

NATIONAL RADIO ASTRONOMY OBSERVATORY
Charlottesville, Virginia

Quarterly Report

October 1, 1972 - December 31, 1972

RESEARCH PROGRAMS

Interferometer

Hours

Scheduled Observing	2030.25
Scheduled Maintenance and Equipment Changes	113.50
Time Lost Due to: Equipment Failure	22.75
Power	0.00
Weather	10.75
Interference	1.00

Unless otherwise indicated, the following continuum observations were conducted at 2695 and 8085 MHz.

Observer

Program

K. Johnson (Arizona)	Accurate position measurements of approximately 500 radio sources.
E. Fomalont	
K. Kellermann	
C. Bolton (Toronto, Canada)	Observations of Algol for flaring, simultaneously with observations with the 74-inch David Dunlap Observatory optical telescope to look for possible correlations.
R. Hjellming	
B. Balick	
R. Hjellming	Monitor Cyg X-3 for flaring.
B. Balick	
K. Kellermann	Monitor of the flux densities of variable sources.
G. Murthy (MIT)	Observations of Hercules X-1 during optimum X-ray active periods.
G. Spada (MIT)	
R. Doxey (MIT)	
H. Bradt (MIT)	
S. Rappaport (MIT)	
R. Hjellming	
E. Fomalont	Study of the 8085 MHz flux densities and angular sizes of sources that will later be used in a relativity experiment.
R. Sramek	
P. Kronberg (Toronto, Canada)	Determination of the integrated linear polarization in 60 Ohio State Catalog sources.
J. Vallee (Toronto, Canada)	

<u>Observer</u>	<u>Program</u>
D. De Young D. Hogg	Search for time variations in the complex sources Vir A, Cyg A, and Cas A.
J. Wardle (Brandeis)	Monitor of variable sources for polarization and intensity changes.
R. Hobbs (NASA-Goddard) S. Jordan (NASA-Goddard) S. Maran (NASA-Goddard) W. Webster (NASA-Goddard)	Observations of fine structure in the solar radio emission.
H. Palmer (Jodrell Bank, England)	Study of five sources, three of which lie in a line four degrees long near Tau A.
P. Gregory (Toronto, Canada) E. Seaquist (Toronto, Canada) P. Kronberg (Toronto, Canada)	Search for continuum emission from OH and IR sources.
Y. Terzian (NAIC) R. Bignell (NRC Fellow, Canada) M. Savedoff (Rochester) B. Balick	Synthesis observations of planetary nebulae.
B. Burke (MIT) J. Spencer (MIT)	Observations to improve the signal-to-noise ratio on existing M51 observations and observations of IC 342.
M. Stull (Stanford) L. D'Addario (Stanford)	Observations of OJ 287 and BL Lacertae to look for small amplitude, short time variations.
D. Hogg	Study of the structure of radio sources which have been identified with blue stellar objects which could be at very large redshifts.
M. Kaftan-Kassim (SUNY, Albany) G. Sisti (SUNY, Albany)	Observations of planetary nebulae.

The following very long baseline observations were conducted at 8085 MHz.

<u>Observer</u>	<u>Program</u>
T. Clark (NASA-Goddard) C. Counselman (MIT) H. Hinteregger (MIT) C. Knight (MIT) I. Shapiro (MIT) A. Whitney (MIT) A. Rogers (Haystack)	Four-antenna VLB using the Haystack and Westford telescopes at the Haystack Research Facility and the NRAO 85-2 and 85-3 telescopes to measure the differential solar deflection from 3C 273 and 3C 279.

<u>Observer</u>	<u>Program</u>
M. Cohen (Caltech)	Very long baseline, four-antenna experiment using two Owens Valley Radio Observatory 90-foot telescopes and two NRAO 85-foot telescopes to collect astrometric and geodetic data, and to do the preliminary astrometric work to measure light bending effect predicted by the general relativity theory.
A. Moffet (Caltech)	
D. Muhlman (Caltech)	
W. Cannon (Caltech)	
P. Hemenway (Virginia)	
B. Clark	
R. Sramek	Very long baseline observations using two Owens Valley Radio Observatory 90-foot telescopes and two NRAO 85-foot telescopes to measure the deflection of emission from 3C 279 as it passes near the sun's limb.
K. Kellermann	
D. Jauncey (NAIC)	
M. Harwit (Cornell)	
R. Lovelace (Cornell)	Four antenna VLB utilizing the Haystack and Westford telescopes and two NRAO 85-foot telescopes to make measurements to improve relative source coordinates and to attempt to detect source proper motions.
J. Broderick (NAIC)	
T. Clark (NASA-Goddard)	
C. Counselman (MIT)	
H. Hinteregger (MIT)	
C. Knight (MIT)	
I. Shapiro (MIT)	
A. Whitney (MIT)	
A. Rogers (Haystack)	
G. Resch (Maryland)	

140-foot TelescopeHours

Scheduled Observing	1924.50
Scheduled Maintenance and Equipment Changes	226.25
Time Lost Due To: Equipment Failure	27.75
Power	0.50
Weather	12.00
Interference	6.25

The following continuum observations were conducted during this quarter.

