

Ground Defence

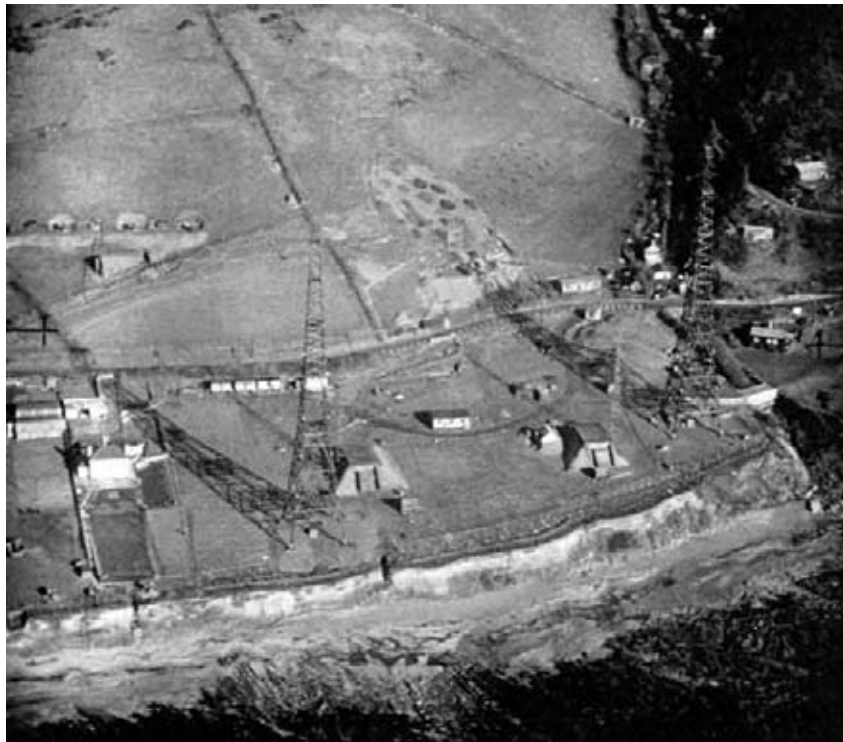
Radar

Although in 1939 many aspects of Britain's defences were ill-prepared for the total war which would come the following summer, one great positive was the possession of a sophisticated radar system.

Fears around the future use of air power as a form of warfare prompted intense research and experiment into developing techniques of detecting incoming aircraft at the furthest possible range. Radar was a British invention and when the war broke out in September 1939 a network of twenty radar stations was in place along the east coast. This network was known as the Home Chain.

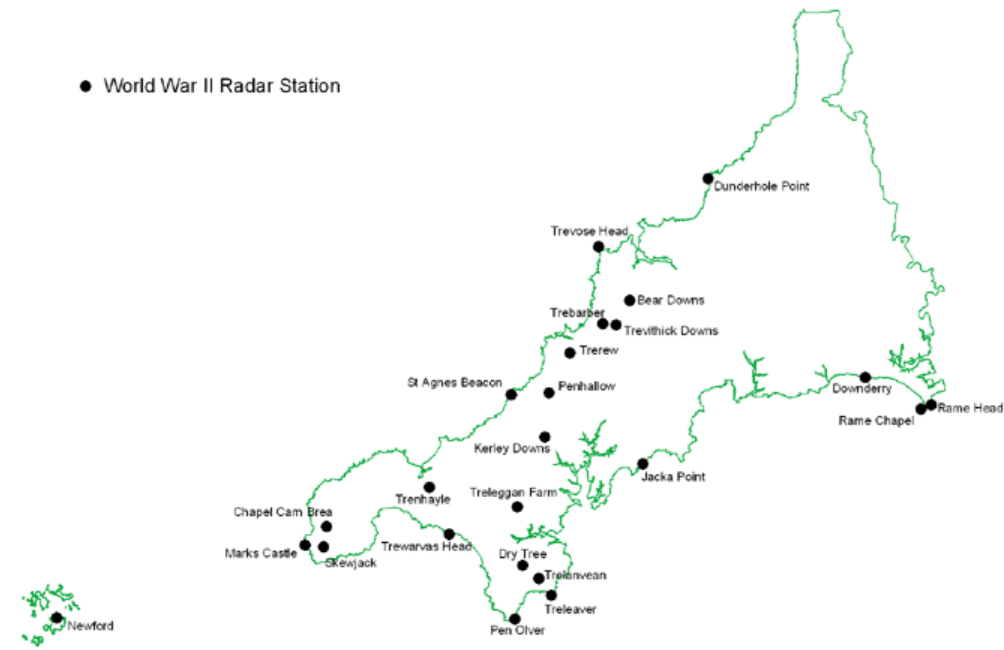
During the early months of the war the Chain Home network was extended and augmented by a new type of station designed to detect low-flying aircraft – Chain Home Low stations. Information on approaching enemy aircraft was passed from these radar stations to operations rooms which in turn directed fighter aircraft to intercept the raiders. Radar removed the need for fighters to be exposed by carrying out routine spotting patrols, and it contributed hugely to the RAF victory in the Battle of Britain.

In the spring of 1940 as the sweeping German advance into France rendered more and more of Britain's coasts, including Cornwall, vulnerable to attack, so the Home Chain was extended. Seven Chain Home and Chain Home Low stations were operating in Cornwall by April 1941. Further developments in radar led to a new wave of coastal radar stations, known as Chain Home Extra Low, which were capable of detecting both shipping and low-flying aircraft. There were six of these stations in Cornwall by July 1942.



