

History of Rocketry and Astronautics

**Proceedings of the Forty-Sixth History Symposium of
the International Academy of Astronautics**

Naples, Italy, 2012

Niklas Reinke, Volume Editor

Rick W. Sturdevant, Series Editor

AAS History Series, Volume 43

A Supplement to Advances in the Astronautical Sciences

IAA History Symposia, Volume 32

Copyright 2015

by

AMERICAN ASTRONAUTICAL SOCIETY

AAS Publications Office
P.O. Box 28130
San Diego, California 92198

Affiliated with the American Association for the Advancement of Science
Member of the International Astronautical Federation

First Printing 2015

ISSN 0730-3564

ISBN 978-0-87703-615-9 (Hard Cover)

ISBN 978-0-87703-616-6 (Soft Cover)

Published for the American Astronautical Society
by Univelt, Incorporated, P.O. Box 28130, San Diego, California 92198
Web Site: <http://www.univelt.com>

Printed and Bound in the U.S.A.

Chapter 7

Konrad Dannenberg: An Ambassador for Space*

William Tyler Helms[†]

Abstract

Space exploration has been a fantasy of mankind since we first turned our heads to the night sky. Konrad Dannenberg spent most of his life making that fantasy a reality. Born in the town of Weißenfels, Germany, as a young man he quickly realized his fascination with space; and later earned a degree in mechanical engineering at Hannover University. In 1939 he was called into military service for Germany as World War II broke out. In mid-1945, Dannenberg and other German engineers surrendered to the U.S. Army and eventually aided the United States in rocket design as a part of Operation Paperclip. While working for the U.S. Army he helped to develop systems such as the Jupiter and the Redstone rockets. He also helped in the development of NASA's Saturn V liquid-fuel expendable rocket engines. This achievement allowed man to walk on the Moon in 1969, as well as the first U.S. orbiting space laboratory, Skylab, in 1973. Though his work greatly helped man succeed in our quest for space exploration, he also had another major contribution to the space community. In retirement Dannenberg became a respected educator at the NASA U.S. Space and Rocket

* Presented at the Forty-Sixth History Symposium of the International Academy of Astronautics, 1–5 October 2012, Naples, Italy. Paper IAC-12-E4.3B.05.

[†] University of Alabama in Huntsville, Alabama, U.S.A.

Center in Huntsville, Alabama, where he inspired the next generation of astronauts and engineers, making him truly an ambassador for space.



Figure 7-1: Konrad Dannenberg in the early 1960s. Credit: Collection of Konrad K. Dannenberg, Department of Archives/Special Collections, M. Louis Salmon Library, University of Alabama in Huntsville, Huntsville, Alabama, U.S.A. (hereafter referred to as: “Dannenberg collection, UAH”).

Biography

Early Years

Konrad K. Dannenberg, Figure 7-1, was born on 5 August 1912, near the city of Weißenfels in Schloss Augustusburg, Germany, to Klara and Hermann Dannenberg. After Dannenberg was born Hermann moved the family to Velber, which is a small town near Hannover. This is where Hermann had family and also had grown up as a boy. Hermann had just finished his twelfth year of service with the German Army. Soldiers who committed to this length of service were known as a “Zwölf-ender,” referring to the antlers on a deer. Before they moved Dannenberg’s dad applied and was hired at the postal service, which was the main reason the family moved to Velber. Dannenberg’s sister was born shortly after their move. Young Dannenberg, his mother and sister Hildegard can be seen in Figure 7-2. His dad later returned to Army duty at the beginning of World War I, serving in Russia and France. His father was fortunate to return after the war uninjured and in good health. Dannenberg recalls that his father brought them back a “Zuckertüte” (a bag of candies) when he returned. Dannenberg attended “Bürgerschule in der Alemann Straße” for the first three years of his education and after an examination was accepted to the “Oberrealschule an der Lu-

therkirche,” which was a high school at a Lutheran church. Dannenberg recalls riding his bicycle to school, going swimming after school hours at the “Goseriede Swim Hall” and also playing water polo. While still in school Dannenberg joined the CVJM, which was a Christian club for young men that met weekly to organize events. One summer through the CVJM Dannenberg attended a camp on the island of Usedom near Heringsdorf. Here he and his friends talked about rocketry and the potential of spaceflight. He also met Albert Püllenber, who became a lifelong friend and who later helped him get a job working for Wernher von Braun. Dannenberg’s first contact with rocketry came in the form of a lecture by the rocket pioneer Max Valier. Valier inspired young Dannenberg and his friends with the possibilities of man going to Mars, however to do this, new types of rockets would need to be developed. In 1928 Dannenberg and a rocketry friend, Hans Lampe, decided to cycle 20 kilometers to see the second and third attempts for a rocket to propel a rail car. Though the second test was successful, the rockets to Dannenberg seemed to have only limited power. However, later on the third test the propulsion of the rockets was increased and as Dannenberg recalls a cat was added as the passenger on the rocket rail car. The rocket had so much acceleration that the car derailed and exploded, which unfortunately killed the cat.¹



Figure 7-2: Dannenberg, mother Klara, and sister Hildegard.
Credit: Dannenberg collection, UAH.

