

## AERONAUTICS AND FLIGHT

# What it Takes to be Airborne

How did we become airborne, and how did flight change the way we experience the world? From the laws of physics to bold inventions and creative problem-solving, humanity's path to flight transformed how we travel, communicate, and connect. Driven in part by the ingenuity and engineering feats of American scientists, this journey led to a more global and connected society.

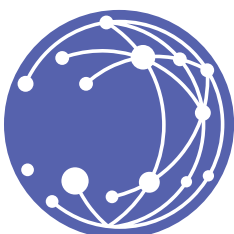
The innovators in this section are grouped into three connected categories:



### Understanding Motions and Forces



### Engineering the Sky



### Making Flight a Global System



### 175. Octave Chanute (1900)

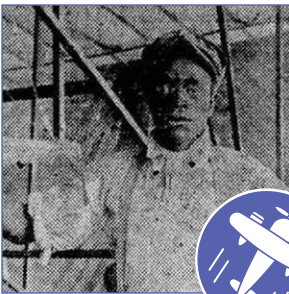
Octave Chanute advised and championed many early aviation enthusiasts and, at their request, became the main advisor to the Wright brothers in 1900 after they had begun testing a powered flight glider. While Chanute believed that people should patent their inventions, he also firmly believed in sharing aviation knowledge.



### 176. Orville Wright (1903)

### 177. Wilbur Wright (1903)

The Wright brothers helped launch the aviation age on December 17, 1903 when Orville piloted their aircraft 120 feet through the air in 12 seconds. Together, they proved that sustained flight was possible by inventing, building, and flying the world's first successful airplane.



### 178. Charles Wesley Peters (1906)

Charles Wesley Peters was the first African American man to design, build, and fly an airplane. He flew for the first time at 17 years old in a glider that he designed and built himself, traveling the length of a football field. Later, he attached an air-cooled automobile engine to his motorized airplane to create a plane capable of flying for up to 12 minutes at a time.



### 179. Lucean Arthur Headen (1910)

Lucean Arthur Headen was an inventor, entrepreneur, and one of the earliest African American aviators. Headen invented an automatic stabilizer for aircraft, a cloaking system for ships during World War I, and a method to de-ice the wings of airplanes that continues to inspire aviation technology today.



### 180. Glenn Hammond Curtiss (1911)

Glen Hammond Curtiss was an inventor who helped advance the aeronautics field. He started working in aviation by inventing the first ever four-cylinder engine for airships and eventually became one of the top aircraft manufacturers in the United States. He also ran five flight schools across North America, including one in Miami.



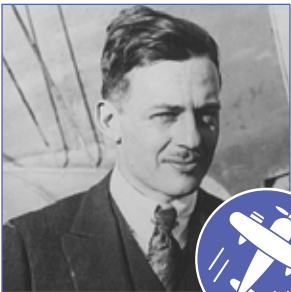
### 181. Bessie Coleman (1921)

Bessie Coleman broke racial and gender barriers in aviation by earning her pilot's license in France after schools in the United States denied her applications. Coleman was the first American woman, first African American person, and first Native American person to be awarded an international pilot's license. Dubbed "Queen Bess," Coleman became a stunt pilot and performed airshows across the United States until she was killed in a tragic aviation accident.



### 182. Amelia Earhart (1932)

Amelia Earhart was the first woman and the second person to complete a solo transatlantic flight. Earhart also set a world record for the highest altitude for a rotary-wing aircraft, flying it at an altitude of over 18,000 feet. She holds numerous other records. Her 1937 disappearance during a flight over the Pacific Ocean remains a mystery today, though the most likely explanation is that her plane ran out of fuel and crashed into the ocean.



### 183. Donald Wills Douglas Sr. (1935)

As a fresh engineering graduate, Donald Wills Douglas Sr. worked at the Massachusetts Institute of Technology (MIT) to design and build the first wind tunnel. After leaving MIT, Douglas designed a wide variety of military and commercial aircraft known for their reliability and safety. The safety protocols he developed in his aircraft production greatly influenced the public's perception of aircraft safety, expanding global air travel.



### 184. Mary Golda Ross (1942)

Mary Golda Ross worked for the Lockheed Aircraft Corporation to improve the design of fighter jets used by the United States Army Air Forces. Along with her work in aviation, Ross also helped develop the preliminary concepts for space travel, created the flight paths to Venus and Mars, and contributed heavily to the NASA Planetary Flight Handbook Vol. 3, which is still used for modern space travel. Ross was the first female Native American (Cherokee Nation) aerospace engineer.



### 185. Theodore von Kármán, Ph.D. (1944)

Dr. Theodore von Kármán was a physicist and laboratory lead at the California Institute of Technology. Under von Kármán's direction, his lab developed a jet-assisted takeoff rocket and solid and liquid propellants. His research also contributed to the development of supersonic flight, or flight faster than the speed of sound. In 1944, von Kármán co-founded the NASA Jet Propulsion Laboratory.



### 186. Brigadier General Charles E. Yeager (1947)

Brigadier General Charles E. Yeager was a United States Air Force officer who, in 1947, became the first person to fly faster than the speed of sound. Nine years later, Yeager made history again when he became the first person to fly twice the speed of sound. Over his 70-year career, he piloted more than 360 types of aircraft.



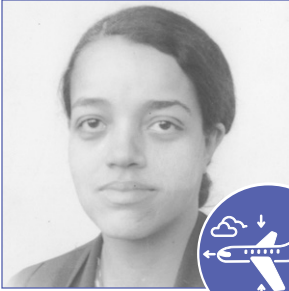
### 187. Mary Winston Jackson (1953)

Mary Winston Jackson, who had a dual degree in math and physical science, was hired by engineer Kazimierz Czarnecki in 1953 to run experiments in the Supersonic Pressure Tunnel (a super strong wind tunnel). Czarnecki believed in Jackson's ability and invited her to take graduate classes as part of an engineering training course. These graduate classes were segregated, but she fought for her spot, and completed the training, and became NASA's first Black female engineer.



### 188. Clarence Leonard "Kelly" Johnson (1955)

Clarence Johnson kicked off his career by pointing out a crucial design flaw in one of the new airplane models produced by Lockheed Aircraft Corporation. Lockheed then hired Johnson as a tool designer. He continually worked his way up at the company, where he was responsible for leading the design of over 40 different aircraft. These included several record-breaking aircraft like the fastest and highest-flying aircraft in the world, the Lockheed SR-71 Blackbird, and the first U.S. jet fighter.



### 189. Dorothy Vaughan (1958)

Dorothy Vaughan was a mathematician and worked as a “computer”, or a person who performed mathematical calculations, in a segregated department for the National Advisory Committee for Aeronautics (NACA). As NACA moved to electronic computing, Vaughan became a programming language expert and taught her colleagues a computer programming language to prepare them for the future. When NACA became NASA, segregation ended and Vaughan joined its Analysis and Computing Division. Her calculations were used for the Apollo Program.



### 190. Katherine Johnson (1961)

Katherine Johnson was an African American mathematician whose orbital trajectory calculations were critical to Project Mercury, which put NASA astronauts in orbit around the Earth. Her calculations were also crucial for both the Apollo Program and early shuttle missions. Her story, along with that of Dorothy Vaughan and Mary Jackson, was detailed in the 2016 film *Hidden Figures*.



### 191. Alan Bartlett Shepard Jr. (1961)

Alan Bartlett Shepard Jr. became the first American to travel into space aboard the Freedom 7 Mercury capsule in 1961. His suborbital flight marked a critical step in human spaceflight. Shepard later became the commander for Apollo 14, which put the United States back on the moon.



### 192. Colonel John Herschel Glenn (1962)

Colonel John Herschel Glenn became the first American to orbit the Earth in 1962, helping establish the United States as a serious contender in the space race. His expertise as a test pilot also informed spacecraft cockpit design and control systems, improving their safety and performance.



### **193. Christine Mann Darden, Ph.D. (1989)**

Dr. Christine Mann Darden developed tools for air traffic management and computer programs for predicting and minimizing sonic booms (thunderous noises produced when an object travels faster than the speed of sound). During her foundational work with supersonic aircraft, she redesigned aircraft shapes and wing flaps to reduce the severity of sonic booms, paving the way for modern supersonic transport efforts.



### **194. Eileen Marie Collins (1995)**

Eileen Collins learned to fly at the age of 19 and, after earning her undergraduate and master's degrees, became a professor of mathematics at the Air Force Academy and a test pilot at Edwards Air Force base. In 1990, Collins was selected by NASA as part of NASA Astronaut Group 13. In 1995, she became the first woman to pilot a U.S. Space Shuttle, the Discovery, and the first woman to command a U.S. Space Shuttle mission. Collins logged nearly 900 hours in space during her career.

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	Wilbur Wright
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1910	Lucean Arthur Headen
1911	Glenn Hammond Curtiss
1921	Bessie Coleman
1932	Amelia Earhart
1935	Donald Wills Douglas Sr.
1942	Mary Golda Ross
1944	Theodore von Kármán, Ph.D.
1947	Brigadier General Charles E. Yeager
1953	Mary Winston Jackson
1955	Clarence Leonard "Kelly" Johnson
1958	Dorothy Vaughan
1961	Alan Bartlett Shepard Jr.
	Katherine Johnson
1962	Colonel John Herschel Glenn
1989	Christine Mann Darden, Ph.D.
1995	Eileen Marie Collins

# AERONAUTICS AND FLIGHT (by category)

## What it Takes to be Airborne

### Engineering the Sky



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### Making Flight a Global System



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### Understanding Motion & Forces



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