



Smithsonian

National Museum of American History Kenneth E. Behring Center

Guide to the Robert Ledley Papers

NMAH.AC.1135

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Collection Overview

Repository:	Archives Center, National Museum of American History
Title:	Robert Ledley Papers
Date:	1972-1990
Identifier:	NMAH.AC.1135
Creator:	Ledley, Robert S. National Biomedical Research Foundation. Georgetown University
Extent:	3 Cubic feet
Language:	English .
Summary:	The Robert Ledley Papers document the development of the first whole-body diagnostic imaging system, the Automatic Computerized Transverse Axial (ACTA) X-ray Scanner by Ledley in 1973. Also included is material relating to Ledley's company, Digital Science Information Corporation (DISCO), as well as the public and medical communities' reactions to the scanner.

Administrative Information

Acquisition Information

This collection was donated by Robert S. Ledley on September 18, 1984.

Provenance

The papers were transferred to the Archives Center in 2008 from the Division of Medicine and Science (now Division of Medicine and Science).

Separated Materials

An ACTA Scanner and numerous accessories were donated to the Division of Medicine and Science in 1984.

Processing Information

Processed by Elizabeth Garber (intern), June 2009; supervised by Alison Oswald, archivist.

Preferred Citation

Robert Ledley Papers, 1972-1984, Archives Center, National Museum of American History, Smithsonian Institution

Restrictions

The collection is open for research.

Conditions Governing Use

Collection items available for reproduction, but the Archives Center makes no guarantees concerning intellectual property rights. Archives Center cost-recovery and use fees may apply when requesting reproductions.

Biographical / Historical

Robert Steven Ledley was born in Flushing Meadows, New York in 1926. He received a D.D.S. degree from New York University College in 1948. While attending dental school, he simultaneously studied at Columbia University; he earned a M.A. in Theoretical Physics in 1949. He volunteered for the army and was sent to the U.S. Army Medical Field Service School in Fort Sam Houston, Texas.¹ After completing his service, Ledley held a wide variety of research and academic positions in physics, electrical engineering, and medicine.

Ledley was a physicist within the External Control Group of the Electronic Computer Laboratory of the National Bureau of Standards from 1953-1954. He was an operations research analyst within the Strategic Division of the Operations Research Office at Johns Hopkins University from 1954-1956. Ledley went on to become an associate professor in the Department of Electrical Engineering at The George Washington University from 1956-1960 while also serving as a consultant mathematician at the National Bureau of Standards Data Processing Systems Division, 1957-1960. At this time, Ledley also worked part time at the National Research Council's National Academy of Sciences from 1957-1961. Ledley became the president of the National Biomedical Research Foundation in 1960, a position he still holds today. He was an instructor of pediatrics at the Johns Hopkins University School of Medicine from 1960-1963. He returned to The George Washington University's Department of Electrical Engineering in 1968 where he was a professor until 1970. He then became a professor in the Department of Physiology and Biophysics at the Georgetown University School of Medicine in 1970. In 1974, Ledley also became a professor in the Radiology Department at the Georgetown University Medical Center. In 1975, he became the director of the Medical Computing and Biophysics Division at Georgetown University Medical Center.

In 1972, the British company Electric and Musical Industries Limited (EMI) released a medical imaging machine for use on smaller areas of the body that were positioned under a water tank. In 1973, Ledley developed the Automatic Computerized Transverse Axial (ACTA) X-ray Scanner (US Patent #3,922,552). This machine was a whole-body diagnostic medical imaging system. He was awarded a grant from the National Institutes of Health for an engineering equipment project, but the money was never received due to budget cuts. Ledley looked elsewhere for funding. He consulted with Georgetown staff and discovered a neurosurgeon had asked to buy a head scanning machine from EMI. Ledley did not think the images in EMI's brochure appeared clear, and he offered to create a similar machine for half the price. Georgetown agreed to fund this project for \$250,000. Ledley secured the services of a machinist at a local machine shop, an electronic engineer, and a programmer/mathematician to assist in the project.² The ACTA Scanner debuted in February, 1974 and did not require the use of a water tank.

Following the creation of the ACTA Scanner, Ledley organized Digital Information Science Corporation (DISCO) in order to manufacture the system. DISCO began producing scanners as orders were received. Due to financial constraints, DISCO was forced to request \$100,000 upon receipt of the order, \$100,000 when the scanner was halfway completed, and the final \$100,000 payment upon delivery³. In 1975, Pfizer purchased the rights to manufacture the ACTA Scanner from DISCO for \$1.5 million.