German Army

After high school in 1931 Dannenberg attended the Technical University of Hannover, Figure 7–3. His parents wanted him to be a school teacher, which was considered a secure job. Dannenberg was good at physics and math, but to be a teacher you also had to have a musical talent, which Dannenberg did not. He did try to learn to play a violin, but he could never learn to tune it. Discouraged with not knowing what he wanted to study at the university and not having any enthusiasm with his classes in physics and math, Dannenberg decided to take time away from school to think things over. He joined the German Army during the time of Hitler and the Nazi Party's rise to power. His motive to join was due partly to economic uncertainties and he was not too enthusiastic about his studies at the Hannover Technical University. Dannenberg was assigned to the 13th company of an infantry regiment of 12 companies. His company's job was to provide protection against other armored vehicles. Since he was assigned to a motorized unit, Dannenberg was able to get his driver's license for a range of vehicles including cars, trucks and motor bikes. Dannenberg was discharged a year later as a sergeant. With his training, he was now qualified to enter the officer reserves, which he would later attend a month of exercises every summer and advance to the rank of master sergeant.²

University

With his military training finished Dannenberg went back to the Technical University of Hannover and decided to major in mechanical engineering, since it allowed him to learn more about engine design. At that time the university did not yet offer classes in rocket design. His intent was to focus on diesel engines because of their similarity to rocket combustion engines.³ Dannenberg knew that both of these systems required an extremely precise mixture of fuel and air to produce efficient combustion. While at the university Dannenberg joined the AKAKRAFT student group, which helped provide technical knowledge to people who wanted to get their driver's licenses. This way they could learn how a vehicle works, since that knowledge was required to pass the driver's exam. Under the guidance of Dr. Kurt Neumann and support from the AKAKRAFT, Dannenberg worked on using alternative fuels such as propane to power a converted 1908 Benz. These studies in using alternative fuels to power vehicles interested the government, which led Dannenberg to study the use of diesel fuel for light-weight motor bikes. His master's degree thesis was based on these studies, which was titled "Fuel Injection into High Pressure Combustion Chambers."⁴ Dannenberg gained his master's degree in mechanical engineering in 1938. After his

graduation he did not immediately get a job, but rather stayed at the university, working as an assistant to Professor Neumann.



Figure 7-3: Dannenberg in his early university years.
Credit: Dannenberg collection, UAH.

Vereinigte Deutsche Ota

After two years as assistant to Professor Neumann, Dannenberg received a job offer to work for the VDO, Vereinigte Deutsche Ota, which was a company who built instruments such as fuel gauges and speedometers for automobiles. Dannenberg promptly accepted the offer and started training shortly thereafter. This training period consisted of Dannenberg working in different areas of the company such as customer service, sales, manufacturing and also the repair department. In doing so Dannenberg was able to understand the full cycle of how the company produced and sold its auto instruments. Dannenberg talked about how during training one of his most interesting projects was to design a tachometer for less than 1.00 RM (German Reichsmark). By doing price calculations he was able to determine how much each individual component costs, and how much each department charged as overhead. To save money, it was determined that instead of making the internal wheeled mechanisms out of brass they could be made out of plastic. By doing this they were able to get the price of the tachometer just under their target price.⁵ This type of manufacturing soon came to an end as the VDO switched from making consumer items to producing items for the war and Dannenberg himself was called into duty for the war.

World War II

Before World War II Dannenberg had trained in the military for a mobilized unit, but because he had a Frankfurt mailing address, he was instead assigned to a horse-drawn unit that transported anti-tank cannons. Dannenberg did not enjoy this assigned unit at all. He was required to learn how to feed, shoe,

ride and also take care of horses. As a result of being a master sergeant, he did not have to do these things himself, yet he had to understand how it was done. Dannenberg also had to undergo several months of training before entering the French campaign. Part of this training was to learn how to ride horseback. During one of his exercises his “high-spirited” Arabian horse, Tarantella, stopped right in front of his commander’s car, causing Dannenberg to flip off and land on the car’s hood. This convinced the commander and Dannenberg’s company commander that he was not suited for the horseback campaigns of France, but because of war Dannenberg had to stay with the company. A short while later Dannenberg’s company traveled to Freiburg in Baden. While there Dannenberg was contacted by the VDO, his former employer, to come back and work for them, due to the company needing help in changing their assembly lines. His company commander did not reject the request, and Dannenberg was discharged from the Army. To be discharged during war times was unheard of, but although Dannenberg was disappointed on the onset to be drafted to a horse-drawn unit, it actually saved his life. He found out later through a friend that his entire former mobilized unit was taken out near Moscow, Russia, during the war.

