. Mutel (Iowa) R. Phillips (Haystack) J. Spencer (NRL) R. Perley	Survey at 18 cm of steep spectrum sources, with telescopes F, G, H, I, K, N, O, and Yn.
J-104V	M. Elvis (CFA) K. Johnston (NRL) S. Neff (NFRA) J. Spencer (NRL) J. Ulvestad	Observations of Seyfert galaxies at 18 cm, with telescopes G and N.
M-37V	F. Mantovani (Bologna) R. Porcas (MPIR) J. Romney (MPIR)	Observations at 2.8 cm of faint radio sources showing strong low-frequency variability, with telescopes B, F, G, K, and O.
M-38V	R. Mutel (Iowa) R. Phillips (Haystack)	Monitoring at 2.8 cm of BL Lacertae, with telescopes B, C, F, G, H, K, and O.
M-39V	H. Aller (Michigan) R. Mutel (Iowa)	Synthesis mapping at 1.3 cm of the "red" OSO 1413+135, with telescopes B, G, K, O, and Yn.
M-40V	R. Mutel (Iowa) R. Phillips (Haystack)	Search at 18 cm for compact doubles, with telescopes F, G, H, I, O, and Yn.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
M-42V	L. Baath (Chalmers) R. Moore (Caltech) A. Readhead (Caltech)	Studies at 22 GHz of the structure and alignment of 3C 345, with telescopes B, C, G, K, O, Sn, and Yn.
M-209V	R. Mutel (Iowa) J. Benson	Studies at 18 cm for interstellar turbulence using angular broadening of OH masers, with telescopes G and I.
P-39V	A. Eckart (MPIR, Bonn) K. Johnston (NRL) I. Pauliny-Toth (MPIR, Bonn) A. Witzel (MPIR, Bonn)	Observations at 2.8 cm of 0016+73, 0212+78, 0615+82, and 0836+71, with telescopes B, G, H, K, and O.
R-22V	W. Alef (MPIR, Bonn) N. Broten (Herzberg) I. Pauliny-Toth (MPIR) E. Preuss (MPIR, Bonn) J. Romney (MPIR, Bonn) K. Kellermann	Observations at 2.8 cm of the structural evolution in 3C 84, with telescopes B, C, F, G, H, K, N, and O.
S-25V	R. Mutel (Iowa) S. Spangler (Iowa) J. Benson	Observations at 1.3 cm of DA 193, with telescopes B, G, K, O, and Yn.
S-26V	R. Rusk (Toronto) E. Seaquist (Toronto) R. C. Bignell	Measurements at 18 cm of the SNR in NGC 4449, with telescopes G, O, and Yn.
T-3V	C. Gwinn (Princeton) J. Taylor (Princeton) J. Weisberg (Princeton)	Pulsar astrometry observations at 18 cm, with telescopes A, G, and O.
W-21V	P. Hintzen (Goddard) D. Shaffer (Interferometrics) D. Weistrop (Goddard)	Observations at 6 cm to investigate the milliarcsecond radio structure of the BL Lac object 1400+162, with telescopes B, F, G, K, O, and Yn.
X-8V	L. Molnar (CFA) M. Reid (CFA) J. Romney (MPIR, Bonn)	Observations at 18 cm to make a polarization map of M87, with telescopes B, F, G, K, O, and Yn.
X-9V	R. Mutel (Iowa) J. Lestrade (JPL)	Observations at 2.8 cm of the QSO 1739+522, with telescopes F, G, K, and O.
X-10V	J. Doiron (Iowa) D. Gibson (NMIMT) J. Lestrade (JPL) R. Mutel (Iowa) A. Neil (JPL) R. Preston (JPL) M. Slade (JPL)	Observations at 18 cm of UX Ari, HR 1099, and CTA 21, with telescopes G, I, O, and Yn.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
X-11V	N. Cohen (CFA)	Observations at 6 cm of 3C 196, with telescopes F, G, K, O, and Yn.
Z-3V	R. Porcas (MPIR, Bonn) A. Zensus (MPIR, Bonn)	Observations at 18 cm of the optically faint object 0026+34, with telescopes B, G, H, I, and O.

