



# Smithsonian

*National Air and Space Museum*

## Air Cushion Vehicles [Bertelsen] Collection

Amanda Buel

2013



National Air and Space Museum Archives  
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## Collection Overview

<b>Repository:</b>	National Air and Space Museum Archives
<b>Title:</b>	Air Cushion Vehicles [Bertelsen] Collection
<b>Date:</b>	1957-1994 (bulk 1960-1980)
<b>Identifier:</b>	NASM.1994.0013
<b>Creator:</b>	Bertelsen, William
<b>Extent:</b>	4.68 Cubic feet (13 letter-size document boxes, 1 VHS tape)
<b>Language:</b>	English .
<b>Summary:</b>	The Air Cushion Vehicles Collection consists of materials gathered by William R. Bertelsen and it highlights his interest in, and contributions to, the development of Air Cushion Vehicles (ACVs). The bulk of the collection covers the span between 1960 and 1980, but materials before and after those dates are also present. The collection includes photographs, brochures, reports and proceedings, and a videotape on the topic of ACVs. Bertelsen's notebooks, documenting his research and development of air cushion technologies, constitute the majority of the collection.

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## Administrative Information

### Acquisition Information

Donated by William R. Bertelsen; William D. Bertelsen, Jr.

### Processing Information

Arranged, described, and encoded by Amanda Buel, 2013.

### Preferred Citation

Air Cushion Vehicles [Bertelsen] Collection, Accession 1994-0013, National Air and Space Museum, Smithsonian Institution.

### Restrictions

No restrictions on access.

### Restrictions

Please contact the Audio/Visual Archivist to access the VHS tape that is included in this collection.

### Conditions Governing Use

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## Biographical / Historical

William R. Bertelsen was a pioneer in the research and development of Air Cushion Vehicles (ACVs). Born in Moline, Illinois, on May 20, 1920, Bertelsen, initially studied electrical engineering but later pursued medical science studies. He attended the Indiana Institute of Technology, the University of Illinois in Urbana-Champaign, and the University of Illinois College of Medicine. Bertelsen earned his M.D. from the University of Illinois College of Medicine in 1947, while also serving in the United States Navy Reserve.

It was Bertelsen's career as a country doctor that primarily drove him to design and experiment with a variety of ACVs. His need for a way to reach rural patients in all forms of inclement weather quickly evolved into a life-long passion for developing alternative forms of transportation. Persisting through periods of encouragement and rejection alike, Bertelsen designed a number of ACVs and Ground Effect Machines (GEMs), including: Aerobiles 35-1, 35-2, 72, 200-1, 200-2, 250-1; Arcopter GEM-1, GEM-2, GEM-3; and a vertical take-off and landing aircraft (VTOL). He also developed other types of air cushion applications, such as the Aeroplrow, the Aeroduct System of Mass Transportation, and the Air Track Air Cushion Crawler. Additionally, Bertelsen wrote scientific papers, appeared in publications, and participated professionally in a number of domestic and international air cushion vehicles organizations, such as the U.S. Hovercraft Society, the British Hovercraft Society, and the Canadian Aeronautics and Space Institute.

Besides his busy career as a physician and inventor, Bertelsen was also a husband and father of four children. Experiments and tests were often a family affair, as he liked to involve family and neighbors whenever practicable. Bertelsen never truly retired, working for the Metro MRI Center in Moline, Illinois, until March 2009. His final blog posts, only months before his death on July 16, 2009, still encouraged innovation and new ways of thinking about transportation. Several of Bertelsen's vehicles are in the collections of the National Air and Space Museum.

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## Scope and Contents

The Air Cushion Vehicles Collection consists of materials gathered by William R. Bertelsen, highlighting his interest in, and contributions to, the development of ACVs. The bulk of the collection covers the span between 1960 and 1980, but materials before and after those dates are also present. The collection includes photographs, brochures, reports and proceedings, as well as a videotape on the topic of ACVs. Bertelsen's notebooks, documenting the research and development of his vehicles, represent the majority of the collection.