Peenemünde

Peenemünde was a research and test complex for rocket technology, at the mouth of the Peene River, which is northeast of Germany on the Baltic Sea. Its most famous achievement was the development and testing of the A4, later known as the V-2, Figure 7-4. It was established by General Walter Dornberger with Wernher von Braun, Walter Thiel, and Klaus Riedel being the main engineers over the projects of this new facility.⁶ They were initially responsible for briefing engineers and scientists who came to work on the projects at Peenemünde. Dannenberg first learned about Peenemünde from his friend, Albert Püllenber, who wrote to him saying that they were doing “interesting work” and he, Dannenberg, should apply for a job when he got a chance. At the time Dannenberg was still working for the VDO, but after not being happy with his current VDO assignment he decided to apply. He shortly received a reply and was asked to come in for an interview with Dr. Walter Thiel. After discussing with Dannenberg about propulsion problems they were currently having, Dr. Thiel promptly offered Dannenberg a job as a development engineer. Since Dannenberg was still working for the VDO, Dr. Thiel issued a “Dienstverpflichtung,” which was a military draft of civilians. This required the VDO to allow Dannenberg to leave and start working at Peenemünde for the Heeresversuchsanstalt Peenemünde (HVP). Dannenberg’s first assignment at his new job was to maximize the performance of the fuel injectors in combustion chambers under the di-

rection of Gerhard Heller. To accomplish this task Dannenberg was involved in combustion and cold flow tests to maximize their performance.

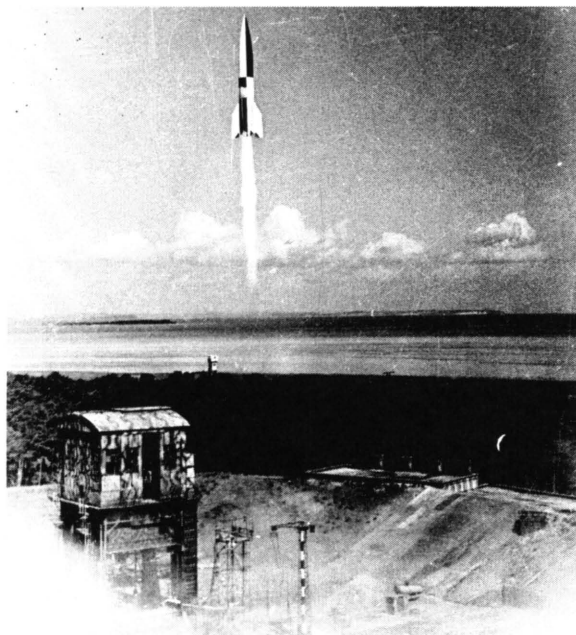


Figure 7-4: Successful launch of A4/V-2 at Peenemünde.
Credit: Dannenberg collection, UAH.

The main reason behind the improvements was the goal to add these systems to aircraft that were too heavy to take-off by themselves. Dannenberg also worked with universities such as the Technical University of Dresden to conduct these cold flow tests. Dr. Walter Thiel believed universities could greatly help their research. When work began on the A4, later to be renamed the V-2, Dr. Walter Thiel, being the propulsion specialist, decided to arrange the thrust units at the top of the combustion chamber. Dannenberg became the development engineer to design these 1,400 kilogram thrust units for the required total of 25,400 kilograms of thrust for the A4 system.⁷ To obtain this level of thrust a new combustion chamber that was water cooled also had to be developed to do testing. Since Dannenberg was the development engineer he was responsible for establishing the requirements for the design of the system with a test plan and evaluation of those test plans. He was also in charge of determining if the requirements of the system had been met at the end of development or if further changes were needed. Dannenberg was married to Ingeborg Margarete Kamke on 8 April 1944, Figure 7-5. However, like a lot of Peenemünde engineers a majority of their time

was spent trying to solve problems such as Dannenberg's thrust units in the combustion chambers, instead of a family life.

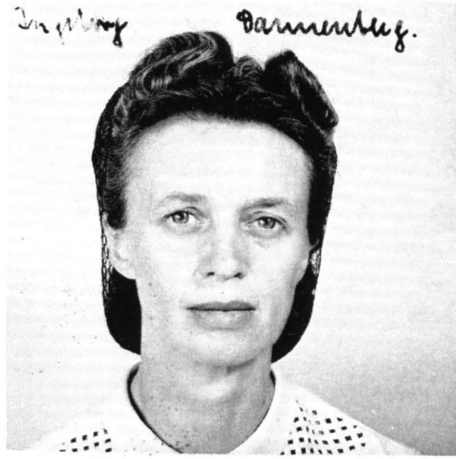


Figure 7-5: Dannenberg's wife, Ingeborg Dannenberg, in late 1949.
Credit: Dannenberg collection, UAH.

The development of these chambers took place at Test Stand #3 in Peenemünde, which was operated by chief mechanic Willi Pflanze. At this stand Dannenberg, under direct supervision of Gerhard Heller, tested the arrangement of the thrust units also known as oxidizer injectors; these were brass nozzles arranged at the top of the combustion chamber. This arrangement was very important, and the tests conducted by Dannenberg were meant to find the perfect arrangement by experimentation to achieve the required thrust for the system. Many tests resulted in a burn through of the combustion chamber walls, which required the arrangement of the nozzles to be reworked.