<u>300-foot Telescope</u>	<u>Hours</u>
Scheduled observing	2014.25
Scheduled maintenance and equipment changes	129.75
Scheduled tests and calibration	0.00
Time lost due to: equipment failure	11.50
power	5.50
weather	0.00
interference	4.00

The following continuum programs were conducted during this quarter.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
A-59	H. Aller (Michigan) M. Aller (Michigan) R. Fanti (Bologna) A. Ficarra (Bologna) F. Mantovani (Bologna) L. Padrielli (Bologna)	Observations at 1400 and 2695 MHz of low-frequency variable sources selected from the Bologna-Michigan program
B-335	T. Balonek (New Mexico) W. Dent (Massachusetts) W. Kinzel (Massachusetts) C. O'Dea (Massachusetts)	Polarization and flux density measurements of variable radio sources at 2695 MHz.
B-359	C. Bennett (MIT) B. Burke (MIT) J. Hewitt (MIT) C. Lawrence (MIT)	Survey at 6 cm for sources over the range $0^\circ < \delta < 20^\circ$ .
B-389	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.
H-178	D. Heeschen	Observations at 9 cm to study the variability of extragalactic radio sources.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
K-266	C. Aumann (Wisconsin) P. Chute (Wisconsin) J. Harlander (Wisconsin) G. Kojoian (Wisconsin) J. Muth (Wisconsin)	Observations at 4.7 GHz of those galaxies exhibiting strong ultra-violet continua and those of high surface brightness.

The following pulsar program was conducted during this quarter.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
T-166	R. Dewey (Princeton) J. Taylor (Princeton) J. Weisberg (Princeton) M. Damashek	Observations over the range 320 and 880 MHz for an improved northern hemisphere pulsar survey.

<u>36-foot Telescope</u>	<u>Hours</u>
Scheduled observing	238.75
Scheduled maintenance and equipment changes	1785.50
Scheduled tests and calibration	138.75
Time lose due to: equipment	1.50
weather	52.25
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>
G-267	B. Geldzahler (NRL)	Continuum observations of S5 survey objects.
H-177	J. Hollis (NASA-Goddard) P. Rhodes	Search for sodium hydroxide.
S-241	S. Spangler (Iowa) W. Cotton	Multi-frequency monitoring of low-frequency variables.
T-169	H. Thronson (Wyoming)	Search for molecules in NGC 7027 cloud.
W-168	P. Wannier (Caltech) S. Lichten (Caltech)	Effects of turbulence in dense clouds.

#### Very Large Array

The quarter was scheduled 99.2 percent of the time.

Astronomical	1561.0 hours	(72.3 percent)
Test	581.2 hours	(26.9 percent)

The average downtime was 8.34 percent.