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## Arrangement

The Air Cushion Vehicles [Bertelsen] Collection is arranged as follows:

Series I: Notebooks, Photographs, and Writings

Series II: Personal Research

The arrangement presents the original order of materials. Series 1, Bertelsen's notebooks, photographs, and writings, is in original order (chronological), with folder titles reflecting his original notebook titles. Series 2 is also arranged in original order but with chronology being imposed at the folder level as necessary. Original folder titles are kept when available; titles appearing in brackets [ ] are the archivist's.

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## Names and Subject Terms

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

Subjects:

Air-cushion vehicles  
Bertelsen, William R.  
Ground-effect machines  
Vertical take-off and landing aircraft

Names:

Bertelsen, William

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## Container Listing

### Series 1: Notebooks, Photographs, and Writings, 1957-1994 (bulk 1960-1980)

**Scope and Contents:** This series, ranging in dates from 1957 to 1994, includes Bertelsen's notebooks relating to his research, inventions, experiments, and tests; photographs showing a number of his vehicles; his writings and ground effect machine documentation; as well as his business correspondence with the Canadian Ministry of Transport and Hoverlift Systems. The topics addressed in his notebooks include the aerodynamic sustentation of ground vehicles, a register of inventions, and test and experiment records for the vehicles he developed. Some notebooks include photographs, others do not.

**Arrangement:** Bertelsen's notebooks are organized according to his numbering scheme, which, with a few exceptions, is in chronological order. His photographs are arranged according to their designated Smithsonian Institution (SI) Negative Number. Bertelsen's writings and documentation on his inventions are arranged chronologically and, when necessary, according to the order of their development. Folder titles appearing in brackets [ ] are the archivist's.

Box 1, Folder 1	Notebook 1: Arcopter VTOL Models "Stovepipe" and "Windjammer," March 7, 1957
Box 1, Folder 2	Notebook 2: Experiments on Aerodynamic Sustentation of Ground Vehicles, Volume I, February 17, 1958
Box 1, Folder 3	Notebook 3: Aeromobile Research, Volume II, Research on the Aerodynamic Sustentation and Propulsion of Ground Vehicles, November 4, 1958
Box 1, Folder 4	Notebook 4: Aeromobile Research, Volume III, Research on the Aerodynamic Sustentation and Propulsion of Ground Vehicles, June 29, 1959
Box 1, Folder 5	Notebook 5: Register of Inventions, January 1, 1960
Box 1, Folder 6	Notebook 6: Aeromobile 200 Test Records, Research on the Aerodynamic Sustentation and Propulsion of Ground Effect Vehicles, Volume IV (A-200-1), May 30, 1960
Box 1, Folder 7	Notebook 7: Aeroplw Experiments, August 23, 1960
Box 1, Folder 8	Notebook 8: Aeromobile 200-2 Test Records, January 21, 1961
Box 1, Folder 9	Notebook 9: Arcopter GEM-1 Flight Tests and Research Observations, May 7, 1961
Box 2, Folder 1	Notebook 10: Flight Tests of Arcopter GEM-2, August 21, 1961
Box 2, Folder 2	Notebook 11: Experiments on Deflected Slipstream Vertical Take Off and Landing Aircraft, September 6, 1961

