



Smithsonian

National Museum of American History Kenneth E. Behring Center

Guide to the Andrew Chi Atomic Clocks Collection

NMAH.AC.1264

Alison Oswald

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Archives Center, National Museum of American History
P.O. Box 37012
Suite 1100, MRC 601
Washington, D.C. 20013-7012
Business Number: Phone: 202-633-3270
Fax Number: Fax: 202-786-2453
archivescenter@si.edu
<https://americanhistory.si.edu/archives>

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Collection Overview

Repository:	Archives Center, National Museum of American History
Title:	Andrew Chi Atomic Clocks Collection
Date:	1959-1980
Identifier:	NMAH.AC.1264
Creator:	Chi, Andrew (Creator)
Extent:	2 Cubic feet (5 boxes)
Language:	English .
Summary:	The collection consists of the papers of scientist Andrew Chi, documenting his work on the Cesium 133 atomic clock, and its relevance to the Global Positioning System.

Administrative Information

Acquisition Information

Immediate source of acquisition unknown.

Provenance

Collection was found in the Division of Medicine and Science, National Museum of American History, in 2012.

Processing Information

Collection processed by Alison Oswald, archivist, 2023.

Preferred Citation

Andrew Chi Atomic Clocks Collection, Archives Center, National Museum of American History.

Restrictions

Collection is open for research but is stored off-site and special arrangements must be made to work with it. Contact the Archives Center for information at archivescenter@si.edu or 202-633-3270.

Conditions Governing Use

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Biographical / Historical

Andrew R. Chi was head of the Timing Systems Section, Space Data Control Branch, at the Goddard Space Flight Center.

Scope and Contents

The collections contains correspondence, memorandum, and journal articles related to the Cesium 133 atomic clock. Many of the documents relate to the U.S. Study Group 7, International Radio Consultative Committee (CCIR) which was formed to prepare documents to determine the United States position in relating to worldwide service of standard frequency and time-signal emissions. The CCIR is an advisory arm on technical matters to the International Telecommunications Union (ITU).

Arrangement

The collection is arranged into two series.

Series 1: U.S. Study Group 7, International Radio Consultative Committee (CCIR) Materials, 1964-1980

Series 2: Other Materials, 1959-1977

Names and Subject Terms

This collection is indexed in the online catalog of the Smithsonian Institution under the following terms:

Subjects:

Atomic clocks

Types of Materials:

Charts
Correspondence -- 20th century
Graphs
Memorandums -- 1950-2000
Proceedings
Reports -- 20th century

Names:

United States. National Aeronautics and Space Administration

Container Listing

Series 1: U.S. Study Group 7, International Radio Consultative Committee (CCIR) Materials, 1964-1980

Box 1, Folder 1	U.S. Study Group 7, International Radio Consultative Committee (CCIR), document list, undated
Box 1, Folder 2	U.S. Study Group 7, International Radio Consultative Committee (CCIR), documents, 1964-1966 Notes: Includes <i>Technical News</i> from the u.S. Department of Commerce, National Bureau of Standards for January 1965.
Box 1, Folder 3	U.S. Study Group 4, 7, 8, and 9, International Radio Consultative Committee (CCIR), interim meeting, Monte Carlo, 1965-1966
Box 1, Folder 4	U.S. Study Group 7, International Radio Consultative Committee (CCIR), meeting, 1967-01
Box 1, Folder 5	U.S. Study Group 7, International Radio Consultative Committee (CCIR), meeting, 1967-10
Box 1, Folder 6	U.S. Study Group 7, International Radio Consultative Committee (CCIR), meeting, Boulder, Colorado, 1968
Box 1, Folder 7	U.S. Study Group 7, International Radio Consultative Committee (CCIR), standard frequencies and time-signals, Boulder, 1968-07
Box 1, Folder 8	U.S. Study Group 7, International Radio Consultative Committee (CCIR), report, final meeting, Geneva, Switzerland, 1969
Box 1, Folder 9	U.S. Study Group 7, International Radio Consultative Committee (CCIR), interim meeting, Geneva, Switzerland, 1969-1971
Box 2, Folder 1	U.S. Study Group 7, International Radio Consultative Committee (CCIR), definitions and terminology, 1969-1975
Box 2, Folder 2	U.S. Study Group 7, International Radio Consultative Committee (CCIR), International Working Party, 1970-09
Box 2, Folder 3	U.S. Study Group 7, International Radio Consultative Committee (CCIR), 1971
Box 2, Folder 4	U.S. Study Group 7, International Radio Consultative Committee (CCIR), interim meeting, Geneva, Switzerland, 1971-02