The following research programs were conducted during this quarter.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AA-21	M. Andrews (Iowa State) J. Basart (Iowa State)	Rho Ophiuchi dark cloud. 6 and 20 cm.
AB-129	B. Burke (MIT) P. Greenfield (MIT) D. Roberts (Brandeis)	Monitoring double quasar 0957+561. 6 cm.
AB-182	J. Burns (New Mexico) T. Balonek (New Mexico) E. Hummel (MPIR, Bonn)	Monitoring the cores of extended radio sources and spiral galaxies. 2, 6, and 20 cm.
AB-186	J. Basart (Iowa State) M. Andrews (Iowa State) R. Lamb (Iowa State)	Center of W28. 6 cm.
AB-197	A. Barrett (MIT) J. Armstrong (MIT) J. Jackson (MIT) P. Ho (CFA)	NH <sub>3</sub> condensations in the Sgr A cloud. 1.3 cm line.
AB-198	F. Bash (Texas) M. Kaufman (Ohio State)	Giant HII regions, spiral structure, and supernova remnants in M81. 6 and 20 cm.
AB-200	A. Barrett (MIT) J. Armstrong (MIT) J. Jackson (MIT) P. Ho (CFA)	NH <sub>3</sub> absorption against Sgr A West. 1.3 cm line.
AB-201	B. Balick (Washington) B. Margon (Washington)	Search for an HI halo around NGC 1300. 21-cm line.
AB-204	T. Balonek (New Mexico) J. Burns (New Mexico) M. Zeilik (New Mexico) P. Smith (New Mexico) J. Puschell (Calif., San Diego) R. Barvainis (Massachusetts) J. Kenny (Massachusetts) C. Impey (Hawaii)	Simultaneous radio, infrared, and optical polarimetry of quasistellar objects. 2, 6 and 20 cm.
AB-205	J. Bally (Bell Labs) R. Snell (Massachusetts)	Ionized gas associated with molecular jets and OH objects. 2, 6, and 20 cm.
AB-206	J. Bally (Bell Labs) D. Matsakis (USNO) R. Snell (Massachusetts) R. Predmore (Massachusetts)	Mapping of H <sub>2</sub> CO and NH <sub>3</sub> in the disk associated with the bipolar HII region S106. 6-cm line.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AB-212	B. Burke (MIT) J. Mahoney (MIT) J. van der Hulst (NFRA, Neth.)	Neutral hydrogen in NGC 4038/39. 20-cm line.
AB-214	T. de Jong (Amsterdam, Neth.) P. Bowers (NRL)	Luminosity function of OH maser stars. 18-cm line.
AB-215	M. Birkinshaw (Cambridge, UK) R. Davies (KPNO)	Radio galaxies with known stellar dynamics. 6 cm.
AB-217	J. Bally (Bell Labs) A. Stark (Bell Labs)	High-velocity HI in NGC 2071. 21-cm line.
AB-219	R. C. Bignell	A possible planetary nebula in globular cluster M5. 6 and 20 cm.
AB-221	R. C. Bignell	The Dumbell nebula. 20 cm.
AB-222	A. Bosma (Leiden, Neth.) E. Athanassoula (Besancon Obs.)	The oval disk galaxy NGC 210. 20-cm line.
AB-226	W. Baan (Penn State) I. Mirabel (Puerto Rico) J. van Gorkom A. Haschick (Haystack)	HI emission in IC 4553. 21-cm line.
AC-64	J. Condon K. Mitchell (VPI&SU)	Deep survey. 20 cm.
AC-65	J. Condon J. Machalski (Jagiellonian, Poland)	Extended sources in GB/GB2 1400-MHz samples. 20 cm.
AC-66	P. Coleman (Pittsburgh) C. Hazard (Cambridge, UK) J. Condon	A region of high optical QSO density. 20 cm.
AC-69	R. Crutcher (Colorado) J. Bieging (Calif., Berkeley)	OH absorption line synthesis: Cas A. 18-cm line.
AD-83	L. Davis (KPNO)	Bright interacting galaxies. 6 cm.
AD-84	G. Dulk (Colorado) T. Bastian (Colorado)	The solar transition region and corona and major solar flares. 2 cm.
AD-85	I. de Pater (Arizona) D. Hunten (Arizona) J. Caldwell (SUNY, Stony Brook) J. Dickel (Illinois) T. Owen (SUNY, Stony Brook)	Planetary atmospheres: Jupiter. 1.3, 2 and 6 cm.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AD-89	G. Dulk (Colorado) T. Bastian (Colorado) G. Chanmugam (Louisiana State)	AM Herculis-type binary stars. 2 and 6 cm.
AD-94	I. de Pater (Arizona) R. Fanti (Bologna, Italy) C. Fanti (Bologna, Italy)	Polarization characteristics in variable radio sources. 2, 6, and 20 cm.
AD-102	J. Dreher (MIT) D. Roberts (Brandeis)	Does OJ278 vary with a period of 15 minutes? 1.3 and 2 cm.
AF-50	E. Fomalont E. Feigelson (Penn State) G. Miley (Leiden, Neth.) C. Canizares (MIT)	Steep spectrum radio galaxy 3C 318. 1.6 cm.
AF-55	J. Fix (Iowa) R. Mutel (Iowa) E. Churchwell (Wisconsin)	Search for extragalactic, Type II OH masers. 18-cm line.
AF-57	D. Florkowski (USNO)	Mass loss from RY Scuti. 2, 6, and 20 cm.
AF-58	J. Fix (Iowa) R. Mutel (Iowa) R. Gaume (Iowa)	Ammonia emission from G351.8-0.5. 18-cm line.
