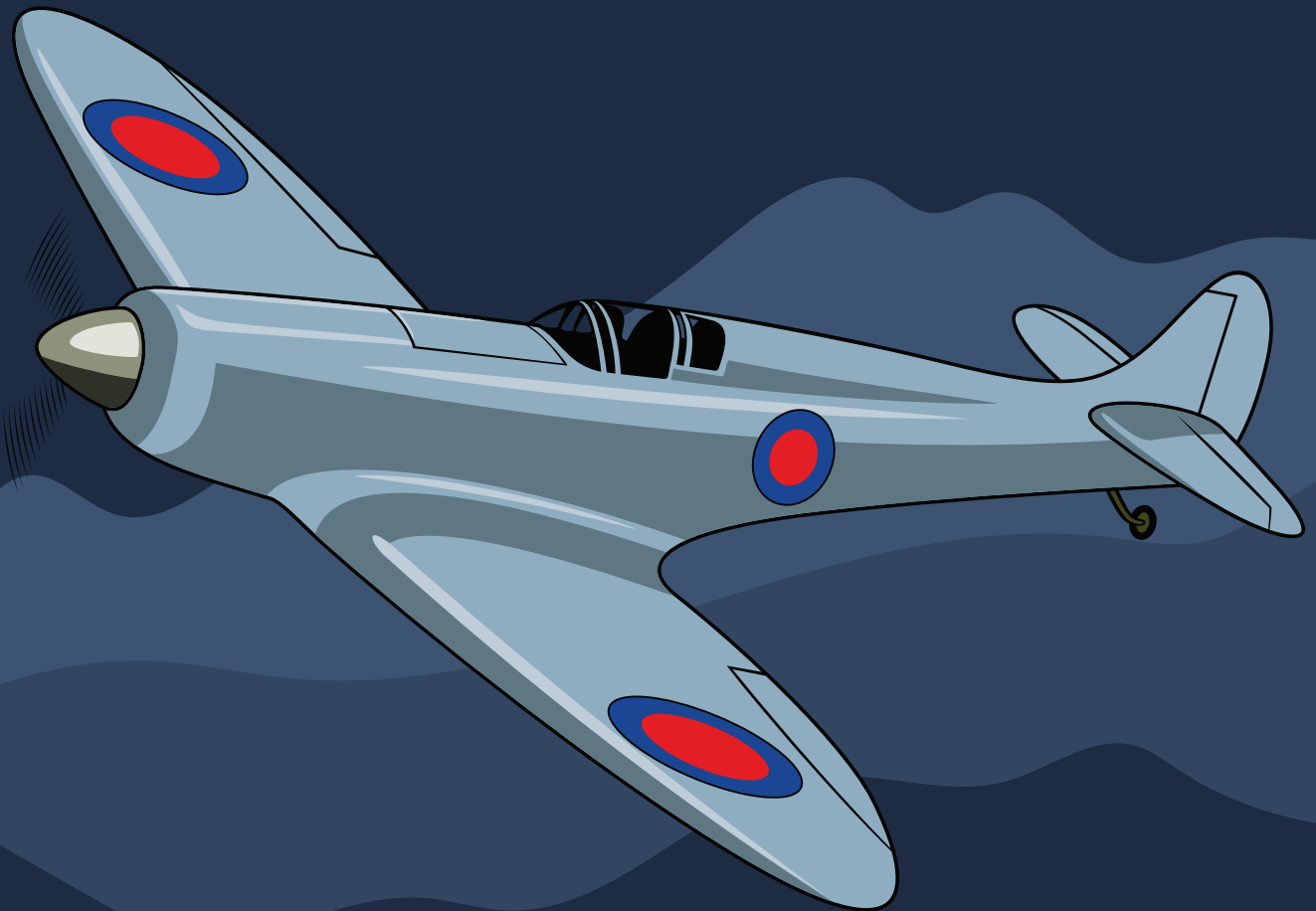


# RAF PERSONNEL

## ACTIVITY WORKPACK 3



 **ROYAL  
AIR FORCE  
Youth STEM**

 **ROYAL Charitable  
AIR FORCE Trust  
Inspire** 



# ABOUT THESE MATERIALS

This resource pack provides students with the opportunity to explore the science and history underpinning the development and deployment of Spitfire AA810 during WWII. The materials form part of a suite of five resource packs exploring a particular area linked to Spitfire AA810. This pack concentrates on **RAF personnel**. Curriculum links for KS3 learners are provided below to support embedding the content within your structured delivery or teaching sessions.

## CURRICULUM LINKS



### History / STEM

- ✓ Science in Society. Exploring the role of scientific advancements in historical events.
- ✓ Working Scientifically. Developing research, analysis, and presentation skills.

### Physics

- ✓ Forces. Investigating the effects of forces on movement, and the physics behind flight.
- ✓ Energy. Exploring how energy is transferred in systems, specifically in engines.

### Biology

- ✓ The Skeletal and Muscular Systems. Understanding how the human body responds to physical stress and injury.

### Chemistry

- ✓ Chemical Reactions. Understanding the reactions that power engines, and the properties of materials used in aircraft.

