THE FIRST ROCKETS



- 0. THE FIRST ROCKETS Story Preface
- 1. WILBUR AND ORVILLE WRIGHT
- 2. AIRCRAFT CONTROL
- 3. LIFT AND DRAG
- 4. KITTY HAWK
- 5. THE FIRST FLIGHT
- 6. FLYER 3 and OTHER FAMOUS FLIGHTS

7. THE FIRST ROCKETS

- 8. EXPERIMENTAL PLANES
- 9. THE SOUND BARRIER
- 10. THE SPACE RACE
- 11. THE FIRST MAN & WOMAN IN SPACE
- 12. ALAN SHEPARD'S FLIGHT
- 13. JOHN GLENN'S ORBIT
- 14. DEATH IN THE COMMAND MODULE
- 15. TO THE MOON
- 16. APOLLO 11
- 17. APOLLO 13
- 18. THE SHUTTLE'S DESIGN FLAW



NASA provides this photograph, and this description, of Dr. Robert Goddard (a "Father of Rocketry"): "Robert H. Goddard, with the first successful liquid-fuel chemical rocket, launched 16 March 1926."

After Wilbur and Orville Wright's amazing breakthroughs, aviation technology - including the development of rockets, passenger planes, and supersonic experimental planes - moved quickly forward.

In 1919 Robert Goddard, an American rocket pioneer, imagined a rocket that could reach the moon. Goddard's dream was realized exactly fifty years later when an American spacecraft, sent into orbit by a huge rocket, reached the moon. But the half-century between Goddard's belief and Neil Armstrong's first steps on the moon was filled with many disappointments and failures, not just huge accomplishments.

One of Goddard's most important achievements was his belief that rockets had to be fueled with liquid, not solid (like gunpowder) fuel. After working on the concept for seventeen years, <u>Goddard</u> launched the <u>first liquid</u> <u>fuel rocket</u> on March 16, 1926.

Although primitive - the rocket was at the top where it <u>received fuel</u> from two lines connected to a fuel tank at the bottom - it was a stunning conceptual achievement as important to space travel as the Wright brothers' work was to aviation. The rocket traveled 152 feet - about thirty-two feet more than Orville Wright's first powered flight in 1903.

It was also Dr. Goddard who first envisioned that rockets require <u>several stages</u>. He received a patent, in 1914, for the concept that is an indispensable part of space travel today. The <u>list of firsts</u> created by this modest man is awe-inspiring. Some of his 214 patents still produce royalties for his estate.

But ... <u>Goddard's work</u> was not embraced in his own country. Ridiculed by the American press for thinking - and writing - that a rocket could go through the vacuum of space, his published work was read and admired the year after his death (in 1945) by <u>Wernher von Braun</u>.

<u>Goddard, the pioneer</u> had, in fact, anticipated the awesome <u>power</u> of von Braun's German <u>A4 rocket</u> (known to a stunned world as <u>the mighty V-2</u>). When von Braun's team launched the V-2 on October 3, 1942, it traveled 120 miles and landed on target.

As the first successful ballistic rocket, the V-2 is the ancestor of most rockets flown today. Looking back, one could make an argument that October 3, 1942 was the beginning of the space age. One could also make an argument it was the beginning of the age of <u>mass destruction</u>.

Popularly known as the $\underline{V-2}$ - short for $Vergeltungswaffe\ zwei$ (meaning "retaliation weapon 2") - von Braun's A4 (its technical name was Aggregat-4) became a much-feared military weapon for the Nazis near the end of the war. Launched from Germany (or German-controlled territories), it killed and injured thousands of people and decimated towns in Belgium (especially Antwerp), the south of England (including London) and elsewhere (such as Paris).

As World War II was ending, the Allies launched "Operation Paperclip" - an effort to find von Braun and his team of brilliant scientists and engineers. When the U.S. Army secretly worked with von Braun and his team - after they turned themselves over to the Americans - it was the best thing that could have happened to the U.S Space Program.