<u>Observer</u>	<u>Program</u>
M. Davis (NSF)	Continuation of 6-cm source survey.
I. Pauliny-Toth (Max-Planck Institut fur Radioastronomie, Bonn, W. Germany)	
K. Kellermann	
J. Erkes (SUNY, Albany)	Confirm and pursue the study of ionized hydrogen in globular clusters at 5.006 and 10.710 GHz.
A.G.D. Philip (SUNY, Albany)	
M. Kundu (Maryland)	Observations of linear polarization in supernova remnants at 3-cm wavelength.
T. Velusamy (Maryland)	
R. Becker (Maryland)	

ObserverProgram

Y. Parijskij (Pulkovo Observatory,
USSR)

Measurements of the small-scale structure
of the 3° K cosmic background.

R. C. Bignell (NRC Fellow, Canada)
S. Goldstein (Virginia)
J. Mast (Eastern Mennonite College)

Observations of strong radio sources to
obtain the position angle and amplitude
of the linear polarized flux at discrete
points over a 1250-1450 MHz frequency range.

The following line observations were conducted during this quarter.

ObserverProgram

J. M. Greenberg (SUNY, Albany)
Y. Minn (Max-Planck-Institut für
Radioastronomie, W. Germany)

Observations of H₂CO (formaldehyde) and
109α-recombination lines at 6-cm wave-
length.

E. Churchwell (Max-Planck-Institut
für Radioastronomie, W. Germany)
P. Mezger (Max-Planck-Institut für
Radioastronomie, W. Germany)
T. Pauls (New Mexico State)

Observations of the 6-cm H109α-recombina-
tion line and the 3-cm H85α-recombination
line in the galactic center.

E. Churchwell (Max-Planck-Institut
für Radioastronomie, W. Germany)
P. Mezger (Max-Planck-Institut für
Radioastronomie, W. Germany)
T. Pauls (New Mexico State)

Observations at 6-cm wavelength to; (1)
detect 109α-recombination lines for ele-
ments heavier than carbon in the dark bay
of Ori A and to extend the C109α-map of
the Orion nebula, and (2) determine the
N(He⁺)/N(H⁺) ratio in NGC 7538 by measur-
ing the 109α-recombination spectrum from
this nebula.

E. Churchwell (Max-Planck-Institut
für Radioastronomie, W. Germany)
P. Mezger (Max-Planck-Institut für
Radioastronomie, W. Germany)
T. Pauls (New Mexico State)

Observations at 3-cm wavelength to detect
85α-recombination lines from elements
heavier than carbon in Ori A.

E. Seaquist (Toronto, Canada)
P. Gregory (Toronto, Canada)

Search in quasars for H II absorption of
3-cm recombination lines.

M. Gordon

Test at 3-cm wavelength of the Dupree-
Goldberg theory that radiation from bright
background objects could stimulate line
emission from cold components of the
interstellar medium.

L. Doherty (NRC, Canada)
R. Gammon
B. Balick

Observations at 10.527 GHz to map the dis-
tribution of carbon in Ori A.

<u>Observer</u>	<u>Program</u>
A. Sandqvist (Stockholm Observatory, Sweden)	Southern extension of a 4830 MHz H_2CO (formaldehyde) survey made at Onsala, Sweden.
P. Lindblad (Stockholm Observatory, Sweden)	
M. Gordon	Search at 6-cm wavelength for the diatomic molecular H_2 and CO in metastable states.
R. Brown	
R. Gammon	
E. Chaisson (Smithsonian Astrophysical Observatory)	High spectral resolution profiles at 4830 MHz of H_2CO (formaldehyde) to correlate results with OH profiles.
L. Rickard (Chicago)	Observations of 5-cm OH emission in Sgr B2 and other galactic sources.
P. Palmer (Chicago)	
B. Zuckerman (Berkeley)	
C. Gottlieb (Harvard)	Search for CH_3SH (methyl mercaptan) at 1569 MHz.
R. Gammon	
B. Turner	
C. Heiles (Berkeley)	Observations at 18-cm wavelength of dark dust clouds in the two main OH lines to confirm a possible anomaly.
B. Turner	
S. Gottesman (Florida)	Observations at 1680 MHz of interstellar recombination lines toward the Cyg X complex.
A. Seacord (Florida)	
P. Solomon (Minnesota)	Search at 5346.64 MHz for HDCO (deuterated formaldehyde) in the galactic center and H II regions.
N. Scoville (Minnesota)	
R. Gammon	Search at 1404.3 and 1412.24 MHz for H_2^+ and at 1399.9 MHz for H_3^+ in Zeta Oph and Xi Per.
B. Turner	