Ledley is a Fellow of the American Association for the Advancement of Science and a senior member of the Institute of Electrical and Electronics Engineers. He has earned numerous awards and honors for his work. In 1997, he received the National Medal of Technology from President William Jefferson Clinton for his pioneering work on the whole-body CT diagnostic X-ray scanner. He also founded the Pattern Recognition Society and Computerized Tomography Society.

Sources

1 Ash, J., D. Sittig, and R. Ledley. "The Story Behind the Development of the First Whole-body Computerized Tomography Scanner as Told by Robert S. Ledley." *Journal of the American Medical Informatics Association*, 2006 Sep-Oct (2006), 465-469, <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1561796>. (accessed June 24, 2009).

2 Ibid.

3 Ibid.

Scope and Contents

The Robert Ledley Papers document the development of the Automatic Computerized Transverse Axial (ACTA) X-ray Scanner, Ledley's company Digital Science Information Corporation (DISCO), as well as the public and medical communities' reactions to the scanner. The collection is arranged into nine series.

Series 1, ACTA Scanner I Schematics, 1973-1975; Series 2, ACTA Scanner I [Computer and Electronics], 1973; and Series 3, ACTA Scanner Tomograph Mechanics, 1973-1974 document the development and design of the ACTA scanner through drawings, notes, memoranda, and product information. More detailed information about these materials is located in the control file. All oversized drawings have been moved to flat storage for preservation concerns.

Series 4, ACTA Scanner Operating Instructions, 1975, is the operating manual created for the scanner used in Ledley's Georgetown lab.

Series 5, ACTA Articles, Clippings, and Press Releases, 1973-1979, is comprised of the aforementioned materials relating to the ACTA Scanner. Newspaper clippings illuminate the public's perception of the scanner, and scientific pieces highlight the medical community's reaction. Ledley's published articles on the scanner and related topics are included.

Series 6, Digital Information Science Corporation (DISCO) material, 1973-1981, documents Ledley's career and his company. A biographical sketch, list of articles, textbooks, and patents highlight Ledley's achievements. Invoices, receipts, contracts, and correspondence illuminate the financial situation at DISCO and the relationship between the company and Pfizer.

Series 7, Computer manuals, 1972-1975, documents the computer systems and software that were used with the ACTA Scanner.

Series 8, Photographic material, 1973-1978, includes an album of photographs depicting the ACTA Scanner and images of the scans it created. This album was disassembled due to preservation concerns. This series also includes a collection of slides featuring the scanner and related equipment in use and images of the scans it created. A detailed description of each photograph and slide is included in the control file.

Series 9, ACTA Scanner film, [1974?], is a 16mm narrated film describing the creation of the scanner, its components, the way they work, the scanner in use, and images of the scans produced.

Arrangement

This collection is arranged into nine series.

Series 1, ACTA Scanner I Schematics, 1973-1975

Series 2, ACTA Scanner I [Computer and Electronics], 1973

Series 3, ACTA Scanner Tomograph Mechanics, 1973-1974

Series 4, ACTA Scanner Operating Instructions, 1975

Series 5, ACTA Articles, Clippings, and Press Releases, 1973-1979

Series 6, Digital Information Science Corporation (DISCO) material, 1973-1981, undated

Series 7, Computer manuals, 1972-1975

Series 8, Photographic material 1973-1978

Subseries 1, Photographs, 1973-1978

Subseries 2, Slides, 1974

Series 9, ACTA Scanner film [1974?]

Names and Subject Terms

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

Subjects:

- Biology
- Diagnostic imaging
- Digital Information Science Corporation
- History of science and technology
- Inventions -- 20th century
- Inventors
- Medical innovations
- Medical radiology
- Medical technology
- Medicine
- Radiology
- Tomography
- Whole body imaging

Types of Materials:

- Albums
- Articles -- 20th century
- Correspondence -- 20th century
- Design drawings
- Diagrams
- Manuals -- 1970-1990
- Motion pictures (visual works) -- 20th century
- Notes
- Patents
- Photographs
- Slides (photographs) -- 1950-2000

Names:

- Automatic Computerized Transverse Axial Scanner
- Computer-Assisted Tomography Scanner
- National Biomedical Research Foundation. Georgetown University