## ABOUT SPITFIRE AA810



Spitfire AA810 is a famous aircraft from the Second World War. It is known for its important role in taking photographs of enemy areas. This particular Spitfire was used by a special group that flew deep into enemy territory to gather information through aerial photography. Unlike regular Spitfires, AA810 had no guns but instead carried lots of extra fuel and cameras. This allowed it to fly 2,000 miles to complete some of its missions. Today, there is a project to restore Spitfire AA810 so it can fly again. This project helps remember the brave pilots who flew it and it teaches people about their contributions during the war. You can find out all about this by [clicking here](#).

# GUIDANCE NOTES AND ANSWERS

This pack has been designed so that it can be comfortably delivered in a 1-hour facilitated session with secondary pupils. This pack forms part of a series of resources designed to explore the history and science linked to Spitfire AA810. Each pack in the series contains web-links and QR codes to suitable background and contextual information to inform your delivery of the content. Answers to tasks and activities, where relevant, are provided below:

**PAGE 12: Now test your knowledge by answering some questions about Constance below.**

**1. What did Constance Babington Smith do before war began?**

Constance Babington Smith was a staff journalist and photographer for the British aviation journal, "The Aeroplane". She became renowned during World War II for her work in photographic interpretation, specifically identifying new German aircraft and secret weapons.

**2. What was Constance Babington Smith's role in the Women's Auxiliary Air Force (WAAF)?**

Constance was commissioned as a Section Officer in the WAAF and set up an aircraft interpretation section. Her section became part of the Central Interpretation Unit at RAF Medmenham.

**3. What significant discovery did Constance Babington Smith make at Peenemünde?**

Constance identified tiny burn marks in the grass at Peenemünde, which were the first evidence of 'jet marks' from jet or rocket engines. She also discovered the Messerschmitt Me 163 Komet, the world's first operational rocket fighter.

**4. How did Constance's findings about the Messerschmitt Me 163 Komet initially get received by Churchill's scientific advisor?**

Churchill's scientific advisor, Lord Cherwell, initially met her findings with disdain and rejected the notion of rocket fighters, believing it to be a Nazi hoax.

**5. What impact did Constance Babington Smith's discoveries have on the war effort?**

Her discoveries led to the identification of V1 launch ramps and contributed to Operation Crossbow, which targeted and bombed these sites, diminishing the impact of the V1 offensive on Britain.

**6. What recognition did Constance Babington Smith receive for her work during and after World War II?**

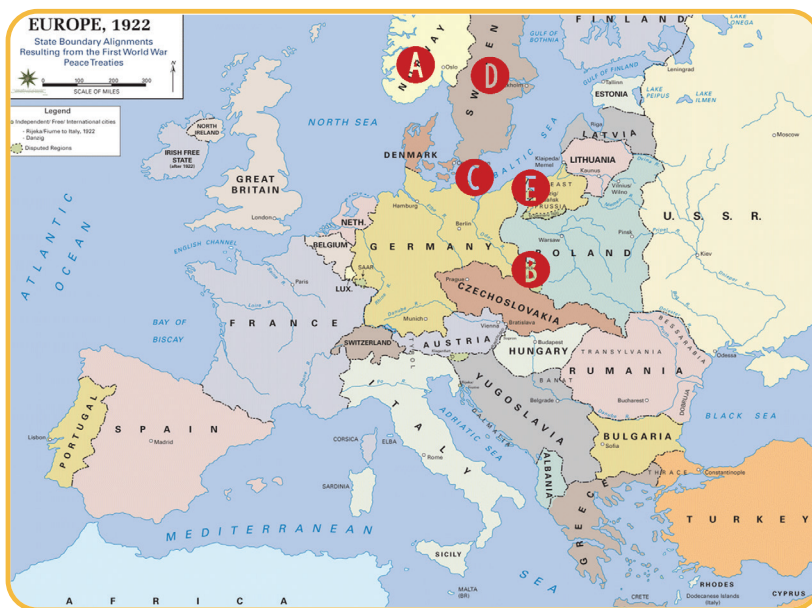
Constance was mentioned in despatches in 1942, appointed MBE in 1945, and received the US Legion of Merit for her contributions to the success of the United States Air Forces in Europe.

**7. What did Constance Babington Smith do after the war?**

After the war, she assisted the Americans with photographic interpretation, worked as a researcher for Life magazine, and wrote several books, including "Evidence in Camera," a book about wartime photographic intelligence.

**PAGE 15: Look online deeper into Alistair's story and use the map on the next page to circle significant locations from the story including:**

- a) The rough location of the spitfire crash.
- b) Stalag Luft III location, (the prison camp where the great escape took place)
- c) Sassnitz port
- d) Sweden
- e) Stettin



**PAGE 19: Now test your knowledge by answering some questions about Beatrice below.**

- 1. How did Beatrice's upbringing and interests help her to solve to issue with the merlin engine's carburettor?** She was fascinated by how things worked and at age 14 bought her first motorcycle, stripped it down, then reassembled it.
- 2. At which universities did Beatrice study, then work?** Studied at Manchester University and worked at the University of Birmingham.