The Chain Home radar station at Donderry, one of the network of early warning sites established throughout Britain between 1939 and 1941. The site is defended from the beach by steel scaffolding and barbed wire. Two of the four steel masts on

which the transmitter aerials were mounted are visible in this photo. Next to each of these are concrete buildings protected by mounds of earth; these are transmitter or receiver blocks. The bomb-proofing of buildings in this manner was in response to attacks on radar stations by German dive bombers in the summer of 1940. © English Heritage (NMR) RAF Photography: MSO31279/PO/3020



Distribution of all Second World War radar stations in Cornwall.

Anti-Aircraft Guns

During the late 1930s, with German rearmament progressing rapidly, close attention was given to Britain's anti-aircraft defences. Many new batteries were placed around London and in Kent; other areas considered vulnerable were the industrial cities of the midlands and the north, as well as ports on the south coast such as Portsmouth, Southampton, Bristol and Plymouth.

By the time war was declared in September 1939 there were twelve heavy anti-aircraft batteries defending Plymouth, some of which were sited on the Cornish side of the Tamar.



Remains of a heavy anti-aircraft battery. This shows the typical layout of four 3.7 inch gun emplacements arranged in a horse-shoe layout with the command centre set slightly back. © English Heritage (NMR) RAF Photography

Heavy anti-aircraft artillery was designed to shoot down planes flying at between 3,000 and 30,000 feet. During the Battle of Britain in the summer of 1940 anti-aircraft guns accounted for some 17% of enemy aircraft shot down but when, in the autumn, German bombers began raiding cities by night the success rate dropped significantly.

Gun-laying radar was not sufficiently developed at this juncture to allow quick and accurate identification of targets, especially at night. Battery crews resorted to the tactic of firing continuously and indiscriminately at the general direction of incoming bombers. Although few planes were shot down, this tactic forced them to fly at a much greater height (reducing the accuracy of their bombing) or persuaded them to avoid the target area altogether.

Significant advances were made in the development of radar during the course of the war and by 1944 anti-aircraft guns were guided by a system that fixed on a plane and followed its position automatically (earlier systems required the operator to manipulate the controls to keep the target in view), producing a 70% success rate in the gunner's performance.



The heavy anti-aircraft battery at St Anthony Head, one of four batteries guarding Falmouth. © English Heritage (NMR) RAF Photography:

Women served on heavy anti-aircraft batteries from the summer of 1941. This was the first time women were employed in a front line role in Britain's armed forces. The idea when first put forward received much opposition (one army director suggested in 1939 that 'women might smash valuable equipment in a fit of boredom'). Once mixed batteries became a reality, however, they quickly became the norm and in December 1941 Britain introduced conscription for single women in their twenties.

As the conflict continued more anti-aircraft batteries were established. The sites were organised into Gun Defended Areas – typically a ring of batteries around a Vulnerable Area, which could be a town or a military installation. By July 1940 Falmouth was guarded by four heavy batteries and by 1942 the airfields at St Eval, Portreath and Predannack were all provided with heavy guns.

The Cornish airfields were also protected by light anti-aircraft guns. Light anti-aircraft defences were provided for specific Vulnerable Points, such as radar stations, dockyards or factories. In Cornwall light anti-aircraft batteries were sited at many places, such as Pendennis Castle for the defence of Falmouth docks, at Fowey to defend its harbour, and at Hayle for the defence of the electricity power station.

Light anti-aircraft batteries were usually armed with Bofors guns capable of rapid firing at low-flying targets. They were deployed at coastal towns such as St Ives in response to the raids of 1942 involving low-level attacks on towns around the south coast. Frequently they did not have permanent mountings but were set on mobile bases. Consequently there is little trace of their positions in the landscape.

During the 1920s and 30s Cornwall was seen by military planners as a relatively safe location. Consequently it was chosen as the base for a number of experimental and training establishments, including the training of anti-aircraft gunners.

The most important of these was RAF Cleave, an exposed clifftop site near Bude. This became operational in early 1939, providing training and practice for anti-aircraft gunners. The guns were sited on the cliff edge and targets were towed by aircraft for which the site had a grass airfield. Target practice was also provided by 'Queen Bee' aircraft which were pilot-less drones. Early in the life of the station a steam catapult was positioned to launch these aircraft but proved unsuccessful.



The anti-aircraft gunnery range at RAF Cleave near Bude, showing the grass airfield, the gun batteries on the clifftop (to the left) and the circular base for the steam catapult launcher (just below the gun batteries). © English Heritage (NMR) RAF Photography: CPE/UK/1793/3045

Barrage Balloons

Barrage balloons were a very basic form of defence against aircraft and were widely used around towns and strategic targets. They were simply large balloons tethered to fixed moorings on the ground.

The cables which attached them to the ground were a dangerous obstruction to low-flying aircraft and their deployment around potential targets forced enemy raiders to fly at high altitudes, thereby reducing the accuracy of their bombing.



A barrage balloon hovers over Mount Edgcumbe: it is visible as a small white shape near the centre of the photograph. Its mooring base lies in the field below. © English Heritage (NMR) RAF Photography: NLA/31/5007

The balloons themselves can occasionally be seen on wartime photographs and their bases are often clearly visible on late 1940s photographs. These consist of inner and outer rings of concrete blocks, a concrete hard standing in the centre and a small hut or bunker at one edge, where the balloon was stored when not in use.



The base for a barrage balloon at Torpoint. The small white dots that form concentric circles are the remains of concrete blocks set into the ground and used to anchor the balloon's mooring cables. © English Heritage (NMR) RAF Photography: 106G/UK/1274/5083