

**Radio Astronomy Program Records, 1950-1976
(Bulk 1953-1960)**



**Carnegie Institution of Washington
Department of Terrestrial Magnetism Archives
Washington, DC**

Finding aid written by:
Abigail Dixon and Shaun Hardy
January 2006

**Radio Astronomy Program Records, 1950-1976
(Bulk 1953-1960)**

TABLE OF CONTENTS

	Page
Introduction	1
Administrative History	1
Scope and Contents Note	2
Folder Listing	5
Subject Terms	8
Bibliography	9
Related Collections	9

Radio Astronomy Program Records, 1950-1976
(Bulk 1953-1960)
DTM-2006-01

Introduction

Abstract: This collection documents work conducted by the radio astronomy program of the Department of Terrestrial Magnetism at the Carnegie Institution of Washington.

Extent: 6.75 linear feet: 3 records center cartons, 2 document boxes, and 1 map case drawer.

Acquisition: The records have been in the possession of the Department of Terrestrial Magnetism (DTM) since their creation.

Access Restrictions: There are no access restrictions to this collection.

Copyright: Copyright is held by the Department of Terrestrial Magnetism, Carnegie Institution of Washington. For permission to reproduce or publish please contact the archivist at the Department of Terrestrial Magnetism.

Preferred Citation: Radio Astronomy Program Records, 1950-1976, Department of Terrestrial Magnetism, Carnegie Institution of Washington, Washington, D.C.

Processing: Processing was completed by Abigail L. Dixon, History Associates Incorporated, in January 2006. This collection was processed through the generous support of the National Historical Publications and Records Commission.

Other Languages: Spanish

Administrative History

Radio astronomy investigations began at the Department of Terrestrial Magnetism (DTM) in 1952, under the leadership of director Merle A. Tuve. A 26-foot (8-meter) diameter Wurzburg Riese radar antenna was erected on the Department's grounds for observing 21-centimeter hydrogen radiation from interstellar gas clouds. Studies of active radio sources on the sun were initiated using an interferometer at DTM's Derwood Experimental Laboratory near Rockville, Maryland. Soon afterward, a "Mills Cross" antenna array was built on a leased site near Seneca, Maryland. In early 1955, the latter was used by B. F. Burke and K. L. Franklin in their discovery of the first natural radio emissions from another planet (Jupiter).

The development of new antennas and increasingly sophisticated receivers continued through the late 1950s and early 1960s. The Precise Position Apparatus – a V-reflector array used to accurately pinpoint discrete radio sources – became operational in 1958. A 60-foot (18-meter) diameter steerable dish was built for the Department by the Blaw-Knox Company and installed at Derwood in 1959, and became the new focus for H-line mapping of the galaxy. Observations made with the 60-foot dish during 1968-1971 resulted in a major publication, *Velocity Structures in Hydrogen Profiles: A Sky Atlas of Neutral Hydrogen Emission* by Merle A. Tuve and Soren Lundsager (Carnegie Institution of Washington Publication 630, Washington, D.C., 1973).

Collaboration between the Carnegie Institution and several Argentine institutions (University of Buenos Aires, University of La Plata, and the Consejo Nacional) resulted in the establishment in 1962 of the Instituto Argentino de Radioastronomia (IAR). With funds from the Carnegie Institution and the National Science Foundation, a 100-foot (30-meter) equatorially mounted dish designed by Everett Ecklund was constructed for the IAR at La Plata, Argentina, and went into operation in 1965. A second 30-meter transit dish was erected the same year on a leased site on Avery Road, one mile east of Derwood, for the purpose of doing radio interferometry with the 60-foot dish. It was the last radio telescope built by DTM. By then, DTM astronomers were increasingly making use of the facilities of the National Radio Astronomy Observatory (NRAO) in Green Bank, West Virginia. Observations of radio hydrogen in external galaxies, including the Andromeda Galaxy (M31) had been started by B. F. Burke, M. A. Tuve, and K. C. Turner with NRAO's 300-foot dish in 1962. By the late 1960s, DTM's instruments were largely relegated to instructional use by graduate students from the University of Maryland and Johns Hopkins University.

