The Great Invention | Inventors | Alexander Watson-Watt (1892 - 1973)

Sir Robert Watson-Watt was the Scottish physicist who developed the radar locating of aircraft in England. Watson-Watt's other contributions include a cathode-ray direction finder used to study atmospheric phenomena, research in electromagnetic radiation, and inventions used for flight safety.

Robert Watson-Watt was born in Brechin, Angus, Scotland, on 13th April, 1892. He was a direct descendant of James Watt, pioneer of the steam engine. His father, like his grandfather, was a carpenter by trade, an Elder of the Presbyterian Church and a very able Sunday School teacher. His mother, so he tells us in his book 'Three steps to victory', was a temperance reformer and a feminist - he described her as miraculous. He went to school in Brechin; firstly Damacre School and then Brechin High School. From there he entered University College, Dundee, which was then a part of St Andrew's University. Watson -Watt obtained his degree of B.Sc.(engineering) in 1912 and then went as an assistant to Sir William Peddie at St Andrew's who excited his interest in radio waves.

Watson-Watt joined the Royal Aircraft Factory in Farnborough as a meteorologist in 1915. During the First World War he researched the idea of developing a rapid method of displaying radio signals on aircraft and in 1916 proposed the use of cathode ray oscilloscopes to provide this information to pilots, however these did not become available until 1923. In 1917, he worked at the British Meteorological Office, where he designed devices to locate thunderstorms. Storm detection was considered very important because the early aircraft were not constructed to cope with bad weather and so it was imperative that they should have prior warning of any oncoming stormy weather and also to know the direction of that storm. Watson-Watt coined the

phrase "ionosphere" in 1926.

In 1924 Watson-Watt moved to the recently established Radio Research Station in Slough. Three years later, in 1927, following an amalgamation with the National Physics Laboratory (NPL), he became Superintendent of an outstation of the NPL at Slough. After a further re-organisation in 1933 Watson-Watt became Superintendent of a new radio department at the NPL in Teddington. He was appointed as the director of radio research at the British National Physical Laboratory in 1935, where he completed his research into aircraft locating devices.
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The Air Ministry contacted Watson-Watt in January 1935 and asked him to investigate the possibility of damaging enemy aircraft by the use of radio waves. Watson-Watt was quick to show that this was impossible but wrote to the Ministry with another suggestion - "Meanwhile, attention is being turned to the still difficult, but less unpromising problem of radio detection". He developed▫ a device that was able to detect aircraft in flight, before it was visible. Watson-Watt called this radar (Radio Detection and Ranging) as it used radio waves. In 1935 Watson-Watt wrote a paper entitled "The Detection of Aircraft by Radio Methods". This was presented to Henry Tizard, the chairman of the Committee for the Scientific Survey of Air Defence. Tizard was impressed with the idea and on 26th February 1935, Watson-Watt demonstrated his ideas at Daventry. As a result he was appointed head of the Bawdsey Research Station in Felixstowe.

With this equipment in February 1935 Robert Watson-Watt, Superintendent of the Radio Division of the National Physical Laboratory, detected radio waves reflected from a flying aircraft. At the time, Watson-Watt suggested linking together radio-detection stations to a fighter-control network. His work was vital in developing radar for use in the Second World War in Britain. Given

government money and a team to help him continue his work Robert moved to Daventry in Leicestershire, where, in 1935, he trialled his invention using a BBC shortwave radio transmitter to successfully detect the distance and direction of a flying Heyford Bomber. The distance was short, only twenty seven kilometres, but it was a beginning. A.F. Wilkins, a colleague of Watson Watts who had helped in the initial calculations, later said "It was clear to all who watched the tube on that occasion that we were at the beginning of great developments in the art of air defence". The original apparatus used in this historic experiment are now housed at the London Science Museum. With a more powerful transmitter, the improved radar enabled them to track a flying aeroplane at a distance of 120 kilometres. This resulted in the establishment of radar stations at various points along Britain's south coast to allow a watch to be kept for enemy aircraft in the event of war with Germany. These were to prove to be invaluable when war broke out in September 1939.

Robert Watson-Watt with the original British Radar Apparatus made at Ditton Park in 1935. This apparatus is now in the London Science Museum.

In 1937, before the war began, