

Sir Frank Whittle

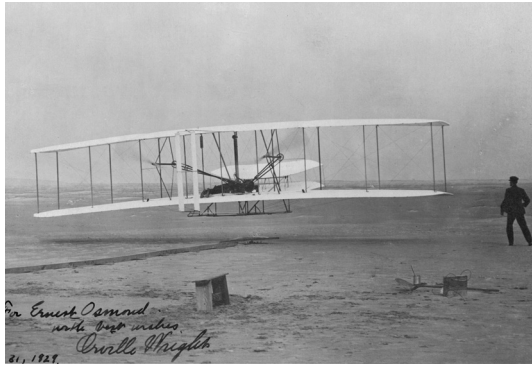
# Ingenious Inventors

For over a century, the RAF has been at the forefront of aviation technology. The RAF Museum's collections and stories show the rapid pace of development from the first powered flight by the Wright Brothers in 1903, to supersonic stealth aircraft made from advanced composite materials.

This resource showcases inventors whose ideas have shaped the technology used by the RAF.

## The Wright Brothers The Aeroplane

In 1903, The Wright brothers invented the first aeroplane to take off and land under its own power. Their aeroplane had two sets of wings, known as a biplane.



### Did you know?

- Their names were Orville and Wilbur
- Their younger sister Katherine was very successful in promoting their achievements
- They worked on their designs for four years before their first flight
- They opened a bicycle repair shop before they worked full-time on aircraft.

Find out more about early flight in: H1 and H2

## Louis Bleriot The Monoplane

Louis Bleriot was the first to produce a working piloted monoplane. This is an aeroplane with only one set of wings. In 1909 he also became the first pilot to cross the English Channel by aeroplane.



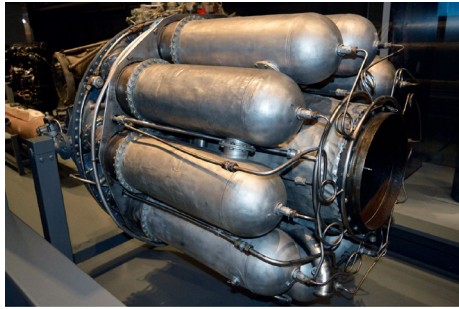
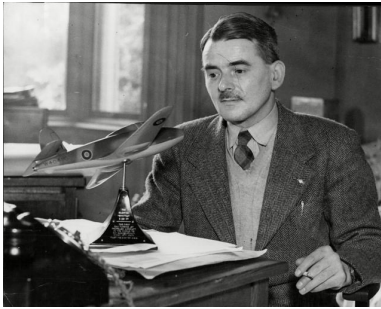
### Did you know?

- Bleriot invented the car headlamp before he invented the monoplane
- For making the first flight across the Channel, he won £1000!
- He was involved in legal battles with the Wright brothers over patents.

Find out more about early flight in: H2

## Sir Frank Whittle The Jet Engine

Sir Frank Whittle designed the Jet Engine in 1937. His brilliant design for a turbojet engine was initially turned down by the Air Ministry; he had to form his own company to build it independently.



### Did you know?

- He failed the medical examination to get into the RAF
- He was a mathematical genius. This helped him get into RAF College Cranwell anyway
- He wrote his university thesis about the jet engine
- Frank Whittle retired from the RAF in 1948 as an Air Commodore and was knighted the same year.

Find out more in: H1

## Igor Sikorsky The Helicopter

Igor Sikorsky designed the first practical helicopter in 1939, although Leonardo Da Vinci sketched what is believed to be the first concept for a helicopter four centuries earlier!



### Did you know?

- His father was a psychiatrist
- Igor was taught at home rather than school
- He was fascinated with Leonardo da Vinci, this must have influenced him
- He had designed and built a rubber-band-powered helicopter by the age of 12.

See the Museum's collection of helicopters in: H4

## Werner Von Braun Modern Rockets

Von Braun invented a number of rockets during and after the Second World War. The German V2 rocket weapon, used against Britain during the Second World War, was considered to be the first cruise missile.



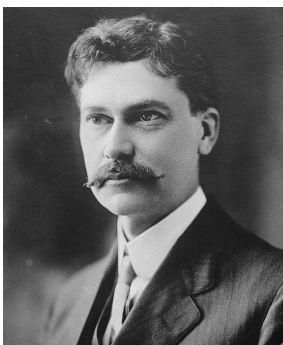
### Did you know?

- Wernher Von Braun was the inventor of the V1 and V2 weapons used against Britain
- Although he worked for Nazi Germany during the Second World War, the United States recruited him and other German rocket scientists after the war
- Von Braun went on to design and build the Saturn V rockets that took men to the moon in 1969.

Find out more in: H1

## Matthew B Sellers II Retractable Undercarriage

Aircraft with wheels hanging out underneath travel much slower because of wind resistance. Sellers invented the retractable undercarriage in 1908 to reduce the resistance and increase the speed of aircraft. An important invention used on most aeroplanes today.