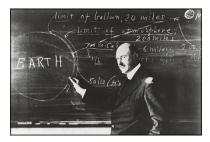
See Alignments to State and Common Core standards for this story online at:

http://www.awesomestories.com/asset/AcademicAlignment/THE-FIRST-ROCKETS-History-of-Flight

See Learning Tasks for this story online at:

http://www.awesomestories.com/asset/AcademicActivities/THE-FIRST-ROCKETS-History-of-Flight

Media Stream



Robert Goddard

Image online, courtesy GRIN (Great Images in NASA).

View this asset at: http://www.awesomestories.com/asset/view/Robert-Goddard



Robert Goddard Photo

Image online, courtesy GRIN (Great Images in NASA).

View this asset at: http://www.awesomestories.com/asset/view/Robert-Goddard-Photo



Goddard - First Liquid Fuel Rocket

Photo of Dr Goodard online, courtesy GRIN (Great Images in NASA).

View this asset at:

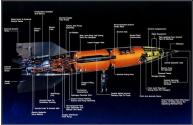
http://www.awesomestories.com/asset/view/Goddard-First-Liquid-Fuel-Rocket



Wernher von Braun

Image online, courtesy the *Smithsonian Air and Space Museum*, Washington, D.C. PD

View this asset at: http://www.awesomestories.com/asset/view/Wernher-von-Braun



German A4 Rocket - Illustration Detail

Drawing of V-2 rocket online, courtesy Smithsonian Air and Space Museum. View this asset at:

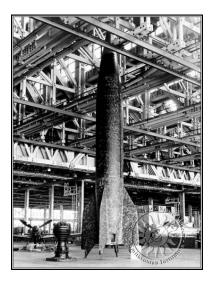
http://www.awesomestories.com/asset/view/German-A4-Rocket-Illustration-Detail



V-2 Rocket

Photo online, courtesy <u>Smithsonian Air and Space Museum</u>.

View this asset at: http://www.awesomestories.com/asset/view/V-2-Rocket-



V-2 Rocket on Display

Photo of V-2 online, courtesy Smithsonian Air and Space Museum.

View this asset at: http://www.awesomestories.com/asset/view/V-2-Rocket-on-Display



V-2 Rocket and Its Transporter

<u>Photo of V-2 rocket</u>, reassembled for study in America at White Sands Proving Ground, online courtesy Smithsonian Air and Space Museum.

View this asset at:

http://www.awesomestories.com/asset/view/V-2-Rocket-and-lts-Transporter

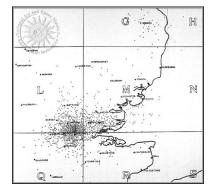


V-2 Rocket Strike - Antwerp

U.S. Army photo online, courtesy Fred Ordway and the <u>Smithsonian Air & Space Museum</u>, gallery 114 (<u>Space Race</u>).

View this asset at:

http://www.awesomestories.com/asset/view/V-2-Rocket-Strike-Antwerp



V-2 Rocket Strikes in the South of England

Map - adapted from *The Blitz, Then and Now* (Volume 3) - online, courtesy National Air and Space Museum.

View this asset at:

http://www.awesomestories.com/asset/view/V-2-Rocket-Strikes-in-the-South-of-England



THE FIRST ROCKETS

View this asset at: http://www.awesomestories.com/asset/view/THE-FIRST-ROCKETS



Operation Paperclip

Clip from the series "Revealed," episode "The Hunt for Hitler's Scientists," copyright Windfall Films (2005), all rights reserved. Clip provided as fair use for educational purposes.

Producers: David Dugan, Mark Radice and Emily Roe

Narrator: Paul Brightwell

View this asset at: http://www.awesomestories.com/asset/view/Operation-Paperclip



Dr. Robert Goddard - Rare Video Footage

Archival footage, from NASA, regarding Dr. Robert Goddard. Online, courtesy NASA. View this asset at:

http://www.awesomestories.com/asset/view/Dr.-Robert-Goddard-Rare-Video-Footage