On 3 October 1942, their efforts to design a new long range rocket were successful with the launch of the A4. Reaching an altitude of 80 km and a range of roughly 196 km, the A4 was the first large liquid propelled rocket. On 17 August 1943, a major air raid on Peenemünde caused about 800 casualties and damage to laboratories and production facilities.⁸ Test stand number 7, Figure 7-6, was left unharmed after the air raids, but time has left it in disarray. Between January and March 1945 due to advancing Russian forces, Wernher von Braun and a majority of the Peenemünde rocket team headed to more central parts of Germany. Dannenberg also had a son by the name of Klaus Dieter Dannenberg born during this time. In late spring of 1945 the rocket team made contact with an intelligence specialist from the United States named Colonel Holger Toftoy for a secret project known as Operation Paperclip.



Figure 7-6: Dannenberg and tour guide near Test Stand #7.
Credit: Dannenberg collection, UAH.

Operation Paperclip

Operation Paperclip was a post-World War II project by the United States, headed by Colonel Toftoy, to bring the German Peenemünde rocket scientists and engineers to the country in order for the U.S. Army to learn how to launch V-2s; in addition learn the technology behind their design.⁹ This group of Germans arrived in New York in early November 1945 by the steamer *Argentina* from Europe. Dannenberg's landing card from the steamer can be seen in Figure 7-7. They were first taken by railroad and a small boat to Fort Strong in Boston, Massachusetts.

TOURIST CABIN PASSENGER LANDING CARD		
American Republics Line		STEAMER (VAPOR) (VAPOR) ARGENTINA
VOYAGE No. (VIAGEM No.) (VIAJE No.)		FROM (DE) (DE)
TOURIST CABIN (CABINA DE TURISTA) (CABINA DE TURISTA)	MANIFEST No. (MANIFIESTO No.) (MANIFIESTO No.)	5 PASSENGER No. (PASSAGEIRO No.) (PASAJERO No.) 11
NAME OF PASSENGER (NOME DO PASSAGEIRO) (NOMBRE DE PASAJERO)		DANNENBERG, CONRAD

AR 49 Mult

This card to be retained by passenger and presented to Immigration Inspector on arrival at destination.
O passageiro deve guardar este cartão e na chegada ao seu porto de destino, apresentar-o aos autoridades de imigração.
Esta tarjeta deberá ser entregada al Sr. Inspector de Inmigración a la llegada al punto de destino.

Figure 7-7: Dannenberg's original passenger landing card from the steamer *Argentina*. Credit: Dannenberg collection, UAH.

After a few days the group was taken by railroad to El Paso, Texas, and then traveled by Army trucks to Fort Bliss, Texas.¹⁰ The team of German rocket scientist and engineers can be seen in Figure 7–8. Konrad recalls being taken to temporary housing, which was an Army barracks. Dannenberg was at this time under contract with the U.S. Army Ordnance Corps for the duration of six months, although many of the German scientist and engineers stayed longer than their initial service length. At Fort Bliss some members of Operation Paperclip were involved directly in the launching of V-2s at White Sands, New Mexico, but Dannenberg was not in that group. He worked on special projects such as the adding of a ramjet to the V-2s and other multistage launchers. Only about 30 German rocket scientists were assigned to go to White Sands daily, but Dannenberg did manage to see two launches. During this time, to support the launching of the V-2s, the Army contracted with General Electric (GE) on a project known as HERMES to assist and also do some engineering work.¹¹

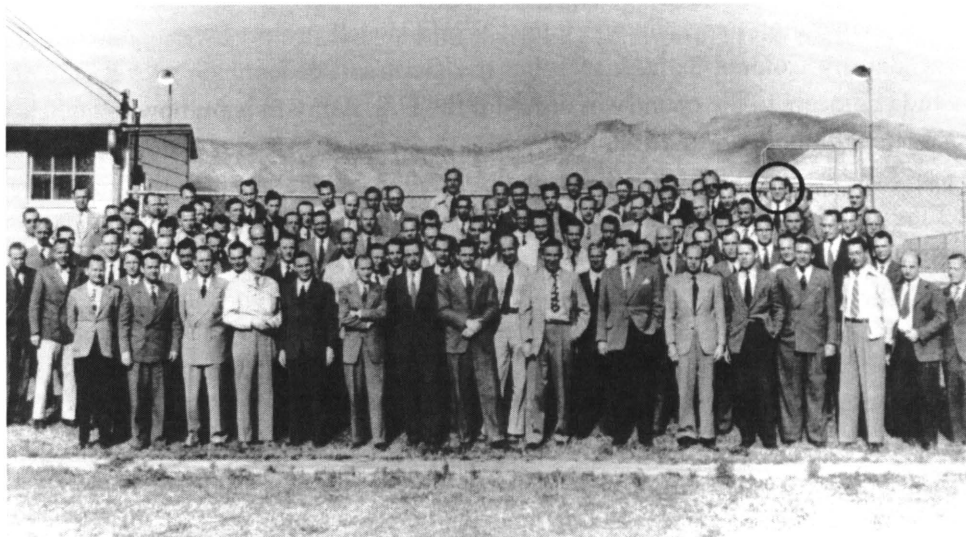


Figure 7–8: Scientists and engineers of Operation Paperclip at Fort Bliss, Texas, with Konrad Dannenberg circled. Credit: Dannenberg collection, UAH.