AG-95	A. Gower (British Columbia)	Halo of quasar 4C 18.68. 6 and 20 cm.
AG-101	B. Geldzahler (NRL) R. Rust (NBS)	Search for complementary quasars as a test of a closed universe. 20 cm.
AG-103	S. Gottesman (Florida) J. Ball (Florida) J. Hunter (Florida) J. Huntley (Bell Labs)	HI in barred spirals: NGC 3992, NGC 4731. 21-cm line.
AG-104	B. Geldzahler (NRL)	Some proposed galactic compact radio sources. 18 cm.
AG-106	S. Gottesman (Florida) J. Ball (Florida) J. Hunter (Florida) J. Huntley (Bell Labs)	HI observations of the barred spiral galaxy NGC 3359. 21-cm line.
AG-107	S. Gottesman (Florida) T. Hawarden (Royal Obs., Scotland)	HI observations of the peculiar southern galaxy NGC 5084. 21-cm line.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AG-109	B. Geldzahler (NRL) K. Johnston (NRL)	Flaring X-ray source 0323+022. 1.3, 2, 6 and 20 cm.
AH-99	R. Hjellming R. Newell (Scott Sci. & Tech.)	Alpha Sco radio sources. 2 and 6 cm.
AH-102	E. Hummel (MPIR, Bonn) C. Kotanyi J. van Gorkom M. Phillips (CTIO, Chile) A. Turtle (Sydney, Aust.)	Peculiar radio structure in the spiral galaxies N2992 and N4388. 6 cm.
AH-105	R. Hjellming M. Hjellming (Illinois)	M31 central source. 20 cm.
AH-112	E. Hummel (MPIR, Bonn) J. van der Hulst (NFRA, Neth.)	Spectral index distribution in NGC 253. 18 and 21 cm.
AH-114	H. Helfer (Rochester) J. Pipher (Rochester) C. Woodward (Rochester)	Star formation regions. 2 and 6 cm.
AI-15	R. Isaacman (Leiden, Neth.) H. Habing (Leiden, Neth.) I. Gatley (U.K. Infrared Tele.)	A radio survey of compact planetary nebulae. 6 cm.
AJ-84	D. Johnson (Battelle)	HI observations of the Fornax dwarf galaxies. 21-cm line.
AJ-86	C. Jones (CFA) D. Harris (CFA) W. Forman (CFA) F. Owen	Central dominant cluster galaxies. 6 and 20 cm.
AJ-89	N. Jeske (Calif., Berkeley) M. Davis (Calif., Berkeley) M. Stevens (Calif., Berkeley)	HI velocity mapping of dwarf irregular galaxy DD043. 21-cm line.
AJ-90	K. Johnston (NRL) P. Seidelman (USNO) C. Wade G. Kaplan (USNO)	Minor planet 10 Hygiea. 6 cm.
AK-47	S. Kwok (NRC, Canada) R. C. Bignell	AFGL 618, a nascent planetary nebula? 2, 6, and 20 cm.
AK-69	M. Kundu (Maryland) D. McConnell (Maryland) E. Schmahl (Maryland)	Active solar regions and flares. 2 and 6 cm.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AK-71	K. Kellermann D. Shaffer (Phoenix Corp.) R. Sramek	Deep search for Palomar bright quasars. 6 cm.
AK-76	P. Kronberg (Toronto) S. Button (Toronto) E. Zukowski (Toronto) K. Kim (Toronto) A. Boksenberg (Royal Greenwich Obs.)	Rotation measure survey. 2, 6, 19, and 22 cm.
AL-47	R. Laing G. Pooley (Cambridge, UK) J. Riley (Cambridge, UK)	Rotation measure variations in 3C 452. 2 and 6 cm.
AL-52	R. Laing J. van Gorkom	HI in NGC 5363. 20-cm line.
AL-54	T. Landecker (DRAO, Canada) S. Pineault (DRAO, Canada) D. Routledge (Alberta, Canada) F. Vaneldik (Alberta, Canada)	Search in an active stellar remnant in the SNR VRO 42.05.01. 6 and 20 cm.
AL-56	J. Linsky (Colorado) D. Gary (Caltech)	UV Ceti-type flare stars. 6 cm.
AL-57	J. Linsky (Colorado) S. Drake (Colorado)	Mass loss rates from late-type giant and supergiant stars. 2 and 6 cm.
AL-58	K. Lo (Caltech) K. Young (Caltech) W. Sargent (Caltech)	HI in nearby faint dwarf galaxies. 20-cm line.
AM-54	B. McLean (Queen's, Canada) V. Hughes (Queen's, Canada)	W UMa stars. 6 cm.
AM-68	P. Myers (CFA) M. Reid (CFA) P. Benson (MIT)	Ammonia emission study of star-forming regions. 1.3-cm line.
AM-72	L. Molnar (Harvard) M. Reid (CFA) R. C. Bignell	Polarization monitoring of BL Lac objects. 2, 6, and 20 cm.
AM-78	F. Marshall (NASA-Goddard) R. White (NASA-Goddard) F. Owen	X-ray sources from the North Ecliptic Pole IPC survey. 6 cm.
AM-79	I. McHardy (Leicester, UK) A. Smith (Leicester, UK)	Low surface brightness structure of cluster sources. 20 cm.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AM-80	J. Moran (Calif., Berkeley) G. Garay (CFA) M. Reid (CFA)	Orion Nebula. 1.3 cm.
AM-81	T. Montmerle (Saclay, France) E. Feigelson (Pennsylvania) E. Falgarone (Meudon) L. Koch-Miremond (Saclay, France)	X-ray detected pre-main sequence stars in the Rho Ophiuchi dark cloud. 20 cm.