Following the arrival of a new Department director in 1974, DTM's radio telescopes were shut down. As Louis Brown noted in his centennial history of the Department, "The decision did not remove radio astronomy as a discipline for the Department but required that observational work be done elsewhere, a circumstance long the practice for optical astronomers." The 60-foot and 100-foot Derwood dishes were donated to the National Geodetic Survey and the State University of New York at Albany, respectively. The Wurzburg dish was scrapped. The IAR continues an active research program today.

Scope and Contents Note

This collection documents the work conducted by the radio astronomy program at the Carnegie Institution's Department of Terrestrial Magnetism. It includes correspondence files, project files, and equipment files belonging to B. F. Burke, K. L. Franklin, H. E. Tatel, K. C. Turner, and M. A. Tuve. The collection also consists of manuscripts, data files, and notebooks documenting various experiments and discoveries. Photographs and ephemera are also included.

Arrangement

This collection is arranged in six series and three subseries as follows:

Series 1: Files, 1950-1976

Series 1, Subseries 1: Correspondence files, 1950-1976

Series 1, Subseries 2: Project files, 1955-1959, 1970-1973

Series 1, Subseries 3: Equipment files, 1955-1960

Series 2: Manuscripts, 1953-1972, n.d.

Series 3: Data, 1950-1972, n.d.

Series 4: Notebooks, 1953-1975, n.d.

Series 5: Photographs, 1953-1965, n.d.

Series 6: Ephemera, 1953-1970

Folders are arranged alphabetically by title within each series/subseries.

Most of the materials in this collection were created by or belonged to a specific individual associated with the radio astronomy program. If known, his name is provided in brackets before the folder title.

Series 1: Files, 1950-1976

This series is arranged into three subseries, organized by file type. The types of materials found in this series include: correspondence, drawings, financial documents, manuscripts, notes, photographs, printed items, and reports.

Series 1, Subseries 1: Correspondence files, 1950-1976

Correspondence files belonging to Burke, Franklin, Tatel, Turner, and Tuve, consist of both typed and handwritten letters and memos. Enclosures include drawings, manuscripts, notes, and photographs. Of note is correspondence discussing the construction of the radio telescope in Argentina.

Series 1, Subseries 2: Project files, 1955-1959, 1970-1973

This subseries consists of files documenting various projects undertaken by the radio astronomy program. Project files contain notes, printed items, financial documents, correspondence, and photographs. Files pertaining to Turner's direction of the Instituto Argentino de Radioastronomia are also present.

Series 1, Subseries 3: Equipment files, 1955-1960

The equipment files document the construction of various radio telescopes built for the Department of Terrestrial Magnetism. Files contain correspondence, sketches and drawings, photographs, reports, and purchase orders. Materials documenting construction bids by Blaw-Knox Company and D. S. Kennedy and Co. are found here.

Series 2: Manuscripts, 1953-1972, n.d.

Manuscript files contain handwritten and typed drafts of research papers authored or collected by various members of the radio astronomy program. Annotated drafts and final printed copies exist in a few instances. Most papers document the results of investigations conducted at the Department of Terrestrial Magnetism. A few are written in Spanish as contributions of the Instituto Argentino de Radioastronomia.

Series 3: Data, 1950-1972, n.d.

This series contains charts, graphs, and tables, illustrating data collected during radio astronomy investigations conducted at the Department of Terrestrial Magnetism. Of particular significance is a sound recording documenting radio noise emitted from Jupiter and broadcast on the NBC "Monitor" radio program in 1955. Much of the material in this series was sampled from several boxes containing similar data.

Series 4: Notebooks, 1953-1975, n.d.

This series contains workbooks and logbooks documenting research conducted by the radio astronomy program, including extensive documentation of H-line galaxy mapping studies.

Series 5: Photographs, 1953-1965, n.d.

This series consists of approximately 250 photographs documenting the construction and operation of DTM's radio telescopes in Washington, DC; Derwood and Seneca, Maryland; and La Plata, Argentina. Formats include black-and-white and color negatives and prints; 35mm Kodachrome and 2x2 Ektachrome color slides.