Container Listing

Series 1: ACTA Scanner I Schematics, 1973-1975, undated

Box 1, Folder 1	Video Amp Design (ACTAT) A1, 1973-1974, undated
Box 1, Folder 2	Video Amp #2 A2, 1974, undated
Box 1, Folder 3	Analog Signal Generator A8, 1973, undated
Box 1, Folder 4	A/D Convertor #1 Card A3, 1973-1974, undated
Box 1, Folder 5	A/D Convertor #2 A4, 1973-1974, undated
Box 1, Folder 6	Miscellaneous Analog (A & B) A9, 1973, undated
Box 1, Folder 7	Translate Accel Pulses A10, 1973-1975, undated
Box 1, Folder 8	Miscellaneous AN-2 A11, undated
Box 1, Folder 9	Shutter & [Lights] L2, 1973-1974, undated
Box 1, Folder 10	X-X-X Logic L0, 1974, undated
Box 1, Folder 11	Translation Card L3, 1974, undated
Box 1, Folder 12	Rotation Card L4, undated
Box 1, Folder 13	Miscellaneous Logic L5, 1973, undated
Box 1, Folder 14	[Light] Pulse control & 161 L6, 1974, undated
Box 1, Folder 15	L7 (Ramp & Sample), 1973-1974, undated
Box 1, Folder 16	Extra Logic L8, 1974, undated
Box 1, Folder 17	Ex-Ex Logic L9, undated
Box 1, Folder 18	L10, undated
Box 1, Folder 19	Back Panel Wiring List, undated
Box 1, Folder 20	To Do's for L7 & L8, 1974, undated
Box 1, Folder 21	Bed Control ACTA #1, 1974, undated

Box 1, Folder 22	Horizontal Bed Logic ACTA 1 BC0, undated
Box 1, Folder 23	Bed Control Logic ACTA 1 BC1, 1975, undated
Box 1, Folder 24	Bed Control Analog Card BC2, undated
Box 1, Folder 25	Bed Power Driver BC3, undated
Box 1, Folder 26	ACTAT Checkout, 1973
Box 1, Folder 27	X-ray tests, 1973-1974, undated
Box 1, Folder 28	Interface Card MD4, undated
Box 1, Folder 29	Clutch Card (#2) MD5, 1974-1975, undated
Box 1, Folder 30	L Rack [Modifications], undated
Box 1, Folder 31	Shutter Electronics, 1973-1974, undated

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Series 2: ACTA Scanner I [Computer and Electronics], 1973, undated

Box 1, Folder 32-33

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Series 3: ACTA Scanner Tomograph Mechanics, 1973-1974, undated

Box 2, Folder 1-2

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Box 1, Folder 34

Drawings, 1990-11-08 - 1990-11-08

Series 4: ACTA Scanner Operating Instructions, 1975

Box 2, Folder 3	ACTA Scanner Operating Instructions, 1975
Box 4	ACTA Scanner Operating Instructions (decorative binder), 1975
Map-folder 1	ACTA Scanner instructional guide, undated

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Series 5: ACTA Articles, Clippings, and Press Releases, 1973-1979

Box 2, Folder 4-5	ACTA Articles and press releases, 1973-1979
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Box 2	Articles and clippings, 1973-1979
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Series 6: Digital Information Science Corporation (DISCO) material, 1973-1981, undated

Box 4, Folder 9-10

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Series 7: Computer Manuals, 1972-1975, undated

Box 3, Folder 1	Texas Instruments 960A, 1972
Box 3, Folder 2	Texas Instruments 960A/980A, 1972-1974
Box 3, Folder 3	Texas Instruments 979 Tape Transport, 1974
Box 3, Folder 4-11	Texas Instruments 980, undated
Box 3, Folder 12-17	Texas Instruments 980A, 1972-1973
Box 4, Folder 1-2	Texas Instruments 980A, 1973-1974
Box 4, Folder 3	Texas Instruments 980B, 1974
Box 4, Folder 4	GX-100B, undated
Box 4, Folder 5-7	Texas Instruments DX980, 1975
Box 4, Folder 8	Texas Instruments Direct Memory Access Point Expander, 1974

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Series 8: Photographic Material, 1973-1978

Subseries 8.1: Photographs, 1973-1978

Box 5

[Image\(s\)](#)

Box 4, Folder 9

Copies of photograph album pages, 1973-1978

Subseries 8.2: Slides, 1974

Box 6

[Image\(s\)](#)

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Series 9: ACTA Scanner Film, 1974?

Physical 16mm color composite optical track print, 252 feet - No reference copy available

Characteristics

and Technical

Requirements:

Separated Oversize folders 1-2 are separated for preservation concerns

Materials:

Box 4, Folder 11	ACTA Scanner film documentation (photocopies of labels from original enclosure), 1974?
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Reel 1135.1	16mm color composite optical track print, 1974? 252 Feet
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Map-folder 1-2	Materials separated for preservation concerns, 1974?
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