Box 2, Folder 3	Notebook 12: Airtrack Research, December 23, 1961
Box 2, Folder 4	Notebook 13: Arcopter GEM-2 Research Manual, April 30, 1962
Box 2, Folder 5	Notebook 14: Arcopter Model Studies, October 22, 1962
Box 2, Folder 6	Notebook 15: Arcopter GEM-3, September 7, 1963
Box 2, Folder 7	Notebook 16: Aeromobile 250, January 22, 1964
Box 2, Folder 8	Notebook 17: Aeromobile 13, June 10, 1967
Box 3, Folder 1	Notebook 18: Aeroduct-Aeromobile Experiments, October 20, 1966
Box 3, Folder 2	Notebook 19: Progress Book, Aeromobile 13, January 28, 1968
Box 3, Folder 3	Notebook 20: Progress Book, Aeromobile 13, April 3, 1968
Box 3, Folder 4	Notebook 21: Aeromobile 13 Progress Book, October 20, 1968
Box 3, Folder 5	Notebook 22: Aeromobile 14 Progress Book, March 24, 1969
Box 3, Folder 6	Notebook 23: Aeromobile 14 Progress Book, July 11, 1969
Box 3, Folder 7	Notebook 24: Aeromobile 14 Progress Book, September 22, 1969
Box 4, Folder 1	Notebook 25: Aeromobile 15 Progress Book, January 22, 1970
Box 4, Folder 2	Notebook 26: Aeromobile 14 Progress Book, April 5, 1970
Box 4, Folder 3	Notebook 27: Aeromobile 15, September 23, 1970
Box 4, Folder 4	Notebook 28: Aeromobile 15 Notebook, November 25, 1970
Box 4, Folder 5	Notebook 29: A-15 Aeromobile Notebook, October 3, 1971
Box 4, Folder 6	Notebook 30: Aeromobile 15 Notebook, May 27, 1971
Box 4, Folder 7	Notebook 31: Aeromobile 15 Notebook, August 31, 1972
Box 5, Folder 1	Notebook 32: Arcopter Sail Plane. Man Carrying Glider, December 3, 1972
Box 5, Folder 2	Notebook 33: Aeromobile 15 Notebook, June 24, 1973
Box 5, Folder 3	Notebook 34: Arcopter Sail Plane. Man Carrying Glider, May 26, 1974
Box 5, Folder 4	Notebook 35: Arcopter Sail Plane. May Carrying Glider, June 1, 1975

Box 5, Folder 5	Notebook 36: Aeromobile 16 Twin Gimbal Air Cushion Vehicle, November 9, 1975
Box 5, Folder 6	Notebook 37: Aeromobile 16 Twin Gimbal Air Cushion Vehicle, September 17, 1977
Box 5, Folder 7	Notebook 38: Arcopter B-1A, May 15, 1977
Box 6, Folder 1	Notebook 1: Full Scale Air Track Research and Development, April 8, 1988
Box 6, Folder 2	Notebook 2: Full Scale Air Track Research and Development, June 24, 1989
Box 6, Folder 3	Unnumbered Notebook: Aeromobile 17 and Aeroduct Full Scale Prototype Demonstration, May 2, 1994
Box 6, Folder 4	Unnumbered Notebook: Aeromobile 18, November 18, 1994
Box 6, Folder 5	Photographs, Folder 1 of 3 [Negative Numbers 94-13027 through 94-13058], 1957-1960
Box 7, Folder 1	Photographs, Folder 2 of 3 [Negative Numbers 94-13059 through 94-13079], 1969-1978
Box 7, Folder 2	Photographs, Folder 3 of 3 [Negative Numbers 94-13080 through 94-13107], 1960-1974
Box 7, Folder 3	[Writings by William R. Bertelsen], 1959-1989
Box 7, Folder 4	[William Bertelsen's Ground Effect Machines Documentation], 1959-1991
Box 7, Folder 5	Canadian Ministry of Transport, 1975-1976
Box 7, Folder 6	Canadian Ministry of Transport, 1978
Box 7, Folder 7	Hoverlift Systems, 1976-1980

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## Series 2: Personal Research, 1957-1994 (bulk 1960-1980)

**Scope and Contents:** This series contains material gathered for Bertelsen's personal research use and information gathering. Included are newspaper clippings and brochures, articles, conference proceedings and papers, and other miscellaneous materials.

**Arrangement:** The basic folder arrangement of Series 2 adheres to Bertelsen's original order. Newspaper clippings are arranged chronologically, with undated material at the end. Articles and brochures are arranged alphabetically by manufacturer. Folder titles appearing in brackets [ ] are the archivist's titles.