Series 6: Ephemera, 1953-1970

This series consists of assorted ephemera collected by members of the radio astronomy program. It contains lists, news clippings, newsletters, and printed items.

Folder Listing

	<u>Box</u>	<u>Folder</u>
Series 1, Subseries 1: Correspondence files, 1950-1976		
Burke and Franklin, 1955-1956	1	1
Tatel, 1954		2
Turner, 1970-1973		3
Tuve, 1950-1955		4
Tuve, 1956-1958		5
Tuve, 1959		6
Tuve, 1960-1976		7
Series 1, Subseries 2: Project files, 1955-1959, 1970-1973		
[Tuve] Australia, 1956 [Folder 1 of 2]		8
[Tuve] Australia, 1956 [Folder 2 of 2]		9
[Tuve] H-Line, 1955-1959		10
[Turner] Instituto Argentino de Radioastronomia, 1970-1973		11
[Turner] Instituto Argentino de Radioastronomia (Financial), 1970-1973		12
[Tuve] PPA [Precise Position Apparatus], 1956-1959		13
[Tuve] Solar Radio Astronomy, 1957-1959		14
[Tuve] Upper Atmosphere, 1957		15
Series 1, Subseries 3: Equipment files, 1955-1960		
[Tuve] 60 Foot Radio Telescope, 1956-1959		16
[Tuve] 60 Foot Radio Telescope (Blaw-Knox), 1955-1958		17
[Tuve] 60 Foot Radio Telescope (Blaw-Knox) [Drawings], 1958	Map Drawer 19	1
[Tuve] 60 Foot Radio Telescope (Kennedy), 1955-1956	1	18
[Tuve] 84 Foot Radio Telescope (Blaw-Knox), 1956 [Folder 1 of 2]		19
[Tuve] 84 Foot Radio Telescope (Blaw-Knox), 1956 [Folder 2 of 2]		20
[Tuve] 84 Foot Radio Telescope-Mount, 1955-1956		21
[Tuve] 140 Foot Radio Telescope, 1956		22
[Tuve] Big Dish-Argentina (Kennedy), 1960		23
[Tuve] Big Dish-Argentina (Kennedy) [Drawings], 1958-1960	Map Drawer 19	2
[Tuve] Big Plans and Big Dish, 1955-1956	1	24
[Tuve] Big Plans and Big Dish, 1957-1958		25
[Tuve] George R. Agassiz Radio Telescope, 1955-1957		26
[Tuve] Universal Antenna, 1958		27
Series 2: Manuscripts, 1953-1972, n.d.		
[Tuve] 21-cm Line Observations of Small Diameter Galactic H II Regions, 1966		28
[Tuve] 21-cm Survey of the Southern Milky Way, n.d.		29
[Turner] Analisis Estadistico de 123 Concentraciones de Hidrogeno Neutro, n.d.		30

Folder Listing

	<u>Box</u>	<u>Folder</u>
[Tuve] Atlas of Hydrogen Profiles, 1971-1972		31
[Tuve] Atomic Hydrogen Survey Near the Galactic Plane, 1959-1960		32
[Turner] Contribucion al Estudio de Estructura Galactica a Bajas Latitudes, 1968	2	1
[Turner] Evolutionary Models of the Interstellar Galaxy, n.d.		2
[Burke] Further Observations of Radio Emission from the Planet Jupiter, 1956		3
Hydrogen Line Observations, 1953		4
[Turner] Medicion de la Posicion, Estructura y Polarizacion de Radiofuentes Extragalacticas, 1970		5
[Turner] Modelos de Nubes Cosmicas en Contraccion Gravitatoria, n.d.		6
[Turner] Radio Astronomy, 1971		7
[Tuve] Radio Astronomy Bibliography, 1958		8
[Burke] Radio Observations of the Planet Jupiter, 1958		19
Relation of 11 Meter Solar System Phenomena to Solar Disturbances, 1956		10
[Erickson] Survey of Neutral Hydrogen at High Galactic Latitudes, 1958		11
[Tuve] Velocity Structures in Hydrogen Profiles, 1972		12
Series 3: Data, 1950-1972, n.d.		
[Burke] 21-cm, 1955		13
[Helfer] Calculation of A, B, C Tables, 1954		14
Correction Due to the Sun's Motion in the Galaxy, 1955		15
[Burke] Cygnus A, July 1955		16
Dutch Profiles, n.d.		17
[Tatel] Final Curves, 1953		18
HI Observations, 1953-1954		19
[Burke] Jupiter, 1950-1957 [Folder 1 of 2]		20
[Burke] Jupiter, 1950-1957 [Folder 2 of 2]		21
[Burke] Jupiter, 31 Oct-7 Nov 1955		22
[Burke] Jupiter, 16 Dec 1955-1 Jan 1956		23
[Burke] Jupiter, n.d.		24
[Burke] Jupiter-Including Occultation of M1 by Moon, 15 Feb-2 Mar 1956		25
[Burke] Jupiter-Recording [Sound], 1955	Box Phonograph Record Storage 1	
[Burke] Jupiter-Solar System, 1954-1956	2	26
[Tatel] Local Motion Corrections, 1953		27
[Turner] M-31, 1962		28
[Turner] M-31 and M-33 Observations, 1963-1964		29
[Turner] M-31 and M-33 Reductions, n.d.		30
[Turner] M-33, n.d.		31