### Did you know?

- This inventor also came up with an aeroplane with four sets of wings
- He also patented what is possibly the first joystick, an aircraft control column which is directly connected to the rudder.

Look out for retractable undercarriages throughout your visit.



## Hedy Lamarr Anti-Jamming Systems for Torpedoes

Although Hedy Lamarr was more famous as a 1940s film star, she was also a brilliant inventor of technology which helped the Allies win the Second World War. She invented a system that stopped Axis ships and aircraft from jamming allied torpedoes, allowing them to hit and sink enemy ships more effectively and reliably.



### Did you know?

- Hedy Lamarr realised torpedoes could avoid being “jammed” or intercepted
- This could be done by causing the frequency they operated at to “hop”, or change often
- She invented it with George Antheil, who was a musician
- She got the idea by overhearing a former husband talking to German arms manufacturers.

Find out more in: H4

## Anastase Dragomir The Ejector Seat

Although Everard Calthrop first thought up the idea of an ejector seat, the first working model was designed and built by Anastase Dragomir in 1928. With jet engines and faster aircraft, ejector seats are vital to save the lives of aircrew in emergency situations.



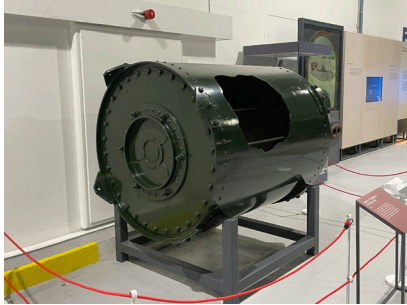
### Did you know?

- The first idea for this was thought up by Everard Calthrop, but his main interest was railway engineering
- Dragomir was born in Romania but worked in France
- The patent submitted by Dragomir was for a ‘catapultable cockpit’
- A major manufacturer of modern ejector seats is the British company Martin Baker.

Find out more in: H1

## Sir Barnes Wallis **The Bouncing Bomb**

Sir Barnes Wallis was tasked with designing a bomb that, in 1943, would destroy German dams during the Second World War. The result was the Bouncing Bomb that could bounce across the water and sink down next to the dam to explode at its base, causing maximum damage.



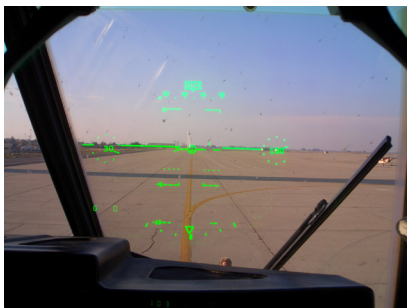
### Did you know?

- Barnes Wallis perfected his idea using water tanks in his garden
- The bombs were designed to spin before release, increasing their range and allowing them to 'skip' like throwing pebbles across a lake.
- The film *The Dambusters* was made about the invention and use of the bouncing bomb.

Find out more in: H5

## Gilbert Klopstein **Head-Up Displays**

Looking at cockpit instruments to get information is useful but can become challenging when flying at speed and in difficult conditions. Gilbert Klopstein invented the Head-up display in the 1960s. These are invaluable safety and awareness aids for pilots of fast aircraft such as fighter jets, where the aircraft could fly miles in the time taken to glance down at an instrument panel.



### Did you know?

- Gilbert Klopstein was a test pilot and inventor
- There were earlier versions of this in the 1950s
- The term "head-up display" was coined by the Royal Aircraft Establishment at Farnborough
- Head-up displays avoid the need for a pilot's eyes to refocus, which takes valuable seconds.

Find more aircraft that use this technology in: H6

## Abraham Karem Unmanned Aerial Vehicles

Unmanned Aerial Vehicles (UAVs), also known as drones, have many uses, from defence applications through to building survey work. They vary in size from a few inches across to full-size aircraft like the Predator. Abraham Karem is known as the 'Drone Father' as he invented the first modern drone as we know it today. Developments of his first design in the 1970s led to the RAF's current Remotely Piloted Aircraft Systems.



### Did you know?

- Abraham Karem was born in Baghdad, Iraq
- Although the drone as we know it was invented in 1973, there were many earlier attempts
- The Ruston Proctor Aerial Target was used during the First World War in 1916, the first to be radio controlled
- In 1935, the radio-controlled DeHavilland DH.82B Queen Bee was produced, thought to be the origin of the word "drone".

Find out more in: H6

## Dr Lawrence Jerome Fogel Noise-Cancelling Headphones

It was recognised that talking between pilot and co-pilot and flight engineers was very difficult, especially in noisy helicopters. In the 1950s Dr Fogel invented a system to reduce background noise for flight crews, allowing them to communicate more effectively. The system devised was the same we now use today in noise-cancelling headphones.