Box 7, Folder 8	[Ground Effect Clippings, 1958-1960], 1958-1960
Box 7, Folder 9	[Ground Effect Clippings, 1961-1969], 1961-1969
Box 7, Folder 10	[Ground Effect Clippings, 1970-1992], 1970-1992
Box 7, Folder 11	[Ground Effect Clippings, undated], undated
Box 8, Folder 1	Other Air Cushion Vehicles [Articles and Brochures - A.C.V. Sales Inc. through Cushionfight], 1966-1985
Box 8, Folder 2	Other Air Cushion Vehicles [Articles and Brochures - Deric Technological Innovation Ltd. through Hovermarine Ltd.], 1968-1985
Box 8, Folder 3	Other Air Cushion Vehicles [Articles and Brochures - Hoverspray through Weston Air Cushion Vehicles Inc.], 1968-1985
Box 8, Folder 4	[Haywood, L.L. The History of Air Cushion Vehicles. Yeovil, England: Normalair Limited], 1962
Box 8, Folder 5	[Symposium on Ground Effect Phenomena], October 21-23, 1959
Box 9, Folder 1	[Newsletters: National Research Council of Canada, Associate Committee on Air Cushion Technology (ACACT)], 1971-1975
Box 9, Folder 2	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 1/72 "Air Cushion Technology in Canada 1972"], June 1972
Box 9, Folder 3	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 1/73 "The Control and Guidance of Light Air Cushion Vehicles"], May 1973
Box 9, Folder 4	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 2/73 "ACV Icing Problems"], October 1973
Box 9, Folder 5	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 3/73 "Air Cushion Technology in Canada 1973"], November 1973
Box 9, Folder 6	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 1/74 "Thrust Systems for Light Air Cushion Vehicles"], February 1974

Box 9, Folder 7	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 2/74 "A Method of Controlling "Skirt-Buzz" in Light Air Cushion Vehicles with Peripheral-Bag Skirts"], February 1974
Box 9, Folder 9	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 4/74 "Permissible Air Pressures - Air Cushion Assisted Vehicles"], April 1974
Box 9, Folder 10	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 5/74 "Proceedings of the Symposium on Heavy Transportation in the Application of Air Cushion Technology"], 6 June 1974
Box 9, Folder 11	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 6/74 "The Caspar ACV Research Report No. 2, The Sensitivity of a Two-Fan, Single-Engine, Multicell ACV to Individual Fan Performance"], September 1974
Box 9, Folder 8	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 3/74 "The Caspar A.C.V. Research Project Report No. 1: Programme and Basic Data"], March 1974
Box 9, Folder 12	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 1/75 "The Caspar ACV Research Project Report No. 3 - On the Drag of Air Cushion Vehicles Overland"], February 1975
Box 10, Folder 1	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 2/75 "The Development of a Non-Dimensional Lift Air Coefficient for Air Cushion Vehicles"], April 1975
Box 10, Folder 2	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 3/75 "Icebreaking with Air Cushion Technology"], September 1975
Box 10, Folder 3	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 4/75 "Towed Air Cushion Rafts (TACRs)"], November 1975
Box 10, Folder 4	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 1/76 "Air Cushion Technology in Canada 1975"], November 1975
Box 10, Folder 5	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 3/76 "The ACV 1/2 Ton Truck - Fact or Fable"], March 1976
Box 10, Folder 6	[Associate Committee on Air Cushion Technology (ACACT) CT Technical Report 5/76 "Caspar ACV Research Project Report No. 4. Program 1, The Multicell Skirt, A Summary"], October 1976
Box 10, Folder 7	["Minutes of the Fourteenth Meeting of the Associate Committee on Air Cushion Technology"], October 28, 1976
Box 10, Folder 8	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 1/77 "The Application of Air Cushion Technology to Icebreaking - Canadian Experience"], January 1977