# WHO WAS CONSTANCE BABINGTON SMITH?

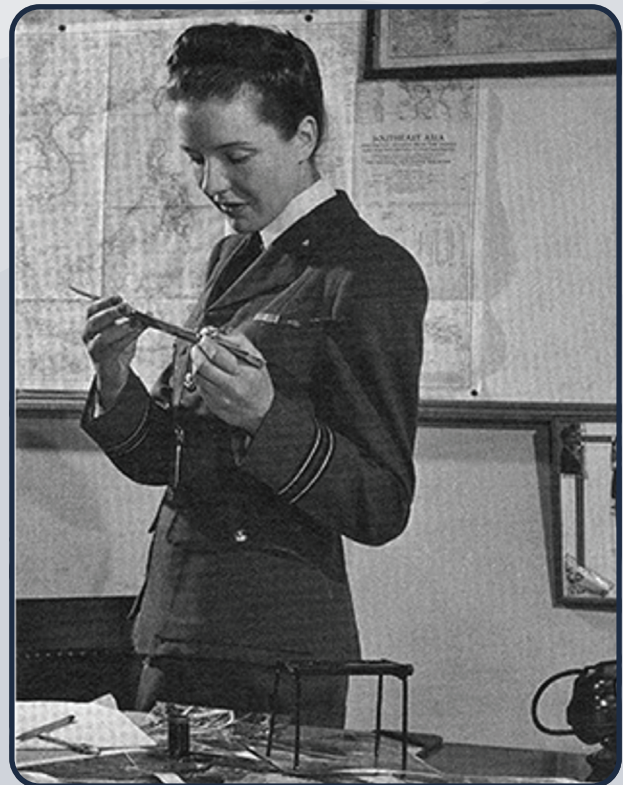


Find out more about this extraordinary woman and then test your knowledge by answering some questions.



Imagine a postcard-sized photograph, taken from thousands of feet in altitude, would you be able to see a little aircraft, let alone recognise which type? This is exactly what Constance Babington Smith did during the Second World War.

At a time when few, if any, of her colleagues were women, Constance was a staff journalist and photographer for the British aviation journal, *The Aeroplane*. Her journalistic flair for the newsworthy incident made her almost a legend in aviation.



When war broke out, Constance was commissioned as a Section Officer in the WAAF, the Women's Auxiliary Air Force. She was asked to set up an aircraft interpretation section. Her section became part of the Central Interpretation Unit, which was based at RAF Medmenham, not far from London. Constance, or 'Babs' as she was informally called, was entrusted with the responsibility of searching for secret weapons.



## DID YOU KNOW?



RAF Medmenham was built in 1901 and passed through several owners before being taken over by the Royal Air Force to use as its headquarters for aerial photographic interpretation. It is now a luxury hotel called Danesfield House.



Work carried out by 'L' Section, Constance's team, provided an enormous contribution to the war effort. They spotted new aircraft types, often still prototypes, and followed their whereabouts throughout Germany; monitoring their development and predicted when they would reach operational status.



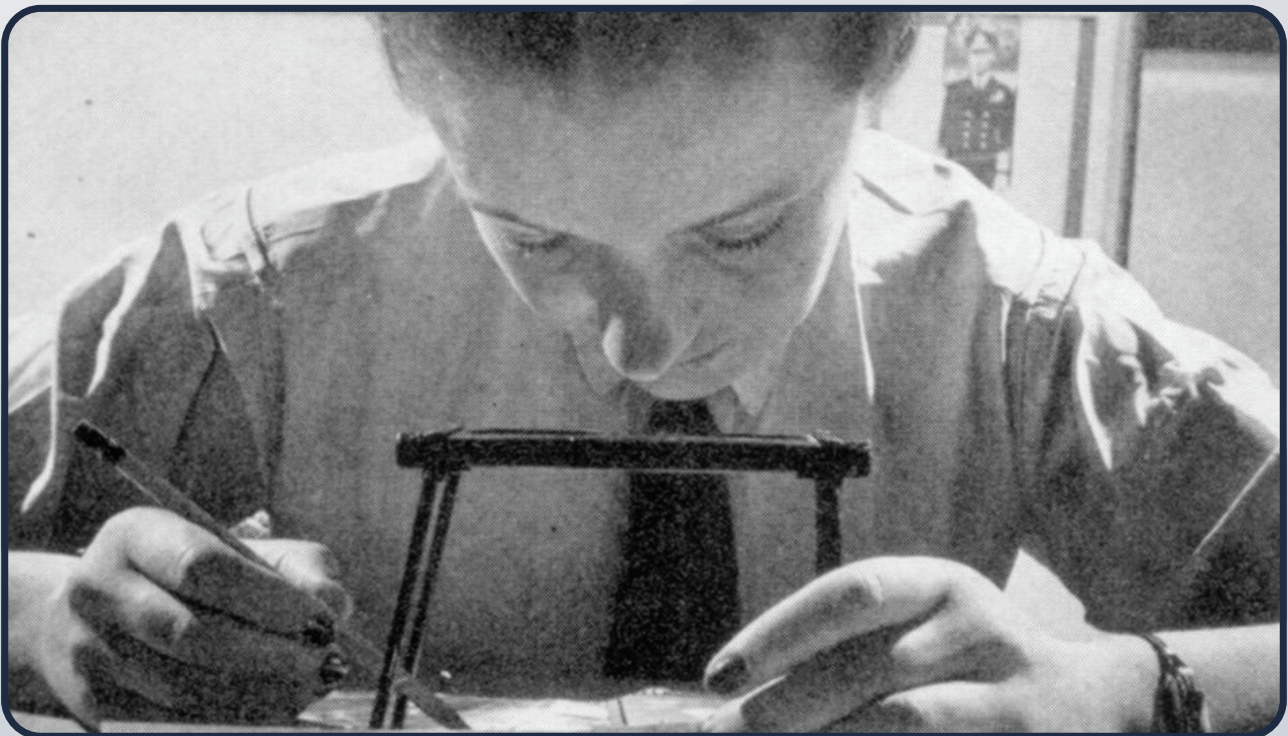
Constance had been charged with looking for 'anything queer' at Peenemünde, a little peninsula in the north of Germany, which was used as a major Nazi weapons test centre. She noticed tiny burn marks in the grass around the airfield. This was the first time she identified 'jet marks', where jet or rocket engines have scorched the grass.