It is important to note that the V-2s that were being shipped from Germany to Fort Bliss by Colonel Toftoy were simply parts, as the majority of completed V-2s were used in Germany's war effort. This required the group to evaluate, assemble and test the V-2 systems before they could even begin to ready for launch at White Sands. Dannenberg said that most of their time was spent on "keep busy" assignments and tasks like documentation.¹² This left a lot of room for fun and games. One of Dannenberg's favorite activities, even in childhood,

was swimming and not having any real assignments Dannenberg got to swim a lot. Regularly, the German scientists and engineers at Fort Bliss would get together to play a German water sport know as “fist ball” as can be seen in Figure 7-9.



Figure 7-9: Dannenberg along with other German scientists resting after playing “fist ball.” Credit: Dannenberg collection, UAH.

Redstone Arsenal

The move to Redstone Arsenal, Alabama, came with the anticipation that wounded soldiers from the Korean War would need the ANNEX building, where the German scientist lived, which was a part of the Army’s Beaumont Hospital in Fort Bliss, Texas. With orders to find a new place to relocate, General Toftoy found Redstone Arsenal near the city of Huntsville, Alabama, which is in the southeastern United States. The move to Redstone Arsenal came in the summer of 1950 and with it came “real” work, not “keep busy” assignments like at Fort Bliss.

Dannenberg along with some of the other German scientists and engineers also became U.S. citizens while living in Alabama, Figure 7-10. While at Redstone Arsenal, Dannenberg worked for the Army Ballistic Missile Agency (ABMA). He was a part of the design and testing of the ramjet propulsion system for rockets and guided missiles. He was also a liaison engineer to the Rocketdyne Division of North American Aviation (NAA), which is now a part of the Boeing Company, and a liaison to the Chrysler Corporation for the Redstone and Jupiter missiles.



Figure 7-10: Dannenberg after getting his U.S. citizenship.
Credit: Dannenberg collection, UAH.

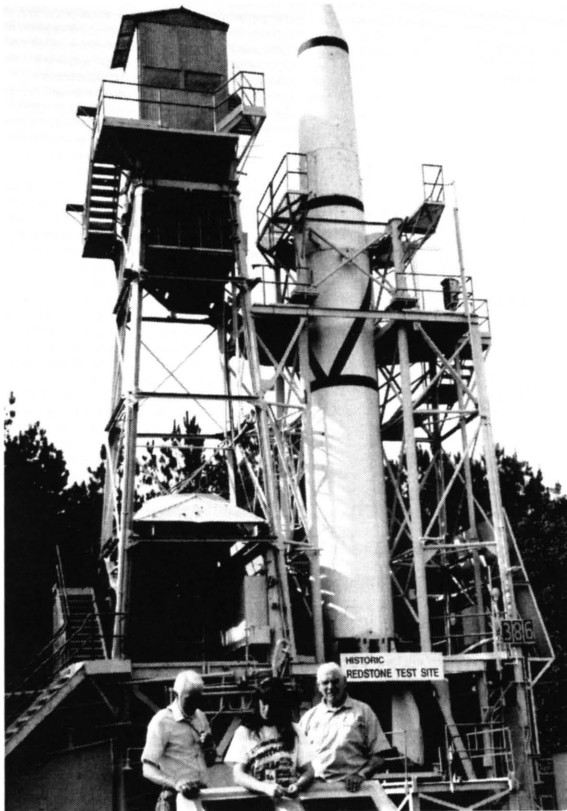


Figure 7-11: A tour guide, wife Jackie and Konrad Dannenberg in front of the Redstone Rocket test stand at Redstone Arsenal, Alabama.
Credit: Dannenberg collection, UAH.

The Redstone rocket, Figure 7-11, was used to launch America's first satellite into space. His other duties included coordinating with subcontractors and suppliers for these two systems. During the 1960s, Dannenberg began working at the George C. Marshall Space Flight Center (MSFC), which is a part of the National Aeronautics and Space Administration (NASA). Here he was appointed Deputy Manager of the Saturn Systems Office; he was put in charge of the design, development, fabrication, and delivery to NASA. The Saturn systems, specifically the Saturn V, took men to the Moon and also carried the U.S. first space station, Skylab, into orbit. Dannenberg was later made director of the Saturn Systems Office in which he was put in charge of systems engineering, testing, and safety assessments. Dannenberg's duties also included conceptual studies of Saturn-based space stations, and concept verification testing for the proposed Space Shuttle and its payloads.

Ambassador to Space

University of Tennessee Space Institute

Dannenberg during the period of 1972 to 1977 moved to Tullahoma, Tennessee, to work at the University of Tennessee Space Institute. Under a NASA grant, he worked on researching applications of NASA technology for other projects. He also lectured short courses on the Space Shuttle and Shuttle applications for research. The Space Shuttle at this time had not yet been built, but was still in the design phase.

U.S. Space and Rocket Center

After Dannenberg retired from the University of Tennessee Space Institute he moved back to Huntsville, Alabama. There he worked as a consultant, lecturer and bus driver for the U.S. Space and Rocket Center in Huntsville. In 1982 Space Camp was started at the U.S. Space and Rocket Center by Ed Buckbee with advisement from Dr. Wernher von Braun.

Dannenberg lectured to senior Space Camp students, Figure 7-12, on rocket history and also propulsion; he would even on occasion lecture to tourists from other countries.¹³ Over the many years he had been at the U.S. Space and Rocket Center, Dannenberg inspired many children with his knowledge and love of rocket design.¹⁴ His presence gave the Space and Rocket Center and Space Camp real credibility. If asked a question about propulsion systems, Dannenberg could immediately answer the question and would even tell of his own personal experiences with the system in question. One of the most important things

Dannenberg taught his students, of all ages was that when designing something that has never been done before, such as liquid oxygen fueled rockets, it will require constant testing. He always was quick to add that those tests were not always successful, and more often than not you would experience more failure than success. Dannenberg also challenged the young minds engaged in his stories to strive for success and one day it would be their generations' time to walk on the Moon and perhaps go to Mars.



Figure 7-12: Dannenberg teaching students about rocket engines.
Credit: Dannenberg collection, UAH.

When Space Camp was conceived, Dannenberg suggested another program with a curriculum for teachers. This program was later used by Space Camp as well as the University of Alabama in Huntsville. Mr. Ed Buckbee, former director of the U.S. Space and Rocket Center, stated that “Konrad Dannenberg had influenced and inspired thousands of children and adults in his time.” Although Dannenberg was retired, he became the U.S. Space and Rocket Center’s “resident rocket scientist.” He never stopped teaching and telling others about his experience in designing rockets, and stayed engaged all his life.¹⁵ Also, while at the U.S. Space and Rocket Center, in August 1988, Dannenberg’s wife, Ingeborg, passed away. He was later remarried to Jackie Staiger, whom he met at Adult Space Camp, which was a program he lectured for regularly.

Project Explorer

Dannenberg also was the manager of Project Explorer, which was sponsored by the Alabama Space and Rocket Center (ASRC). It helped students to get their project a ride on the U.S. Space Shuttle in the cargo bay.¹⁶ The project used

small self-contained capsules, which were called “Get Away Specials” or GAS, which the students used to house their experiment for the duration of the Space Shuttle mission, Figure 7–13.



Figure 7–13: Dannenberg showing off one of the “Get Away Specials” GAS, capsule from Project Explorer. Credit: Dannenberg collection, UAH.

This program helped students to further their knowledge of space while teaching them to keep their projects within the requirements of the transporting system like real engineers and scientists.

University of Alabama in Huntsville

Dannenberg also lectured at the University of Alabama in Huntsville to students and faculty members on propulsion and rocket history. His extensive knowledge of engine design, as well as history of rocket design, made his lectures very valuable. With other lecturers of the day, who only promised theoretical knowledge, Dannenberg brought real-life stories about his successes and failures.¹⁷

Vision of the Future

Dannenberg had always dreamed of going to space, and was a proponent person in trying to get the United States and the world to see the value in a space habitat.¹⁸ In a video interview with Dr. Donald Tarter, Dannenberg discussed his ideas and opinions about manned missions to Mars. Dannenberg stated that to be able to go to Mars we would first need to go back to the Moon. He knew that going to Mars would be a huge challenge for NASA, and expressed his concern for individual governments trying such a tremendous expedition to another planet.

He believed that going to other planets beyond our Earth should be an effort of all individuals and governments together. This international effort would be more cost effective for countries, like the United States, that are presently looking at ways to cut their national budget, as with many countries around the world. This idea of traveling to space was always a dream of Dannenberg's since he was a part of the rocket clubs of Germany, with inspirational people like rocket expert, Hermann Oberth, seen with Konrad in Figure 7-14.



Figure 7-14: (Bottom left to right) Ludwig Roth, Dannenberg, Prof. Hermann Oberth, Dr. Ernst Stuhlinger and Mr. Tuxill. Credit: Dannenberg collection, UAH.

Dannenberg also talked about the U.S. Space Shuttle and how its design was only meant to orbit Earth. To be able to go back to the Moon and to Mars, a new vehicle would need to be designed. Dannenberg thought that rockets like the Saturn V that took men to the Moon, could take us to Mars, by building on their technology. He said that current estimates put a trip to Mars taking around nine months with our current rocket engines. He proposed researching new propulsion engine designs that could potentially lead to faster trips to Mars. Besides getting to Mars, Dannenberg stated that another concern would be that the astronauts would have to wait for at least a year on Mars before starting their return trip. Therefore, he suggested using water sources, if found on Mars, to produce oxygen and hydrogen. These raw gases could then be used to provide the astronauts with breathable air as well as a means back to Earth, since oxygen and hydrogen could be used for propulsion systems.¹⁹