The following very long baseline observations were conducted during this quarter.

<u>Observer</u>	<u>Program</u>
A. Lyne (Jodrell Bank, England)	Three station pulsar experiment at 408 MHz using the NAIC 1000-foot telescope in Puerto Rico, the Jodrell Bank 250-foot telescope in England, and the NRAO 140-foot telescope to measure the velocity of diffraction patterns produced by the ionized interstellar medium.
G. Zeissig (Puerto Rico)	
D. Backer	

<u>Observer</u>	<u>Program</u>
D. Jauncey (NAIC)	Three station "VLB Quasar Patrol" utilizing the Haystack Research Facility 120-foot telescope, the NASA, Goldstone 210-foot telescope, and the NRAO 140-foot telescope at 3.8 cm wavelength.
J. Broderick (NAIC)	
M. Cohen (Caltech)	
G. Purcell (Caltech)	
D. Shaffer (Caltech)	
B. Clark	
K. Kellermann	FOG array observations to determine quasar diameter and variability, utilizing the Fort Davis 85-foot telescope, one of the Owens Valley 90-foot telescopes, and the 140-foot telescope at <u>Green Bank</u> .
M. Cohen (Caltech)	
D. Shaffer (Caltech)	
A. Moffet (Caltech)	
A. Maxwell (Harvard)	
D. Harris (Harvard)	
G. Grove	
K. Kellermann	Water-vapor measurements at 22 GHz to determine the proper motion of source sub-components using the Haystack 120-foot telescope, the NRL 85-foot telescope at Maryland Point, and the NRAO 140-foot telescope.
B. Burke (MIT)	
G. Papadopoulos (MIT)	
K. Johnston (NRL)	
S. Knowles (NRL)	
J. Moran (SAO)	

<u>300-foot Telescope</u>	<u>Hours</u>
Scheduled Observing	2002.25
Scheduled Maintenance and Equipment Changes	146.75
Time Lost Due To: Equipment Failure	62.50
Power	0.75
Weather	3.75
Interference	4.00

The following continuum observations were conducted during this quarter.

<u>Observer</u>	<u>Program</u>
Y. Terzian (NAIC)	Brightness temperature distribution measurements of M33 and M31 at 20-cm wavelength.
B. Balick	
N. Sarma (Tata Institute)	Survey of region along the moon's path at 20-cm wavelength.
J. Fisher	
J. Baker (Max-Planck-Institut für Radioastronomie, W. Germany)	Polarization measurements of the 200-300 MHz galactic background radiation.
R. Becker (Maryland)	Polarization measurements in HB21 at 20-cm wavelength.
M. Kundu (Maryland)	

The following line observations were conducted during this quarter.

<u>Observer</u>	<u>Program</u>
L. DeNoyer (Illinois)	Measurements of 21-cm neutral hydrogen near supernova remnants.
R. Giovanelli (Indiana)	Observations of high-velocity 21-cm neutral hydrogen to establish the existence of an intermediate velocity ridge between $\ell = 90^\circ$ and $\ell = 270^\circ$ at very high galactic latitudes.
T. Cram	
G. Verschuur	
G. Verschuur	Observations of 21-cm neutral hydrogen at a variety of galactic longitudes around $\ell = 140^\circ$, $\ell = 120^\circ$, and $\ell = 60^\circ$.
G. Westerhout	Re-observe the Maryland-Green Bank survey of the galaxy at the 21-cm line of neutral hydrogen.
S. Gottesman (Florida)	Observations of 21-cm neutral hydrogen in the Cyg X complex.
A. Seacord (Florida)	
G. Verschuur	Study of 21-cm high-velocity neutral hydrogen clouds near the south galactic pole.
M. Roberts	Measurement of 21-cm neutral hydrogen in galaxies and clusters of galaxies.
G. S. Shostak	
P. Lindblad (Stockholm Observatory, Sweden)	Observations of 21-cm neutral hydrogen in 30 H ₂ CO (Formaldehyde) clouds.
A. Sandqvist (Stockholm Observatory, Sweden)	
T. Arny (Massachusetts)	Search at 1421 MHz for neutral hydrogen in young clusters found at high galactic latitudes.
J. Lockman (Massachusetts)	
J. R. Fisher	Survey of dwarf galaxies in the 21-cm line of neutral hydrogen.
R. Tully (Maryland)	
G. S. Shostak	Observations of 21-cm neutral hydrogen in approximately 50 Scd galaxies and in several of the galaxies in the Stephan's Quintet cluster.
J. Greenberg (SUNY, Albany)	Observations of 21-cm neutral hydrogen in dark clouds previously surveyed in formaldehyde.
Y. Minn (Max-Planck-Institut für Radioastronomie, W. Germany)	