She then spotted four tailless aircraft she had never seen before. In a second set of photos, one of the aircraft had moved, indicating that they were already in the testing stage. She named it as P-30 (P for Peenemünde and 30 for the wingspan), but it soon became known as the Messerschmitt Me 163 Komet, the world's first and only operational rocket fighter. It was also the fastest aircraft in the world with speeds of 600 miles per hour, close to the speed of sound.

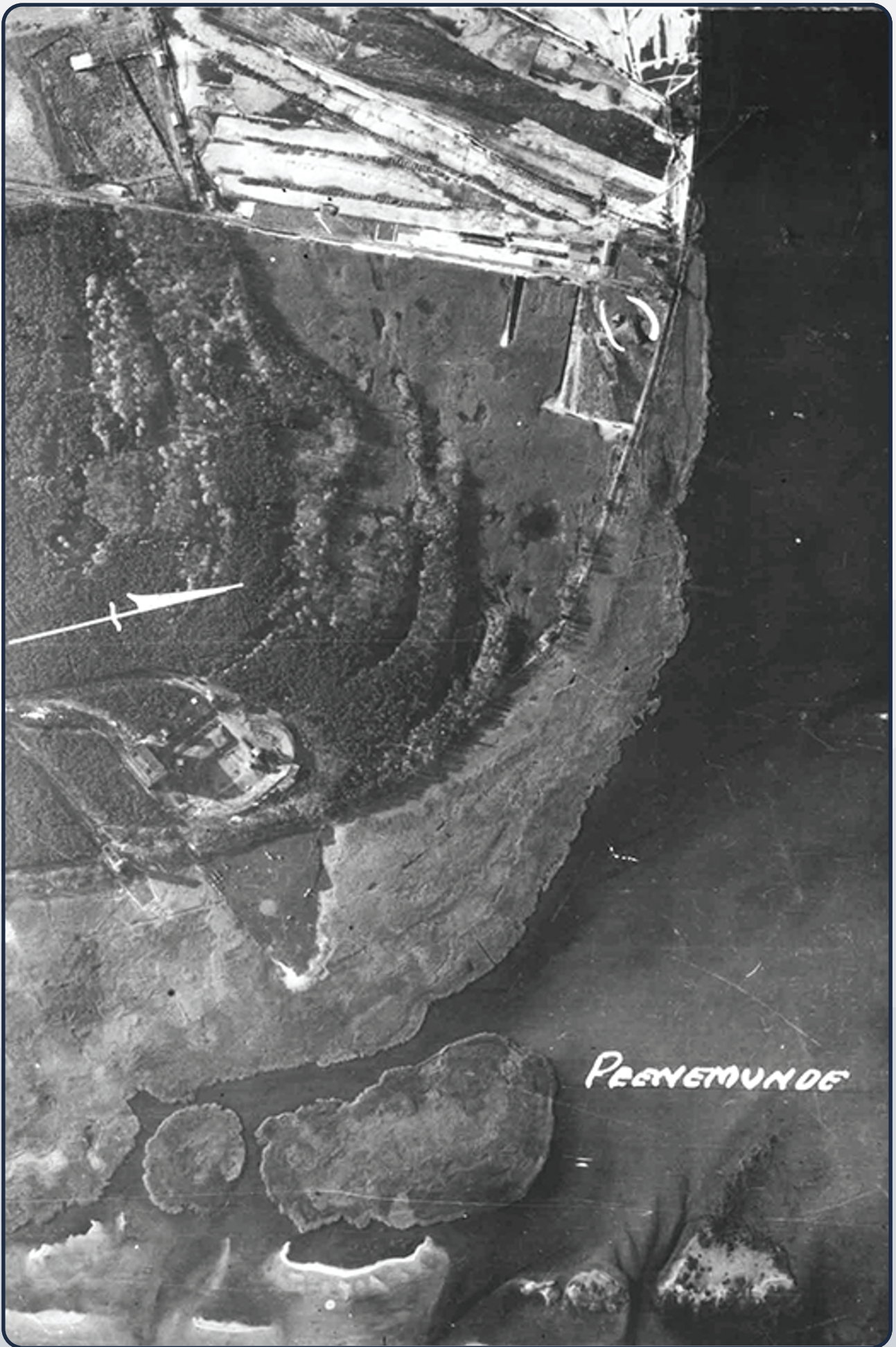


Her analysis, suggesting that the images were of rockets, was met with some disdain by the Prime Minister's scientific advisor, Lord Cherwell. He strenuously rejected the notion of rocket fighters and believed the images were either torpedos or simply a Nazi hoax. Luckily, other scientists overruled him and suggested further investigations