Box 2, Folder 5	U.S. Study Group 7, International Radio Consultative Committee (CCIR), meeting minutes, agendas and miscellaneous, 1972-1977
Box 2, Folder 6	U.S. Study Group 7, International Radio Consultative Committee (CCIR), final meetings, Geneva, Switzerland, 1974-03
Box 2, Folder 7	U.S. Study Group 7, International Radio Consultative Committee (CCIR), 13th Plenary, Geneva, Switzerland, 1974-05
Box 2, Folder 8	U.S. Study Group 7, International Radio Consultative Committee (CCIR), interim working party definitions, 1974
Box 2, Folder 9	U.S. Study Group 7, International Radio Consultative Committee (CCIR), final meetings (second series of contributions), 1974
Box 2, Folder 10	U.S. Study Group 7, International Radio Consultative Committee (CCIR), meetings, 1974-1975
Box 2, Folder 11	U.S. Study Group 7, International Radio Consultative Committee (CCIR), National Committee, 1978
Box 2, Folder 12	U.S. Study Group 7, International Radio Consultative Committee (CCIR), final meeting, Geneva, Switzerland, 1978-01
Box 3, Folder 1	U.S. Study Group 7, International Radio Consultative Committee (CCIR), recommendations and reports of the CCIR, 1978
Box 3, Folder 2	U.S. Study Group 7, International Radio Consultative Committee (CCIR), participation form, 1979
Box 3, Folder 3	U.S. Study Group 7, International Radio Consultative Committee (CCIR), Interim Meeting, Geneva, Switzerland, 1980-06
Box 3, Folder 4	U.S. Study Group 7, International Radio Consultative Committee (CCIR), membership information, 1971 Notes: File includes an overview of the U.S. Study Group 7 CCIR Project.

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Series 2: Other Materials, 1959-1977

Box 3, Folder 5	Clock/time, very low frequency comparion, 1959-1966
Box 3, Folder 6	Timing Systems Section, correspondence of Andrew Chi, 1964-1971
Box 3, Folder 7	Jet Propulsion Laboratory, very long baseline interferometry, 1965-1973 Notes: File includes a National Aeronautics and Space Administration Invention Report, Clock Synchronization Error Resolving Means for inventor Warren L. Martin, 1968.
Box 3, Folder 8	Rubidium-related journal articles, 1965
Box 3, Folder 9	Frequency Stability of Rubidium Gas Cells (by Andrew Chi), 1966
Box 3, Folder 10	Hydrogen Maser-related materials, 1966-1969, 1976
Box 3, Folder 11	Apollo Frequency Stability, 1967
Box 3, Folder 12	Modified Julian Day (time code), 1967
Box 4, Folder 1	Performance Specification on Apollo Precision Frequency Source, 1967-01-31
Box 4, Folder 2	Field Evaluation of MSFN Atomic Frequency Standards, Goddard Flight Space Center (by Fran Stetina), 1967-11
Box 4, Folder 3	Hydrogen Maser Studies, 1968-1969
Box 4, Folder 4	Atomic Hydrogen Maser for Space Vehicle Application, final report, phase 1, 1968-04
Box 4, Folder 5	Time frequency-related articles, 1968-1974
Box 4, Folder 6	Very Long Baseline, Interferometry as a means of Worldwide Time Synchronization (by A.E.E. Rogers and J.M. Moran), 1969-02
Box 4, Folder 7	Technical Memorandum, Global Timing Systems of Nanosecond Accuracy Using Satellite References, 1969-10
Box 4, Folder 8	Extremely Stable Long-Distance Frequency Standard Distribution System, proposal, 1969-10
Box 4, Folder 9	Rubidium Spacecraft Atomic Timing System, final report, 1969-12
Box 4, Folder 10	Apollo Beam Data Analysis, final report, 1970-04
Box 4, Folder 11	Military Specification, Frequency Standards Cesium Beam, 1970, 1972

Notes: Includes information about Cesium Beam, Type I (1972); Cesium Beam, Type II (1972); and Cesium Beam, Type III (1972).

Box 4, Folder 12	Spaceborne Atomic Clock, 1970-05
Box 4, Folder 13	Propagation Delay in the Atmosphere, Goddard Space Flight Center (by David M. Levine), 1970-11
Box 4, Folder 14	Performance of Cesium Beam Frequency Standards and Clock Modelling, 1970-12
Box 5, Folder 1	"New Activities", 1970-1973 Notes: Consists of memorandum, agenda, calculations and notes that relate to satellites, receivers, gravitational red shift probes, and very low frequency time transmissions.
Box 5, Folder 2	Spin Exchange in Collisions Between He + Ions, Goddard Space Flight Center (by G.M. Ressler and F.G. Major), 1971-01
Box 5, Folder 3	Spaceborne Clock System (GEOS Timing Experiment), 1971-11
Box 5, Folder 4	Global Clock Synchronization Via a Satellite (by Straton C. Louis), 1971
Box 5, Folder 5	Time and Frequency by Satellite, articles, 1971-1976
Box 5, Folder 6	Atomic Clock Relativity Experiment (Apollo 17 and Skylab flights), 1972
Box 5, Folder 7	Relaxation Time Measurements by an Electronic Method (by R. Brousseau and J. Vanier), 1972
Box 5, Folder 8	International Electromechanical Vocabulary, 1972
Box 5, Folder 9	Periodic Components in Every Low Frequency (LVF) Propagation, 1973
Box 5, Folder 10	Space Qualifiable Fixed Frequency Oscillators, 1974-08
Box 5, Folder 11	Precise Time Dissemination Experiment, Goddard Space Flight Center (by Andrew Chi), 1975-10
Box 5, Folder 12	Precise, Accurate and Time and Time Interval (PATTI) Experiment, 1975
Box 5, Folder 13	Frequency Stability (Report 580), 1976-1977
Box 5, Folder 14	Role of Time Frequency in Navy Navigation Satellites (by Roger Easton), undated
Box 5, Folder 15	Calculations, undated

Box 5, Folder 16

Phase value graphs, undated

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