The following pulsar observations were conducted during this quarter.

<u>Observer</u>	<u>Program</u>
R. Manchester (Massachusetts)	Continuation of pulsar polarization and timing measurements over the frequency range of 250-500 MHz.
J. Fisher D. Backer	Observations over the range of 250-500 MHz to attempt to detect Hercules X-1 as a radio pulsar.
J. Taylor (Massachusetts) R. Hulse (Massachusetts)	High-sensitivity survey for new pulsars over the frequency range of 250-500 MHz.

The following very long baseline observations were conducted during this quarter.

<u>Observer</u>	<u>Program</u>
T. Clark (NASA-Goddard) S. Knowles (NRL) J. Broderick (NAIC) W. Erickson (Maryland) L. Hutton (Maryland) R. Perley (Maryland) G. Resch (Maryland) N. Vandenberg (Maryland)	Observations at 111.5 and 73.8 MHz to study the Crab pulsar, other pulsars, extragalactic sources, and to search supernova remnants for pulsars using the NAIC 1000-foot telescope at Arecibo, the NRL 150-foot telescope at Sugar Grove and the NRAO 300-foot telescope.

In addition to the above observations, P. Palmer (Chicago) and B. Zuckerman (Berkeley) surveyed nearby stars to attempt to detect signals from other civilizations at frequencies near the 21-cm line of neutral hydrogen.

<u>36-foot Telescope</u>	<u>Hours</u>
Scheduled Observing	1637.75
Scheduled Maintenance and Equipment Changes	546.25
Scheduled Tests and Calibration	56.0
Time Lost Due To: Telescope and Receiver Failure	80.75
Digital System Failure	52.5
Power	4.0
Weather	205.5
Interference	0

During this quarter further modifications were made to the dome door. An improved tracking and continuum data computer program was installed. A test of the 1.2 mm bolometric receiving system showed sufficient sensitivity for detection of extragalactic sources.

<u>Observer</u>	<u>Program</u>
H. Johnson (Lockheed)	Observations of symmetric galactic nebulae and planetary nebulae (31 GHz continuum).
W. Dent (Massachusetts) R. Hobbs (NASA-Goddard)	Temporal variations and spectra of variable radio sources (31 GHz continuum).
P. Thaddeus (NASA-Goddard) A. Penzias (Bell Labs) R. Wilson (Bell Labs) K. Jefferts (Bell Labs) M. Kutner (NASA-Goddard) P. Wannier (Princeton)	Study of methanol in Orion A and Sgr B2; investigation of the ortho-par ratio and pumping mechanism in formaldehyde (150 GHz).
K. Jefferts (Bell Labs) T. Phillips (Bell Labs)	Search for DCN and measurement of CN excitation temperatures (72 and 113 GHz).
P. Solomon (Minnesota) A. Penzias (Bell Labs) R. Wilson (Bell Labs) K. Jefferts (Bell Labs) P. Wannier (Princeton) F. Hill (Minnesota)	Intensity distribution of weak spectral lines in a 2 GHz band near 110 GHz.
D. Dickinson (Smithsonian) C. Gottlieb (Harvard) J. Ball (Harvard)	Mapping of SiO in Sgr B2 and Orion A, and search for SiO in other sources (87 GHz).
C. Gottlieb (Harvard) M. Litvak (Harvard) J. Ball (Harvard) D. Dickinson (Smithsonian)	Mapping of methanol (CH_3OH) in Sgr A and Sgr B2; search for methanol and its isotopes in other sources (94-97 GHz).
C. Gottlieb (Harvard) M. Litvak (Harvard) J. Ball (Harvard) D. Johnson (NBS-Boulder) D. Dickinson (Smithsonian)	Search for methylamine (CH_3NH_2); comparison of methylamine and HCN in Sgr A (88-89 GHz).
C. Gottlieb (Harvard) J. Ball (Harvard) E. Lilley (Harvard) H. Radford (Harvard) D. Dickinson (Smithsonian)	Search for methylamine (CH_3NH_2) and acrylonitrile ($\text{H}_2\text{C} = \text{CHCN}$) in various sources (45-47 GHz).
J. Rather P. Ade (Queen Mary College, London) P. Clegg (Queen Mary College, London)	Comparison tests of InSb and Ge bolometers; observations of planets, galactic and extragalactic sources (250 GHz continuum).
E. Conklin	Observations of flat-spectrum sources from the Ohio State Catalog (31 and 85 GHz continuum).