Constance was asked to go over the photographs of Peenemünde again and see if she could find something smaller than P-30. Day after day, surpassing her usual 12-hour work day, she went over the photographs again, looking through her stereo viewer and magnifying glass. Suddenly, she spotted something, a small cruciform object, less than a millimetre in length on the photograph. She calculated that the wingspan must have been about 20 feet. What she was looking at, was the V1, the Flying Bomb. British Intelligence had heard of this weapon, but Constance was the first to 'see' it. Her discovery was recognised as one of the greatest achievements in photographic identification.







Now knowing what to look for, Constance and her team soon started finding more P-20s, as they were called, on other photographs. They also identified V1 launch ramps, which were later found in France, ready to fire their missiles at Britain. A major bombing campaign, called Operation Crossbow, took several of these sites out, diminishing the impact the V1 offensive had on Britain.



Constance reached the rank of Flight Officer, the WAAF equivalent of the RAF's Flight Lieutenant. She was mentioned in despatches in 1942 and was appointed MBE (Member of the British Empire) in 1945. She later assisted the Americans with photographic interpretation, receiving the US Legion of Merit for *'contributing materially to the success of the United States Air Forces mission to Europe'*. She stayed in the US for a couple of years, working as a researcher for Life magazine.

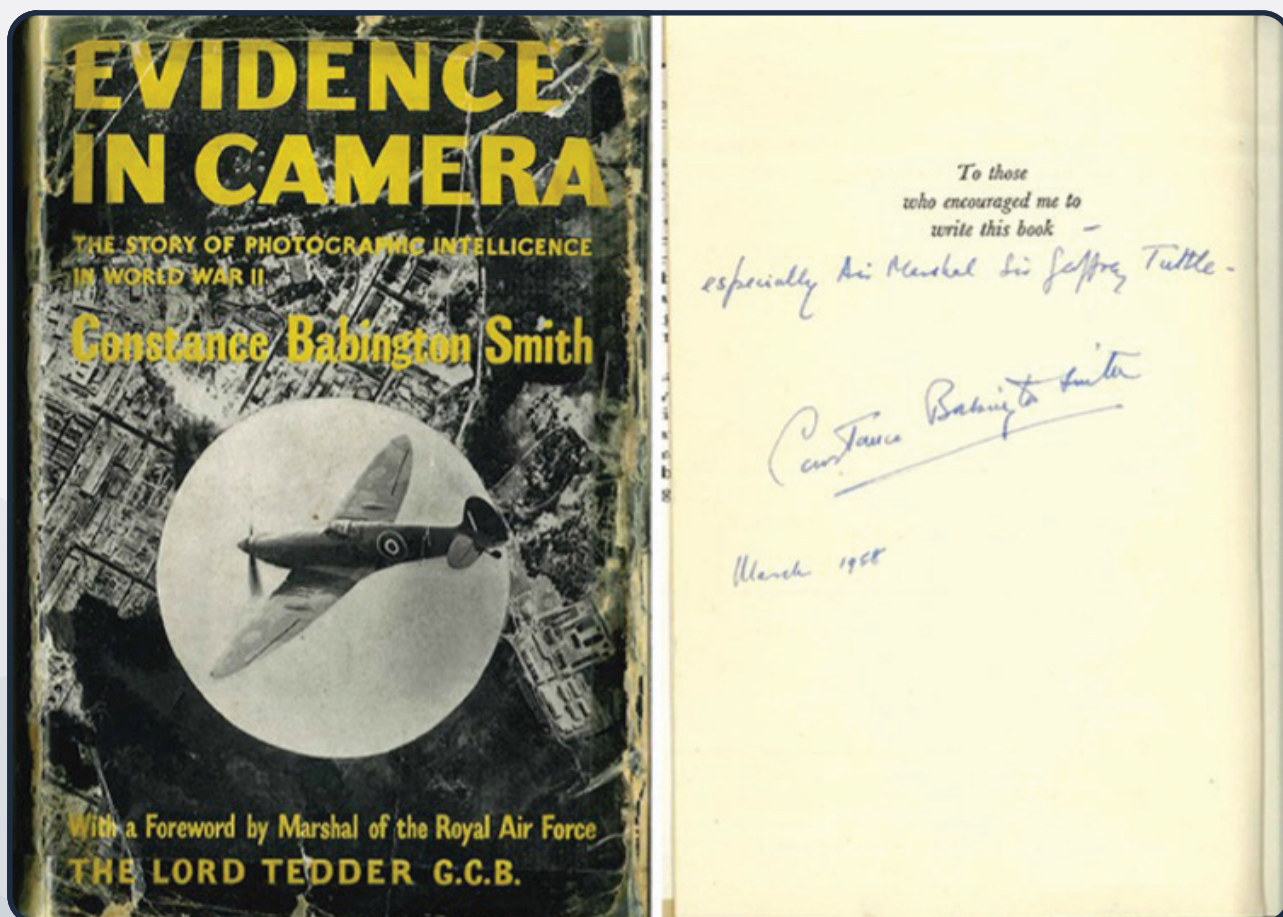




## DID YOU KNOW?



Constance wrote a book about wartime photographic intelligence, called *Evidence in Camera*. A signed copy exists in the RAF Museum's Archives. The museum also hold an extensive collection of her research papers and correspondence. This research was for several books she wrote on test pilots, as well as biographies on great British women, including the famous pilot Amy Johnson.







**Now test your knowledge by answering some questions about Constance below.**

1. What did Constance Babington Smith do before war began?

---