Folder Listing

	<u>Box</u>	<u>Folder</u>
Points on the Galactic Equator, 1953	4	Item 1
[Tatel] Reduced Curves, n.d.		Item 2
[Tatel] Sample Data, 1953-1955		Item 3
[Tuve] Sample Data, 30 Nov 1956		Item 4
[Tuve] Sample Data, 9 Feb 1959	2	32
[Tuve] Sample Data, 23 Apr 1971		33
[Tuve] Sample Data, 14 Apr 1972		34
[Tuve] Tests, 1954		35
[Burke] Venus Search, n.d.		36
Series 4: Notebooks, 1953-1975, n.d.		
[Helfer] Calculations and Reductions, 1953		37
[Tuve] Calibrations, 1958	Map Drawer 19	3
[Turner] D-I, 1970-1971	2	38
[Turner] D-II, 1971-1973		39
[Tuve] H-Line Calculations and Reductions, 1953 [Folder 1 of 2]		40
[Tuve] H-Line Calculations and Reductions, 1953 [Folder 2 of 2]		41
[Tuve] H-Line Calibrations, 1954-1957		42
[Tatel] H-Line Log I, 1951-1952		43
[Tatel] H-Line Log II, 1953		44
[Tatel] H-Line Log III, 1953-1954	3	1
[Tatel] H-Line Log IV, 1954-1955		2
[Tatel] H-Line Log V, 1955-1956		3
[Tatel] H-Line Log VI, 1957-1958		4
[Tuve] H-Line Observations, 1966-1967		5
[Tuve] H-Line Observations, 1968 [Folder 1 of 2]		6
[Tuve] H-Line Observations, 1968 [Folder 2 of 2]		7
[Tuve] H-Line Observations, 1969		8
[Tuve] H-Line Observations, 1970		9
[Tuve] H-Line Observations, 1971		10
[Tuve] H-Line Observations, 1971-1972 [Folder 1 of 2]		11
[Tuve] H-Line Observations, 1971-1972 [Folder 2 of 2]		12
[Tatel] Instrument Log, 1954-1959		13
Jupiter Interferometer-River Road, 1955-1956		14
[Turner] Point Check List, n.d.		15
[Tatel] PPA [Precise Position Apparatus] Observations, 1956-1960		16
[Tatel] PPA [Precise Position Apparatus] Record Reductions, 1958-1960		17
[Tuve] Search for Very High Velocity Clouds, 1971 [Folder 1 of 2]		18
[Tuve] Search for Very High Velocity Clouds, 1971 [Folder 2 of 2]		19
[Tuve] Search for Very High Velocity Clouds, 1972		20

Folder Listing

	<u>Box</u>	<u>Folder</u>
[Tuve] Search for Very High Velocity Clouds, 1973		21
[Tuve] Search for Very High Velocity Clouds, 1973-1974		22
[Tuve] Search for Very High Velocity Clouds, 1975		23
[Tuve] Special Observations, 1958, 1960	Map Drawer 19	4
[Tuve] Untitled, 1966-1968	3	24

Series 5: Photographs, 1953-1965, n.d.