<u>Observer</u>	<u>Program</u>
E. Conklin D. Heeschen	Observations of normal elliptical galaxies for time variations (31 and 85 GHz continuum).
E. Conklin	Observations of short-period variable sources for optical/radio correlations (31 and 85 GHz continuum).
E. Epstein (Aerospace Corp.) W. Fogarty (Arizona)	Observations of OJ+287, BL Lac, and 3C 120 for intraday variability (85 GHz continuum).
B. Turner M. Morris (Chicago) P. Palmer (Chicago) B. Zuckerman (Maryland)	Observations of CS and HCN and their isotopes; survey of H ₂ CO and HCN in infrared nebulae; search for new molecules (85-95 GHz).
P. Thaddeus (NASA-Goddard) P. Encrenaz (NASA-Goddard) K. Tucker (Columbia) B. Zuckerman (Maryland)	Search for deuterated ammonia (NH ₂ D) in Orion A and Sgr B2 (85 GHz).
W. Wilson (Aerospace Corp.) E. Epstein (Aerospace Corp.) P. Schwartz (NRL)	Search for CO and HCN and their isotopes in M31, M33 and other extragalactic sources (88 and 115 GHz).
F. Kerr (Maryland) A. Milman (Maryland) G. Knapp (Maryland) E. Epstein (Aerospace Corp.) W. Wilson (Aerospace Corp.)	Study of structure of dense interstellar dust clouds in the CO line (115 GHz).

ELECTRONICS DIVISION-EQUIPMENT DEVELOPMENT

During the past quarter the manpower assignments within the Electronics Division have been divided among the following programs:

15 GHz Cooled Receiver	2%
140-foot Multifrequency Receiver	4%
0.5-1 GHz Receiver	5%
45-foot Telescope Equipment	10%
Very Long Baseline Interferometer	5%
Interference Protection	5%
Millimeter-wave Development	20%
Antenna Development	3%
256-channel Multifilter Receiver	5%
New Standard Receiver	5%
Advanced Correlator Development	5%
Visitor Support and Routine Maintenance	27%
VLA LO System	2%
VLA IF System	2%

Work is continuing on the multifrequency front end covering 2, 6, 18 and 21 cm. This receiver is a VLA pre-prototype receiver which will be tested and eventually used on the 140-foot telescope. The prototype VLA feeds will be used with this system. It is hoped to have this system completed by Fall 1973.

The 15-GHz cooled receiver is now almost completed and is scheduled on the 140-foot telescope in January 1973.

The 45-foot telescope, receiver, data transmission link and control system are now operational.

The 500-1000 MHz receivers are now well under way and should be finished by April.

The construction of the first of a series of 256-channel multifilter receivers for Tucson is under way and should be completed in May. The 85-95 GHz front-end plate was completed and is in use at Tucson for line observations. Work on a 75-120 GHz cooled mixer receiver has started.

Work has been started during this quarter on LO and IF transmission systems for the VLA. A study of analog and digital delay lines for VLA use has also been made.

ENGINEERING DIVISION

The main efforts of the Engineering Division during this quarter have been in the following areas:

1. Completion of the 45-foot transportable antenna. The antenna was delivered to Green Bank on October 16, 1972 and erection of the structural and mechanical elements completed by October 25, 1972. Alignment, adjustment, cabling, installation of servo and controls, installation of position indicating system and installation of receiving equipment continued until December 1. Calibration, initial observations and check-out of antenna and controls have continued since that date.