2. What was Constance Babington Smith's role in the Women's Auxiliary Air Force (WAAF)?

---

3. What significant discovery did she make at Peenemünde?

---

4. How did Constance's findings about the Messerschmitt Me 163 Komet initially get received by Churchill's scientific advisor?

---

5. What impact did her discoveries have on the war effort?

---

6. What recognition did Constance Babington Smith receive for her work during and after World War II?

---

7. What did Constance Babington Smith do after the war?

---

# WHO WAS ALISTAIR GUNN?



**Find out about Alistair and identify significant locations linked to his story.**

During the final flight of Spitfire AA810, Alistair 'Sandy' Gunn was at the controls. The mission was to find the German battleship 'Tirpitz', and with Enigma intelligence suggesting that the ship could move at any point, there was no time to lose.

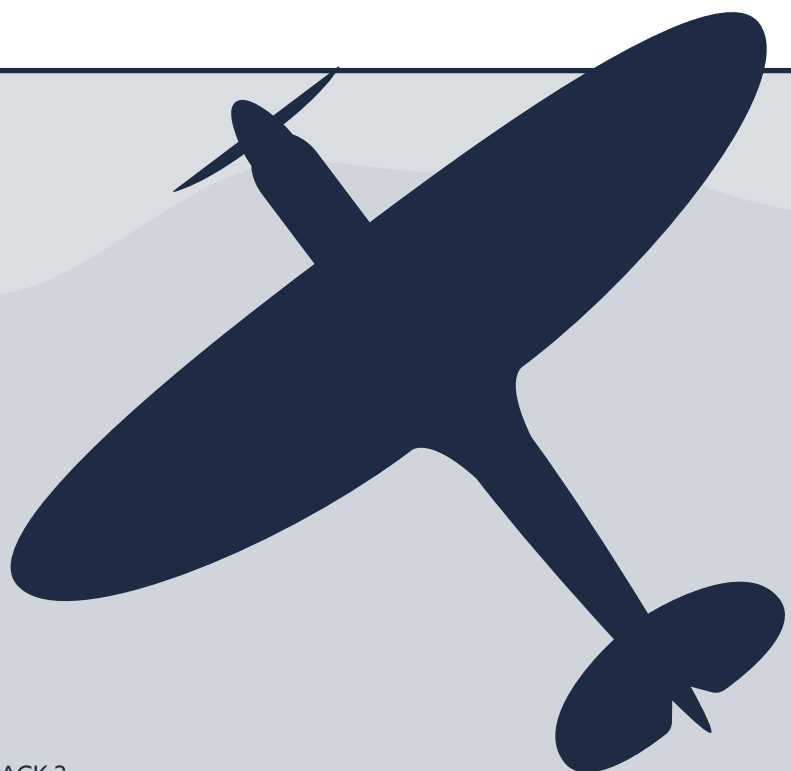
As two German pilots descended in to attack Alistair's Spitfire, bullets and cannon shells struck the aircraft all over, nearly 200 striking AA810 during the battle. The one-sided air battle was won by the German pilots; Alistair heroically held on for as long as he could, burning parts of his face and hands in the process. Accepting that he could not recover the aircraft, Alistair made a daring escape via parachute as the Spitfire crashed in Norway.



When he landed, Alistair was captured and taken to a German prison camp. With his friend Hubbert, Alistair and a number of others in the camp dug the tunnel nicknamed 'Harry', which was going to be used by the prisoners to carry out "The Great Escape". Roger Bushell led the mission as the Escape Leader. He chose the order of the escapees, beginning with the 100 who most contributed the most to the escape plans. Knowing that only 200 prisoners maximum would be able to escape out of 600, he decided that the remaining hundred would be picked through a lottery.

Alistair was chosen as the sixty-eighth to escape in the first hundred. The tunnel was discovered a mere eight men after him. Hubbert was unable to finish his escape attempt, having to turn back and being sent to solitary confinement as punishment.