AN-14	S. Neff (NFRA, Neth.)	Quasars with very large bent jets. 6 and 20 cm.
AN-17	L. Noreau (Toronto) P. Kronberg (Toronto) F. Bertola (Padova, Italy) G. Galetta (Padova, Italy) D. Bettoni (Padova, Italy)	Arp 205 and 206: 21-cm line study. 21-cm line.
AN-18	L. Noreau (Toronto) P. Kronberg (Toronto) F. Bertola (Padova, Italy) G. Galetta (Padova, Italy) D. Bettoni (Padova, Italy)	A continuum study of Arp 205 and 206. 17 and 22 cm.
AN-19	R. Newell (Scott Sci. & Tech.) R. Hjellming	HII regions in the winds of late-type supergiants. 6 cm.
AN-20	J. Neff (Iowa)	Spectral indices in planetary nebulae. 6 and 20 cm.
AN-21	E. Nelson (New Mexico) J. Burns (New Mexico) R. White (NASA-Goddard) F. Owen	Poor clusters of galaxies: a statistical sample 20 cm.
AO-33	M. Ondrechen (Minnesota) J. van der Hulst (NFRA, Neth.)	Barred spirals NGC 1097 and NGC 5236 (M83). 6 cm.
AO-34	F. Owen R. White (NASA-Goddard) J. Burns (New Mexico) C. O'Dea	Abell clusters. 20 cm.
AO-35	F. Owen J. Biretta (Caltech) P. Hardee (Alabama)	M87. 2 and 6 cm.
AO-36	F. Owen C. O'Dea M. Inoue (Tokyo Ast. Obs.) H. Tabara (Tokyo Ast. Obs.) M. Ishiguro (Tokyo Ast. Obs.)	3C 75. 6 and 20 cm.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AO-37	F. Owen J. Eilek (NMIMT) C. O'Dea J. Burns (New Mexico) M. Inoue (Tokyo)	3C 75 and 3C 465 - short spacings. 6 and 20 cm.
AP-46	R. Perley A. Bridle B. Clark R. Ekers J. Burns (New Mexico) G. Grueff (Bologna, Italy) J. Douglas (Texas)	A large sample from the B3 survey. 20 cm.
AP-59	G. Pooley (Cambridge, UK) J. Leahy (Cambridge, UK) J. Riley (Cambridge, UK)	Fine structure in the galactic Faraday medium. 20 cm.
AP-62	S. Pravdo (JPL) K. Sellgren (Caltech) R. White (Calif., Los Angeles) R. Decker (VPI&SU)	Radio emission near HH1 and HH2. 20 cm.
AP-64	J. Peacock (Royal Obs., UK) R. Prestage (Edinburgh, UK) J. Wall (Royal Greenwich Obs.)	The structure and environment of bright radio sources. 6 and 20 cm.
AR-76	L. Rodriguez (Mexico) J. Moran (CFA) J. Canto (Mexico) J. Garcia-Barretto (Mexico)	HI absorption in planetary nebulae. 21-cm line.
AR-77	A. Rots R. Davies (Manchester, UK) P. Appleton (Manchester, UK) T. Kinman (KPNO)	HI distribution and dynamics of the dwarf galaxy K191. 21-cm line.
AR-81	A. Rots W. van Driel (Groningen) H. van Woerden (Groningen)	HI in SO galaxies. 21-cm line.
AR-83	M. Reid (CFA) P. Myers (CFA) J. Bieging (Calif., Berkeley)	Ammonia absorption toward W3(OH). 1.3-cm line.
AS-79	S. Spangler (Iowa) W. Cotton	Monitoring low-frequency variables. 1.3, 2, 6, and 20 cm.
AS-80	R. Sramek J. van der Hulst (NFRA, Neth.)	Supernovae SN 1980 in NGC 6946 and SN 1979c in M100. 6 and 20 cm.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AS-128	E. Seaquist (Toronto) N. Duric (Toronto) P. Crane R. C. Bignell L. Davis (KPNO)	NGC 3079. 6 and 20 cm.
AS-145	S. Strom (KPNO) K. Strom (KPNO) J. van Gorkom	Thermal continuum of low brightness spirals. 6 cm.
AS-146	P. Schwartz (NRL) H. Smith (NRL) K. Shivanandan (NRL)	FIR 0407+51 and FIR 0359+51. 6 and 20 cm.
AS-147	E. Schmahl (Maryland) D. McConnell (Maryland) R. Shevgaonkar (Maryland) M. Kundu (Maryland)	Solar active regions. 6 cm.
AS-149	S. Simkin (Wisconsin) H. Su (Purple Mt. Obs., PRC) J. van Gorkom	HI in Seyferts of different morphological type. 20-cm line.
AS-153	P. Schwartz (NRL) M. Campbell (Colby College)	Cygnus-X. 6 and 20 cm.
AT-30	A. Turtle (Sydney, Aust.) M. Calabretta (Sydney, Aust.) M. Phillips (CTIO, Chile)	Seyfert 2 galaxy M4-1. 6 cm.
AT-31	N. Thonnard (DTM) F. Schweizer (DTM)	HI in SO galaxy NGC 5102. 21-cm line.
AT-34	T. Thuan (Virginia) E. Hummel (MPIR, Bonn)	HI in the active galaxy NGC 520. 21-cm line.
AV-52	J. van der Hulst (NFRA, Neth.) R. Sramek	Supernova in NGC 4536. 6 cm.
AV-77	J. van Gorkom D. Hunter (KPNO)	Non-interacting irregular galaxies. 6 cm.
AV-79	J. van der Hulst (NFRA, Neth.) P. Crane R. Kennicutt (Minnesota) R. Allen (Groningen)	M51 and NGC 6946. 20 cm.
AV-80	T. Velusamy (TIFR, India)	Search for a Crab nebula shell. 20 cm.
AV-81	J. Vallee (NRC, Canada) A. Moffat (Montreal)	Mass loss from nebulae off the galactic plane. 2, 6, and 20 cm.