60 Foot Radio Telescope-Derwood, Maryland, n.d.	5	1
100 Foot Radio Telescope-Avery Road, Maryland, May-June 1965		2
100 Foot Radio Telescope-Avery Road, Maryland, n.d.		3
100 Foot Radio Telescope (Dish Lift)-Avery Road, Maryland, 1965		4
100 Foot Radio Telescope-Derwood, Maryland, n.d. [Folder 1 of 2]		5
100 Foot Radio Telescope-Derwood, Maryland, n.d. [Folder 2 of 2]		6
100 Foot Radio Telescope-La Plata, Argentina, 1963		7
100 Foot Radio Telescope-La Plata, Argentina, 1964		8
100 Foot Radio Telescope-La Plata, Argentina, 1965		9
PPA [Precise Position Apparatus]-Seneca, Maryland, n.d.		10
Wurzbug Radio Telescope at DTM, 1953, n.d.		11

Series 6: Ephemera, 1953-1970

Assorted Clippings, 1953-1969	3	25
Escuela Para Astronomos Jovenes, 1970		26
H-Line Newsletter, 1953-1954		27
Open Letter to 78% of the Alumni, 1953		28
DTM Phone List, 1956		29
Planetario Municipal, 1957-1959		30
Plano de la Ciudad de Buenos Aires, 1959		31
Sessions for the Presentation of Scientific Papers, 1953		32

Subject Terms

Topics:	Interstellar hydrogen
	Radar antennas
	Radio astronomy
	Radio telescopes

Corporate Names: Blaw-Knox Co.
Carnegie Institution of Washington. Dept. of Terrestrial Magnetism.
Instituto Argentino de Radioastronomi_a
D. S. Kennedy and Co.

Personal Names: Burke, Bernard F., 1928-
Franklin, Kenneth L.
Tatel, Howard E. (Howard Edwin), 1913-
Turner, Kenneth C.
Tuve, Merle Antony, 1901-1982

Forms: Calculations
Clippings
Correspondence
Ephemera
Graphs
Laboratory notebooks
Logs (records)
Negatives
Notebooks
Photographs
Plans (drawings)
Purchase orders
Manuscripts
Newsletters
Notes
Phonograph records
Reports
Slides (photographs)
Workbooks

Bibliography

Brown, L., *Centennial History of the Carnegie Institution of Washington, Volume II, The Department of Terrestrial Magnetism*. Cambridge: Cambridge University Press, 2004.

Related Collections

Department of Terrestrial Magnetism General Files, 1904-Present, Department of Terrestrial Magnetism, Carnegie Institution of Washington. See the following series in this collection:

CHRONOLOGICAL SERIES for these folder titles:
Argentine-Carnegie Radio Astronomy Station
Int. [International] Argentina-Radio Astronomy

International Correspondence: Astronomy & Radio Astronomy–Argentina
Manuscripts-Radio Astronomy and Upper Air
NAS-Radio Astronomy Symposium
National Radio Observatory, Green Bank, West Virginia
NSF Advisory Panel on Radio Astronomy Agenda of Nov. 11, 1954
NSF-Radio Astronomy Panel
NSF Panel on Radio Astronomy
Radio Astronomy
Radio Astronomy Conference, NSF
Tatel Telescope

ARCHIVES SERIES for these folder titles:

Avery Road–Dish
Avery Road–Site
Carnegie Southern Station-La Plata
Derwood Experimental Laboratory
Dudley Observatory
Instituto Argentino de Radioastronomia (IAR)
"Jupiter"-Radio Astronomy Discovery (1955)
Radio Astronomy-NSF Advisory Panel
Radio Astronomy Program–History
Radio Astronomy; H-Line Project

Department of Terrestrial Magnetism Photograph Collection [partially processed]. Department of Terrestrial Magnetism, Carnegie Institution of Washington.

Howard Edwin Tatel Papers. Department of Terrestrial Magnetism, Carnegie Institution of Washington.

Merle Antony Tuve Papers. Manuscript Division, Library of Congress, Washington, D.C.