

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



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

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January 2006
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January 2018

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TABLE OF CONTENTS

	Page
Introduction	1
Administrative History	1
Scope and Contents Note	2
Folder Listing	5
Subject Terms	9
Bibliography	10
Related Collections	10

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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: 7.75 linear feet: 3 records center cartons, 4 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. John Firor's research records, relating to his work as a scientist for DTM's radio astronomy program, were acquired from NOAA in 2015, and added to this collection in 2018.

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

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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. An addition of 15 notebooks, two manuscripts, and one box of film was processed by Mary Ferranti in January 2018.

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 and studies of radio emission from the sun.

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
[Firor] Explosions and Collisions, n.d.		3
[Burke] Further Observations of Radio Emission from the Planet Jupiter, 1956		4
Hydrogen Line Observations, 1953		5
[Turner] Medicion de la Posicion, Estructura y Polarizacion de Radiofuentes Extragalacticas, 1970		6
[Turner] Modelos de Nubes Cosmicas en Contraccion Gravitatoria, n.d.		7
[Turner] Radio Astronomy, 1971		8
[Tuve] Radio Astronomy Bibliography, 1958		9
[Burke] Radio Observations of the Planet Jupiter, 1958		10
Relation of 11 Meter Solar System Phenomena to Solar Disturbances, 1956		11
[Erickson] Survey of Neutral Hydrogen at High Galactic Latitudes, 1958		12
[Firor] Untitled, n.d.		13
[Tuve] Velocity Structures in Hydrogen Profiles, 1972		14
 Series 3: Data, 1950-1972, n.d.		
[Burke] 21-cm, 1955		15
[Helfer] Calculation of A, B, C Tables, 1954		16
Correction Due to the Sun's Motion in the Galaxy, 1955		17
[Burke] Cygnus A, July 1955		18
Dutch Profiles, n.d.		19
[Tatel] Final Curves, 1953		20
HI Observations, 1953-1954		21
[Burke] Jupiter, 1950-1957 [Folder 1 of 2]		22
[Burke] Jupiter, 1950-1957 [Folder 2 of 2]		23
[Burke] Jupiter, 31 Oct-7 Nov 1955		24
[Burke] Jupiter, 16 Dec 1955-1 Jan 1956		25
[Burke] Jupiter, n.d.		26
[Burke] Jupiter-Including Occultation of M1 by Moon, 15 Feb-2 Mar 1956		27
[Burke] Jupiter-Recording [Sound], 1955	Box Phonograph Record Storage 1	
[Burke] Jupiter-Solar System, 1954-1956	2	28
[Tatel] Local Motion Corrections, 1953		29
[Turner] M-31, 1962		30
[Turner] M-31 and M-33 Observations, 1963-1964		31

Folder Listing

	<u>Box</u>	<u>Folder</u>
[Turner] M-31 and M-33 Reductions, n.d.		32
[Turner] M-33, n.d.		33
Points on the Galactic Equator, 1953		34
[Tatel] Reduced Curves, n.d.		35
[Tatel] Sample Data, 1953-1955		36
[Tuve] Sample Data, 30 Nov 1956	4	Item 1
[Tuve] Sample Data, 9 Feb 1959		Item 2
[Tuve] Sample Data, 23 Apr 1971		Item 3
[Tuve] Sample Data, 14 Apr 1972		Item 4
Sweep Records, 1960		Item 5
[Tuve] Tests, 1954	2	37
[Burke] Venus Search, n.d.		38
Series 4: Notebooks, 1953-1975, n.d		
87 MC Log, 1960		39
340 MC Log, 1960		40
Calculations, 1960		41
[Helfer] Calculations and Reductions, 1953		42
[Tuve] Calibrations, 1958	Map Drawer 19	3
Comments on Solar Records, n.d.	2	43
[Turner] D-I, 1970-1971		44
[Turner] D-II, 1971-1973		45
[Firor], Helix Array, 1956		46
Helix Array, 1957		47
Helix Array, 1958-1959		48
Helix Array, 1959-1960		49
[Tuve] H-Line Calculations and Reductions, 1953 [Folder 1 of 2]	3	1
[Tuve] H-Line Calculations and Reductions, 1953 [Folder 2 of 2]		2
[Tuve] H-Line Calibrations, 1954-1957		3
[Tatel] H-Line Log I, 1951-1952		4
[Tatel] H-Line Log II, 1953		5
[Tatel] H-Line Log III, 1953-1954		6
[Tatel] H-Line Log IV, 1954-1955		7
[Tatel] H-Line Log V, 1955-1956		8
[Tatel] H-Line Log VI, 1957-1958		9
[Tuve] H-Line Observations, 1966-1967		10
[Tuve] H-Line Observations, 1968 [Folder 1 of 2]		11
[Tuve] H-Line Observations, 1968 [Folder 2 of 2]		12
[Tuve] H-Line Observations, 1969		13
[Tuve] H-Line Observations, 1970		14
[Tuve] H-Line Observations, 1971		15
[Tuve] H-Line Observations, 1971-1972 [Folder 1 of 2]		16
[Tuve] H-Line Observations, 1971-1972 [Folder 2 of 2]		17
[Tatel] Instrument Log, 1954-1959		18

Folder Listing

	<u>Box</u>	<u>Folder</u>
Jupiter Interferometer-River Road, 1955-1956		19
[Turner] Point Check List, n.d.		20
[Tatel] PPA [Precise Position Apparatus] Observations, 1956-1960		21
[Tatel] PPA [Precise Position Apparatus] Record Reductions, 1958-1960		22
[Firor], Quiet Sun Book 1, 1953 [Folder 1 of 2]		23
[Firor], Quiet Sun Book 2, 1954 [Folder 2 of 2]		24
Reduction Tables, n.d.	6	1
River Road, 1959-1960	3	25
[Tuve] Search for Very High Velocity Clouds, 1971 [Folder 1 of 2]		26
[Tuve] Search for Very High Velocity Clouds, 1971 [Folder 2 of 2]		27
[Tuve] Search for Very High Velocity Clouds, 1972		28
[Tuve] Search for Very High Velocity Clouds, 1973		29
[Tuve] Search for Very High Velocity Clouds, 1973-1974		30
[Tuve] Search for Very High Velocity Clouds, 1975		31
[Firor-Stinson], Solar 87.3 MC/S, 1959		32
Solar Scans, 1958	6	2
Solar Scans, 1959	7	1
Solar Scans, 1960	7	2
[Tuve] Special Observations, 1958, 1960	Map Drawer 19	4
[Tuve] Untitled, 1966-1968	3	33
[Firor] Untitled, n.d.		34
 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
Wurzburg Radio Telescope at DTM, 1953, n.d.		11

Folder Listing

	<u>Box</u>	<u>Folder</u>
Series 6: Ephemera, 1953-1970		
Assorted Clippings, 1953-1969	3	35
Escuela Para Astronomos Jovenes, 1970		36
H-Line Newsletter, 1953-1954		37
Open Letter to 78% of the Alumni, 1953		38
DTM Phone List, 1956		39
Planetario Municipal, 1957-1959		40
Plano de la Ciudad de Buenos Aires, 1959		41
Sessions for the Presentation of Scientific Papers, 1953		42

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 Radioastronomía D. S. Kennedy and Co.
Personal Names:	Burke, Bernard F., 1928- Firor, John 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.

John W. Firor Papers. National Center for Atmospheric Research, Boulder, Colorado.

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