<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
AV-83	J. van der Hulst (NFRA, Neth.) E. Hummel (MPIR, Bonn) J. Young (Massachusetts)	Search for thick continuum disks in edge-on galaxies. 20 cm.
AV-84	W. van Breugel (Arizona) R. Strom (NFRA, Neth.) J. Dickel (Illinois)	Radio polarimetry of Tycho A. 6, 18, and 20 cm.
AV-85	J. van Gorkom J. van der Hulst (NFRA, Neth.) A. Haschick (Haystack) A. Tubbs (Bell Labs)	HI observations of Centaurus A. 21-cm line.
AW-48	C. Wade P. Seidelman (USNO) K. Johnston (NRL)	Astrometric observations of minor planets. 2 and 6 cm.
AW-66	B. Wills (Texas) D. Wills (Texas)	Radio structure of objects with broad emission lines. 6 and 20 cm.
AW-72	B. Williams R. Becker (VPI&SU)	HI in a pair of galaxies. 20-cm line.
AW-77	J. Wall (Royal Greenwich Obs.) E. Fomalont K. Kellermann	Structure of sources from 6-cm deep survey. 20 cm.
AW-78	J. Wardle (Brandeis) R. Laing	Monitoring central components of extended sources. 2 and 6 cm.
AW-80	T. Wilson (MPIR, Bonn) C. Walmsley (MPIR, Bonn) H. Hermsen (MPIR, Bonn) C. Henkel (Calif., Berkeley) J. Bieging (Calif., Berkeley)	A protostar in Orion-KL? 1.3-cm line.
AW-84	H. Aller (Michigan) M. Aller (Michigan) B. Wills (Texas) D. Wills (Texas) M. Breger (Texas)	Simultaneous radio/optical polarimetry of short timescale variations in BL Lac objects. 6 and 20 cm.
AW-86	G. Wynn-Williams (Hawaii) W. Becklin (Hawaii)	Dwarf HII region galaxies. 6 and 20 cm.
AW-87	G. de Waard (Leiden) G. Miley (Leiden) R. Perley	Monitoring of IRAS active galaxies. 1.3, 2, 6, and 20 cm.
AW-88	W. Webster (NASA-Goddard) P. Lowman (NASA-Goddard) R. Hobbs (Computer Technology)	Asteroids. 2 cm.