2. 36-foot dome modifications. Design, fabrication and installation of new rollers and spring loaded thrust rollers for the rigid door section at the dome on the 36-foot antenna were completed. The drive truss rollers, drive truss end plates, and sprocket drive axles were replaced. Rigid door frame and drive track were inspected and repaired.

3. Laboratory elevator at Green Bank. A freight elevator was installed in the east end of the Jansky Building which provides access for equipment from the basement to or from the first and second floors.

4. The VLA project. Engineering Division support to the VLA project consisted of antenna error analyses, review of antenna specification, preparation of antenna cost estimates, preparation of site studies and layouts.

5. 140-foot Cassegrain studies. Conceptual designs were started on structural and mechanical elements necessary for the installation of a Cassegrain system on the 140-foot telescope.

COMPUTER DIVISION

Equipment which will enable the 1130 in Green Bank to be used as a remote job-entry station to the 360/50 computer in Charlottesville has been installed and is being tested.

Arrangements have been made for leasing additional fast core for the 360/50 computer. Installation is expected in February.

Technical selection has begun which will lead to the procurement of the following computer systems:

140-foot special processor - this system will provide on-line interactive processing at the 140-foot telescope.

VLBI post-processor - this system will replace the role currently played by the central computer center in processing VLBI data (very long baseline interferometry data).

Development lab system - this system will form the basis of a laboratory to develop, test, and evaluate special-purpose computer systems.

36-foot telescope system - this system will replace the existing 36-foot telescope control/data-processing computers.

ANTENNA DESIGN

Very Large Array

John H. Lancaster was named Assistant Director of the Observatory and Project Manager for the VLA.

The NSF has forwarded a contract amendment to AUI authorizing the design and construction of the VLA. Also included was the first year's funding of \$3 million. The NSF has requested the U.S. Army Corps of Engineers to procure the necessary land and land rights for the VLA.

The Request for Proposal (RFP) for the design, manufacture, erection and test of 28 radio telescope antennas has been completed and mailed to pre-qualified companies. Prequalified companies to date are: Collins Radio Company; E-Systems, Inc.; Goodyear Aerospace Corporation; North American Aviation; Philco-Ford Corporation; Radiation, Incorporated; Radio Corporation of America; Rohr Industries, Inc.; and Westinghouse Electric Corporation.

Homology Telescope

The report of the design of the 65-meter telescope for millimeter waves has now been published. Several hundred copies have been printed, and the

book will be widely distributed. Mailing will start just after the first of January.

SYMPOSIUM ON THE COLLECTION AND ANALYSIS OF ASTROPHYSICAL DATA

On November 13-15, 1972, the NRAO was the host for a Symposium on the Collection and Analysis of Astrophysical Data, attended by 77 outside participants and approximately 40 staff. ~~The Symposium was~~ sponsored by the IEEE Group on Aerospace and Electronic Systems, the International Union of Radio Science (URSI) and the NRAO. The program consisted of 43 papers dealing primarily with the use of the computer for data processing and telescope control. The proceedings will be published in a special issue of the Supplement Series of Astronomy and Astrophysics. The evening programs included a reception, a dinner for the Symposium participants and the Seventh Annual Jansky Lecture.

JANSKY LECTURE

The Seventh Annual Karl G. Jansky Lecture was delivered on the evening of November 13, 1972 by Dr. Bart J. Bok of the Steward Observatory, University of Arizona, Tucson, Arizona on the topic "Star Birth in the Galaxy." Dr. Bok, who delivered the talk at the time of the Symposium on the Collection and Analysis of Astrophysical Data, is currently President of the American Astronomical Society and his research interests include investigation into the spiral structure of the Milky Way, dark nebulae, and the Magellanic clouds. Until 1970, Dr. Bok was Head of the Department of Astronomy and the Director of the Steward Observatory at the University of Arizona. Previous to that he was Director of the Mount Stromlo Observatory, Canberra, Australia, and he was for many years the Robert Wheeler Professor of Astronomy at Harvard. Much of Dr. Bok's research has been carried out in collaboration with his wife Priscilla, who accompanied him to Charlottesville.

PERSONNEL

Appointments

Donald K. Poillon	Business Officer	October 1972
Henry P. Palmer	Visiting Scientist	October 1972
*John H. Lancaster	Assistant Director and VLA Project Manager	October 1972
Harry L. Beazell, Jr.	Electronic Engineer I	November 1972
Alan deS. Parrish	Electronic Engineer I	November 1972

Terminations

Hrant M. Tovmassian	Visiting Scientist	October 1972
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*Transfer from Brookhaven National Laboratory