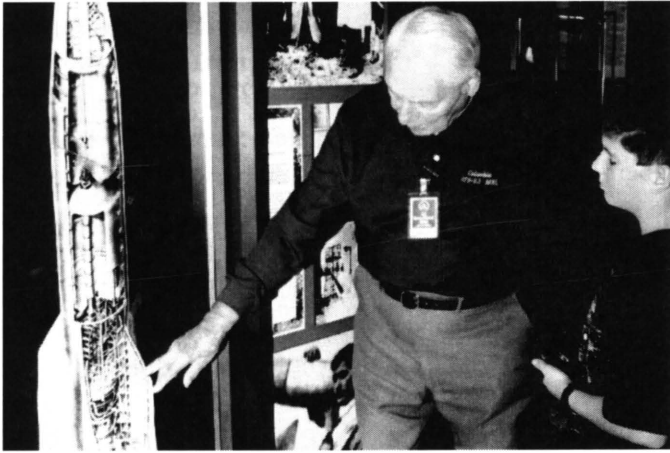


Figure 7–15: Dannenberg showing a child the propulsion section of a V-2 rocket. Credit: Dannenberg collection, UAH.

Passing of a Space Ambassador

On the morning of 16 February 2009, Konrad Dannenberg passed away at the age of 96, leaving behind his wife, Jackie, a son, Klaus, as well as many grandchildren.²⁰ His life was an adventure. Growing up in Germany with stories of how man could someday walk on the Moon and he eventually being one of the people who made that happen. His interest and knowledge, Figure 7–15, on the subject of rocketry spurred many children and adults to pursue careers as scientists and engineers. His work on Project Explorer gave students a new opportunity to send their projects to space, which was more than the school classroom was capable of doing. Dannenberg over his lifetime received many awards for his excellence in design and development of rockets, one of which was the Hermann Oberth award. He also held many positions over the years in such societies like the American Institute of Aeronautics and Astronautics (AIAA), the American Rocket Society, and the World Future Society. Some saw Dannenberg as a friend, others a coworker and still others, a teacher, but to everyone Dannenberg was an ambassador for space.²¹

Acknowledgments

The author would like to sincerely thank Mrs. Anne Coleman of the University of Alabama in Huntsville Salmon Library Archives Section for her help in searching through Mr. Dannenberg’s extensive collection of personal items. With her help the author was able to find Mr. Dannenberg’s works and papers vital to his research. The author would like to sincerely thank Mrs. Jackie Dannenberg,

the widow of Mr. Dannenberg, for her help and support in researching the biography of her husband. With Mr. Dannenberg's 100th birthday being this year (2012), it was an honor to write about him and listen to her stories about the many memories they shared. I hope I have accurately captured and represented Mr. Dannenberg's life in this chapter. The author would like to thank Klaus Dannenberg, the son of Mr. Konrad Dannenberg, for his help and support in the progression of this chapter. The author would like to thank Mr. David Hanning of the University of Alabama in Huntsville Salmon Library Archives Section for his role in archiving Mr. Dannenberg's personal collection of documents, pictures and personal memorabilia. The author would like to thank Mrs. Monika Sayar of the University of Alabama in Huntsville Salmon Library Archives Section for her help in translating some works of Mr. Dannenberg's from German to English. The author would like to thank Mr. Julius Braun for his help in the areas of propulsion technology used by the scientist and engineers of Operation Paperclip in Fort Bliss, Texas. The author would also like to thank David Cook and the Office of the Vice President for Research for their hard work and support to help students become involved in the International Astronautical Congress. Without their involvement this would not be possible. The author would also like to thank Dr. Charles Lundquist for his help and experience that went into preparing this chapter. The author would like to thank Dr. Niklas Reinke for his helpful suggestions on this chapter. Lastly, the author would like to sincerely thank Mr. Ed Buckee, former director of the United States Space and Rocket Center in Huntsville, Alabama; co-worker, and friend of Mr. Konrad Dannenberg. Mr. Buckbee was supportive in telling his memories about Dannenberg and how he influenced many children and adults over the decades of his involvement with the Space and Rocket Center. Mr. Buckbee was instrumental in describing Dannenberg, the person, which is not normally found in written sources, but from close personal experience.

About the Author

William Helms is an undergraduate student at the University of Alabama in Huntsville pursuing a bachelor's degree in computer engineering. His interests are in the advancement of technology in the fields of unmanned robotics, as well as in artificial intelligence. William is an active member in the student branch of the Institute of Electrical and Electronics Engineers (IEEE) at UAHuntsville, and is also the former president. He was the robotics hardware team lead for IEEE's 2011 Southeast Conference. William is a member of UAHuntsville's Unmanned Aerial Vehicle (UAV) Club, and he is currently serving as electronics team lead.

This position's job requires him to develop telemetry and computer vision navigation for fixed wing and quad-copter aircraft. William is planning on pursuing a master's degree in system's engineering shortly after his spring 2013 graduation from the University of Alabama in Huntsville.