<u>No.</u>	<u>Observer(s)</u>	<u>Program</u>
VAH-11	N. Cohen (Cornell)	3C 196. 6 cm.
VAH-12	L. Molnar (Harvard)	3C 274 polarization. 18 cm.

## ELECTRONICS

### Charlottesville

During this quarter fifteen 15 GHz and fourteen 1.5 GHz cooled FET amplifiers were shipped to the VLA for use in the sensitivity improvement program. Work is continuing on the development of a varactor-tuned amplifier operating in the 22-25 GHz range.

The development of mixers for the 200-350 GHz and 90-120 GHz ranges continues along with design of L.O. multipliers. A single-sideband receiver temperature of 360 K at 230 GHz has been achieved.

The construction of a 12 Mb/s VLBI tape recording system is in process with an expected summer completion. An image storage system for use with an I<sup>2</sup>S display has been constructed and testing has begun. The construction of a VLA archives tape storage system is 80% complete.

During this quarter there were seven visitors, all from foreign countries, to the Central Development Lab.

### Green Bank

Construction of the inductosyn systems for the interferometer is complete and testing is almost complete. They will be installed as time allows.

Acceptance testing of the Oscilloquartz hydrogen maser time standard for the VLA was performed at Bendix, in Columbia, Maryland, and in Green Bank; the unit met specifications.

Progress is continuing, on schedule, on the construction and testing of the 1-2 GHz cooled FET-OMT receiver. The OMT is essentially complete in the shop and is awaiting test. We anticipate that this receiver will be available in late summer.

Progress is also continuing on the construction and testing of the second channel of the 5-25 GHz upconverter/maser receiver, the new interferometer links, and the IF electronics for the digital continuum receiver.

Hardware for the front-end data-link prototype has been debugged, and the firmware debugging is nearing completion.

Construction of the holographic surface measuring receiver for the 12-meter telescope is 90% complete. However, much testing remains. The back end for this receiver is being designed.