Originally designed for helicopters.  
Find our helicopters in: H4

### Did you know?

- Dr. Fogel was also a keen musician and jazz player
- The first patent for a noise-control system was taken out by Paul Lueg in 1936
- The system works by phase-shifting sound waves so that peaks and troughs cancel each other out.

## Captain John Moore-Brabazon **Aerial Cameras**

Although a hot-air balloon was used in 1858 to take photographs, the first successful camera designed for use in aeroplanes was invented by John Moore-Brabazon during the First World War. Since its inception, aerial photography has become a key part of both military operations and everyday civilian life with uses including intelligence, surveying, and capturing large scale events.



### Did you know?

- John Moore-Brabazon spent his early years working for Charles Rolls, who founded Rolls Royce with Henry Royce
- He was also a keen yachtsman
- By the end of the First World War both sides were using aerial photography extensively.

Find out more in: H2

## Joan Curran **Chaff**

Joan Curran was a physicist who, in 1942, invented a method to make it more difficult to detect an aeroplane with radar – chaff. In its simplest form, chaff are small metallic strips, normally aluminium, which are released from military aircraft to deceive enemy radar. Incoming radar beams reflect off the metallic chaff rather than the host aircraft, thereby giving a false reading, concealing the aircraft from radar detection.



### Did you know?

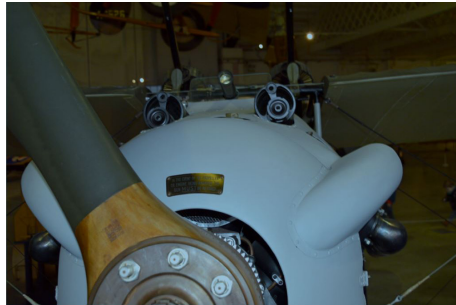
- Joan Curran was the daughter of a Welsh optician
- She also invented a proximity fuse, which helped destroy German V1 rockets during the Second World War
- She gained an honours degree from Cambridge University, but was not awarded it because in the 1930s women were not allowed Cambridge degrees.

Find out more in: H5



## George Constantinescu Synchronisation Gear

Romanian inventor George Constantinescu developed the synchronisation gear. Developed during the First World War, and introduced to the Royal Flying Corps in 1917, this equipment allowed aircraft to fire machine guns through a moving propellor, without danger of bullets injuring the pilot or breaking the propellor blades. This meant the pilot could aim their guns by pointing the aircraft at the target, reducing the need for a separate gunner.



### Did you know?

- During his career, George registered over 130 inventions
- He also designed bridges
- Although born in Romania he lived most of his life in England, eventually moving to the Lake District.

Find out more in: H2

## Hugh Robinson Tail Hook Carrier Landing System

When an aircraft lands on an aircraft carrier ship, the only way it can stop falling into the sea on the other side is with a hook on the tail of the aeroplane that catches a wire which is stretched across the deck. The wire brings the aircraft to a swift stop. This system of wires and tail hooks was invented by Hugh Robinson in 1911 to let biplanes land on ships.



### Did you know?

- Hugh Robinson was the first person to make an air-sea rescue
- He was also involved in the design of parachutes
- Hugh Robinson was a keen motorcyclist and performed a stunt called the "Circle of Death".

Take a look at the Buccaneer  
in: H6

## Sir Alan Cobham **Air-to-Air Refuelling**

Because it takes more power for an aircraft to take off than to fly, a lot of fuel is used in the early parts of the flight. This is particularly problematic in fighter jets, which already have a limited range. Cobham established Flight Refuelling Limited in 1934 to provide a solution for this problem by refuelling aircraft while in flight, without the need to land. His company developed the pioneering 'probe and drogue' technique of in-flight refuelling which is still used today by air forces all over the world.



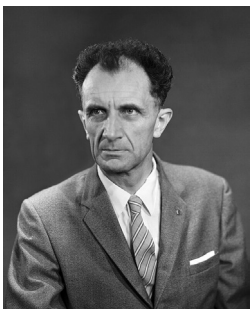
### Did you know?

- The idea of in-flight refuelling was first devised by Giovanni Caproni in 1921
- Cobham started as a teenage commercial apprentice in the City of London
- After the First World War he became a test pilot for the de Havilland aircraft company
- His company exists today as Cobham PLC, developing aviation technology.

Find out more in: H5

## Adolf Busemann **Swept-Wing Aircraft**

The shape of an aircraft's wings has a major effect on speed, altitude and manoeuvrability. Straight wings give good lift, which allows an aeroplane to be airborne at lower speeds, but do not allow high speed flight. Adolf Busemann developed the swept wing in 1935, which reduces drag and allows for much higher top speeds. Alongside the invention of the jet engine, swept wing aircraft allow us to go further, higher, and faster.



### Did you know?

- Although Busemann researched swept-wing designs in 1935, the main development was after the Second World War
- He also worked on the theory behind what causes "sonic booms" when flying at the speed of sound.

Find out more about aircraft design in 'First to the Future': H1