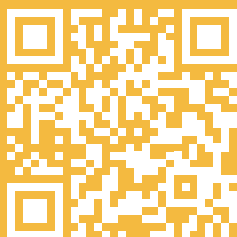
Alistair's plan was to find a boat in the German port of Sassnitz to take him to Sweden, which was neutral in the war. Tragically, Alistair was caught by the Germans on the 26th of March just two days after he had escaped from the camp and just 25 miles away from Stettin. He was then taken to prison by the Gestapo.



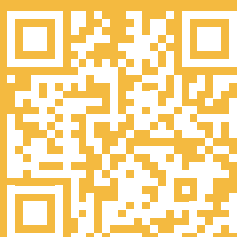


Look online deeper into Alistair's story and use the map on the next page to circle significant locations from the story including:

- a) The rough location of the Spitfire crash.
- b) Stalag Luft III location, (the prison camp where the great escape took place).
- c) Sassnitz port
- d) Sweden
- e) Stettin



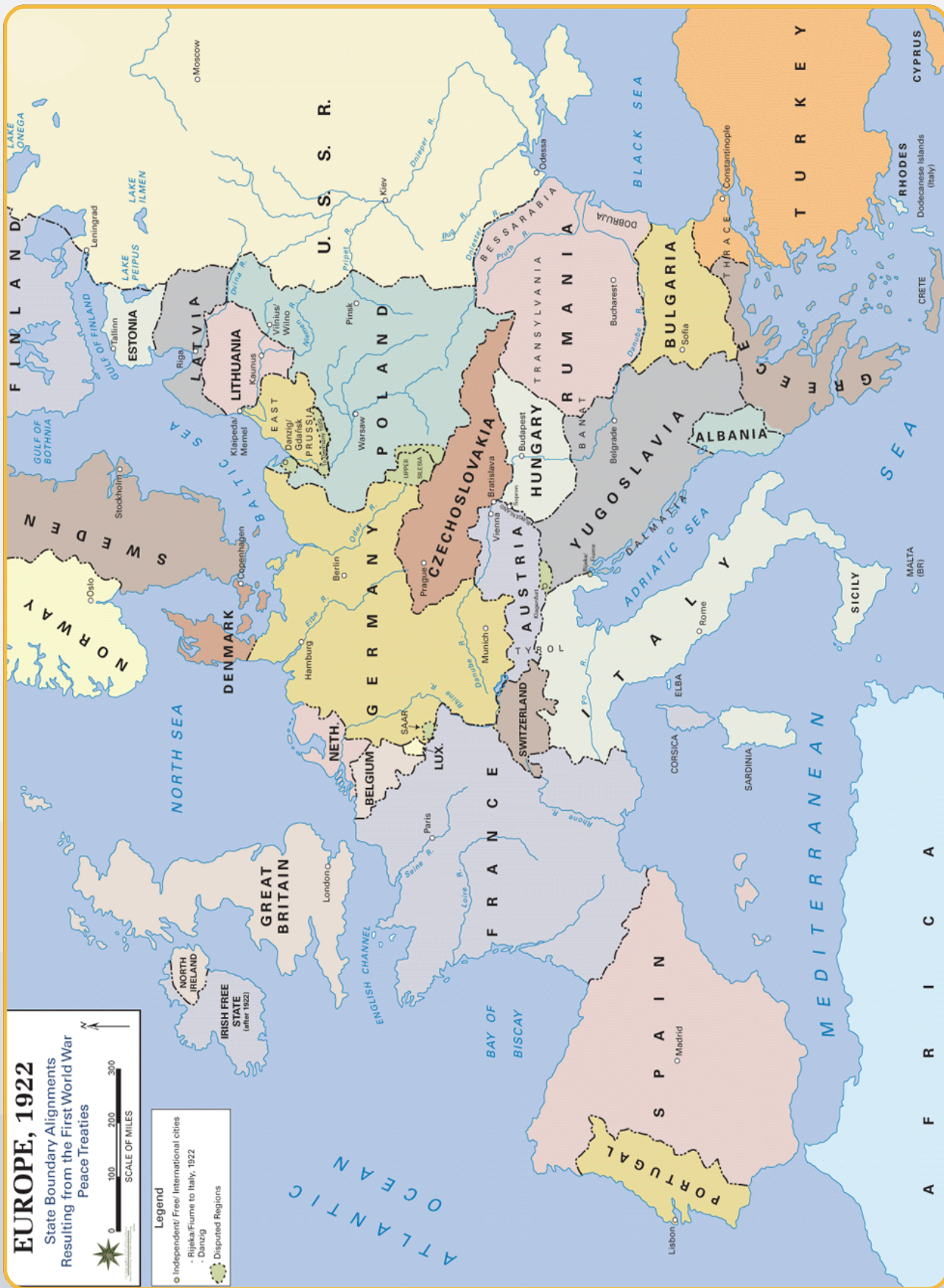
Scan the QR code or [click here](#) to find out more about The Great Escape from Ley Kenyon, who worked on the escape plan as a forger.



Scan the QR code or [click here](#) to view more stories about pilots who flew the Spitfire and find out more about the history of this great aircraft.