Box 10, Folder 9	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 2/77 "Proceedings of the 10th Canadian Symposium on Air Cushion Technology"], January 1977
Box 10, Folder 10	["Minutes of the Fifteenth Meeting of the Associate Committee on Air Cushion Technology"], April 22, 1977
Box 10, Folder 11	[Associate Committee on Air Cushion Technology (ACACT) Technical Report 4/77 "Prairie Weak Road Load Relief Program. A Feasibility Study to Determine Which Type of Vehicle Should be Developed to Meet this Need for Heavy Fleet Trucking Operations, for the Movement of Very Heavy Special Loads, and for Farm Trucking Over Poor Roads."], July 1977
Box 10, Folder 12	Eggleton, Peter L. and Jacques Laframboise. "Field Evaluation of Towed Air Cushion Rafts", January 1974
Box 10, Folder 13	International Hovering Craft, Hydrofoil and Advanced Transit Systems Conference Conference Papers. Brighton, England. 13-16 May 1974, May 13-16, 1974
Box 10, Folder 14	Quarterly Bulletin of the Division of Mechanical Engineering and the National Aeronautical Establishment, October 1-December 31, 1974
Box 11, Folder 1	[Sixth Canadian Symposium on Air Cushion Technology], June 12-14, 1972
Box 11, Folder 2	Twelfth Canadian Symposium on Air Cushion Technology Proceedings, Copy 1, September 25-27, 1978
Box 11, Folder 3	Twelfth Canadian Symposium on Air Cushion Technology Proceedings, Copy 2, September 25-27, 1978
Box 11, Folder 4	Thirteenth Canadian Symposium on Air Cushion Technology Proceedings, September 17-19, 1979
Box 11, Folder 5	Fifteenth Canadian Symposium on Air Cushion Technology Proceedings, September 29-30, 1981
Box 12, Folder 1	Sixteenth Canadian Symposium on Air Cushion Technology Proceedings, October 19-21, 1982
Box 12, Folder 2	1984 [Associate Committee on Air Cushion Technology] ACACT International Conference on Air Cushion Technology, September 25-27, 1984 2 Copies (derivative objects) ( There are two (2) copies of this document; one bound, one unbound.)
Box 12, Folder 3	1985 [Associate Committee on Air Cushion Technology (ACACT)] Joint International Conference on Air Cushion Technology, September 24-26, 1985

Box 12, Folder 4	1986 [Associate Committee on Air Cushion Technology] ACACT International Conference on Air Cushion Technology [Preprints and Late Papers], September 16-18, 1986
Box 12, Folder 5	1987 [Associate Committee on Air Cushion Technology] ACACT International Conference on Air Cushion Technology, February 1988
Box 12, Folder 6	1988 Joint International Conference on Air Cushion Technology [Proceedings], September 1988
Box 13, Folder 1	[Papers on Air Cushion Technology] Icebreaking, Cold Weather Operations, Vehicles, September 1989
Box 13, Folder 2	[Papers Presented to the Hovercraft Society], 1979-1982
Box 13, Folder 3	[Proceedings "On a Cushion of Air" A Review of Hovercraft Technology], 1985
Box 13, Folder 4	Multiped Air-Cushion Hybrid Systems [Forest Management Institute Information Report FMR-X-95], April 1977
Box 13, Folder 5	An Evaluation of Air Cushion Assisted Vehicles for On-Road Freight Transportation in the Provinces of Saskatchewan and Alberta [E 78-8], July 31, 1978
Box 13, Folder 6	Air Cushion Vehicles Standards, Vol. 1 [Standards Relating to Design, Construction, and Operational Safety of Dynamically Supported Craft in Canada, Vol. 1], December 1985
Box 13, Folder 7	Chaplin, J.B. Air Cushion Development Yesterday, Today, and Tomorrow [Canadian Aeronautics and Space Institute 25th Anniversary Annual General Meeting], May 1-3, 1979

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