Design of a beam splitter, for frequencies above 7.5 GHz, for the 140-foot upconverter/maser system is about 60% complete. A separate splitter covering frequencies below 7.5 GHz will be designed later.

The stability of the 4-feed, 21-cm receiver was significantly enhanced during this quarter by improving the feeds. Tests on the second stage amplifiers revealed that further stability improvements can be made there. These will be implemented in the coming quarter.

#### Tucson

During this quarter work has continued on the 200-300 GHz cooled mixer receiver. The receiver will be tested on the telescope during April.

The installation of the receivers at the Cassegrain focus of the 12-m telescope has been completed and the radiometric performance is satisfactory.

#### Socorro

The installation of the 21-cm and 2-cm wavelength cryogenically cooled amplifiers is proceeding, with sixteen completed. First fringes at 327 MHz were obtained after two antennas were equipped with feed and receiver systems for this frequency. Initial testing has shown that there are problems with aperture efficiency, beam quality and radio frequency interference. Development of this major new observing capability is continuing. Various quasi-optical devices have been installed in a temporary manner at the Cassegrain focus. The concept of changing receivers by rotating the central mirror has been tested with good results.

### ENGINEERING DIVISION

#### Green Bank

The Engineering Division helped Tucson Operations in final adjusting and checking the new 12-meter surface to bring the 12-meter telescope on line.

Design and ordering of materials for interfacing the new inductosyns to the 12-meter telescope structure continued.

An enclosure for the alidade platform on the new 14.2-meter telescope was designed and fabricated in the Green Bank shop.

The passive repeater installations for the new interferometer link were completed and tested.

Design studies of a means of horizontal shifting the subreflector on the 140-foot telescope continued.

Further studies and conceptual designs for the VLBA sites and antennas were developed.

### Socorro

The investigation was continued into the derailment of transporter No. 2 with an antenna on board which occurred in October, 1982. Changes in transporter operating procedures and planned modifications to the rail wheels on the transporter will prevent a recurrence of this event.

## COMPUTER DIVISION

### Tucson

Two of the RK05 2.5 Mbyte disk drives on the analysis PDP 11/40 computer were replaced by dual RL02 10 Mbyte disk drives. The RSX-11M operating system was upgraded from version 3.2 to 4.0. The spectral-line and continuum analysis tasks were made completely self-documenting with the verbs HELP and EXPLAIN.

An A/D multiplexer (DEC AD11-K and AM11-K) was added to the control PDP 11/40 computer for reading the sensors on the 12-meter telescope surface measuring template. All programs necessary to analyze the surface measurements were written on the analysis PDP 11/40 computer.

A new 12-meter operator's manual has been written.

### VLBI

A simple atmospheric correction term is undergoing final testing in the VLBI processor. This should increase phase stability at low elevation angles.

### Socorro

As of the end of March 1983, the short-term goals of the pipeline were reached. Using the pipeline computer, it is now possible to take data from the on-line system, to proceed through the calibration and editing steps, and to produce either spectral-line or continuum maps.

The command interpreter, which is used in all programs on the DEC-10 computer for calibration and editing, has been enhanced; the major feature is an improved and more consistent "help" feature. In an attempt to facilitate this programming effort, a new version of the SAIL compiler was acquired and installed. A major step forward in the development of the pipeline is now available as a single version for both a PDP-11 and a VAX. This has been installed in all of the appropriate programs of the pipeline.

To accommodate the burgeoning computer tape library, a new tape storage area has been constructed in the original computer trailer. Since this is remote from the computer room, only old archive tapes containing monitor or visibility data will be transferred to the new room. In order to make this new system manageable, tapes containing observational data were taken before March 21, 1983, have been renumbered.

Work has commenced on the software necessary to add the B and D IF channels to the array. This should be complete by mid-year 1983.

#### PERSONNEL

##### New Hires

None

##### Terminations

Albert K. Wu	Electronics Engineer I	01/31/83
Zbigniew Nosal	Electronics Engineer II	03/25/83

##### Rehire

Alan H. Bridle	Scientist	01/10/83
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##### Return from Leave of Absence

Peter J. Napier	Deputy Site Manager - VLA	01/01/83
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