Endnotes

- ¹ Dannenberg's unfinished memoire, Collection of Konrad K. Dannenberg, Department of Archives/Special Collections, M. Louis Salmon Library, University of Alabama in Huntsville, Huntsville, Alabama, U.S.A., January 2003.
- ² Dannenberg's unfinished memoire, January 2003.
- ³ Marsha Freeman, *How We Got to the Moon: The Story of the German Space Pioneers* (Washington, D.C.: 21st Century Science Associates, 1993).
- ⁴ Dannenberg's unfinished memoire, January 2003.
- ⁵ Dannenberg's unfinished memoire, January 2003.
- ⁶ Freeman, *How We Got to the Moon*, 1993.
- ⁷ Konrad Dannenberg, "From Vahrenwald via the Moon to Dresden," in *History of Rocketry and Astronautics* (Proceedings of the Twenty-Fourth Symposium of the International Academy of Astronautics, Dresden, Germany, 1990), J. D. Hunley, editor, AAS History Series, Volume 19, IAA History Symposia, Volume 11 (San Diego, California, published for the American Astronautical Society by Univelt, Inc., 1997), pp. 105–115 (paper IAA-90-622 presented at the 24th History Symposium of the International Academy of Astronautics as part of the 41st International Astronautical Federation Congress, Dresden, Germany, 6–12 October 1990).
- ⁸ Beryl Williams and Samuel Epstein, *The Rocket Pioneers: On the Road to Space* (New York: Julian Messner, Inc., 1958), pp. 215–231.
- ⁹ Williams and Epstein, *The Rocket Pioneers: On the Road to Space*, 1958.
- ¹⁰ Ruth von Saurma and Walter Wiesman, "The German Rocket Team," U.S. Space and Rocket Center, Huntsville, Alabama, U.S.A., 1994 [also see Ruth von Saurma and Walter Wiesman, "The German Rocket Team: A Chronology of Events and Accomplishments," *The Huntsville Historical Review*, Vol. 23, No. 1 (Winter–Spring 1996), pp. 20–30].
- ¹¹ Julius H. Braun, "The legacy of HERMES," Collection of Konrad K. Dannenberg, Department of Archives/Special Collections, M. Louis Salmon Library, University of Alabama in Huntsville, Huntsville, Alabama, U.S.A. [also published in *History of Rocketry and Astronautics* (Proceedings of the Twenty-Fourth History Symposium of the International Academy of Astronautics, Dresden, Germany, 1990), J. D. Hunley, editor, AAS History Series, Volume 19, IAA History Symposia, Volume 11 (San Diego, California, published for the American Astronautical Society by Univelt, Inc., 1997), pp. 135–142 (paper IAA-90-625 presented at the 24th History Symposium of the International Academy of Astronautics as part of the 41st International Astronautical Federation Congress, Dresden, Germany, 6–12 October 1990)].
- ¹² Letter from Wernher von Braun to Walter Dornberger and Ernst Steinhoff, Collection of Konrad K. Dannenberg, Department of Archives/Special Collections, M. Louis Salmon Library, University of Alabama in Huntsville, Huntsville, Alabama, U.S.A. (15 January 1946).

- ¹³ B. Lawson, "German Space Tourists See Dreams," *The Huntsville Times* (9 July 2006).
- ¹⁴ Letter to Dannenberg from Stanley R. Chapman about Space Camp, Collection of Konrad K. Dannenberg, Department of Archives/Special Collections, M. Louis Salmon Library, University of Alabama in Huntsville, Huntsville, Alabama, U.S.A. (18 April 1995).
- ¹⁵ Email interview between Ed Buckbee and author (30 July 2012).
- ¹⁶ Project Explorer paper, Collection of Konrad K. Dannenberg, Department of Archives/Special Collections, M. Louis Salmon Library, University of Alabama in Huntsville, Huntsville, Alabama, U.S.A. (February 1987).
- ¹⁷ Oral interview with Jackie Dannenberg by the author, Huntsville, Alabama (4 August 2012).
- ¹⁸ Konrad K. Dannenberg, "Organizational Possibilities for Space Habitat Realization," Collection of Konrad K. Dannenberg, Department of Archives/Special Collections, M. Louis Salmon Library, University of Alabama in Huntsville, Huntsville, Alabama, U.S.A. [published in *Space Manufacturing Facilities (Space Colonies)*, Proceedings of the Princeton/AIAA/NASA conference, 7–9 May 1975 (including the proceedings of the May, 1974 Princeton Conference on Space Colonization), Jerry Grey, editor (New York: American Institute of Aeronautics and Astronautics, 1977), pp. 185–188].
- ¹⁹ Interview with Dannenberg by Dr. Donald Tarter, Collection of Konrad K. Dannenberg, Department of Archives/Special Collections, M. Louis Salmon Library, University of Alabama in Huntsville, Huntsville, Alabama, U.S.A. (30 July 2001).
- ²⁰ Oral interview with Jackie Dannenberg by the author, Huntsville, Alabama (4 August 2012).
- ²¹ Email interview between Ed Buckbee and author (30 July 2012).