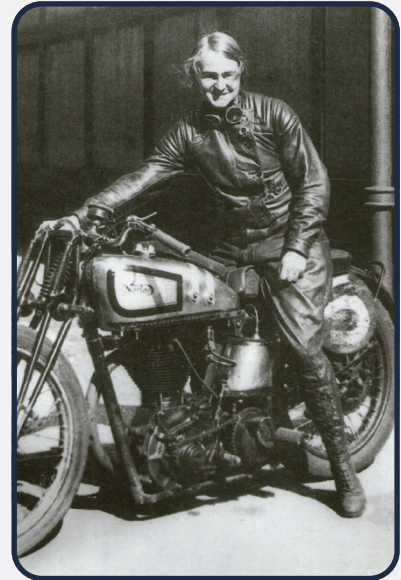






# WOMEN IN WAR

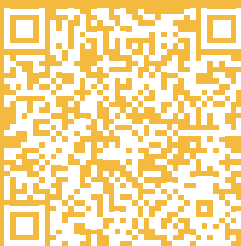
## BEATRICE SHILLING



**Beatrice Shilling enjoyed finding out how things worked by taking them apart. Find out how she solved a problem that was making aircraft engines stall in flight.**



- Beatrice Shilling was the daughter of a butcher, born in 1909.
- Played with Meccano and spent pocket money on glue and hand tools.
- Bought her first motorcycle aged 14, stripped it down, then reassembled it.
- Became an electrical engineer apprentice age 17- rare for women at the time.
- Became one of two women enrolled in an Electrical Engineering Degree at Manchester University.
- Worked as a researcher on single-cylinder engines at the University of Birmingham.
- By 1936, Beatrice was working for the Royal Aircraft Establishment, supporting the Air Ministry as an Aeronautical Engineer. Her specialism was the carburettor.



Scan the QR code or [click here](#) to find out more about this innovative aeronautical engineer

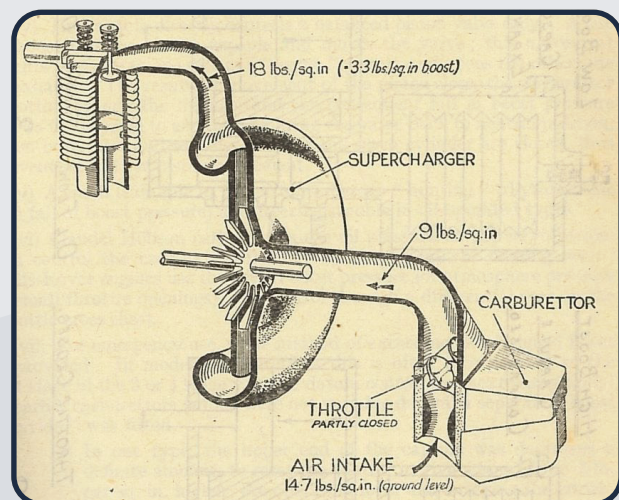


# THE PROBLEM THAT BEATRICE SOLVED

Engines produce the thrust required to make aircraft fly. The Spitfire used a Rolls Royce Merlin engine to power it. However, Spitfire pilots initially had a problem- the engine could cut out and stall when performing a negative G- dive towards the ground, or flying inverted- just as current RAF aircraft like the Typhoon do- due to fuel flooding. This could result in fighter aircraft stalling during air combat, or reconnaissance pilots becoming unable to dive quickly at low level to secure vital imagery. A young female aeronautical engineer sought to fix this.

## The solution:

She designed a thimble-shaped brass flow restrictor with precisely calculated dimensions to allow just enough fuel flow for maximum engine power.



## DID YOU KNOW?



A Carburettor is a device that allows air and fuel into the engine through valves, mixing them together in different amounts to suit a wide range of different power conditions.





**Now test your knowledge by answering some questions about Beatrice below.**

1. How did Beatrice's upbringing and interests help her to solve to issue with the merlin engine's carburettor?

---

---

---

---

---

---

---

---

2. At which universities did Beatrice study, then work?

---

---

---

---

---

---

---

---

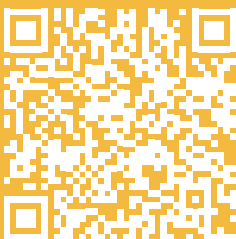
# RESEARCH TASK



**Create a short PowerPoint presentation on the impacts of the jet engine and other important aviation technology and innovations in WW2 such as:**

- 1) Radar technology
- 2) Aircraft Carriers
- 3) Precision Bombing and the Blitz
- 4) The Spitfire

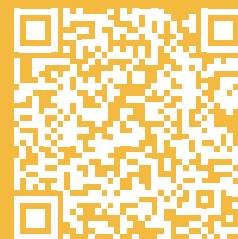
**Learning resources on radar in WW2**



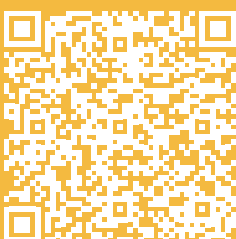
**Radar & WW2 technologies (British Defence Section)**



**Information on the UK's giant aircraft carriers**



**Information on precision bombing techniques**



**More information on the Spitfire**

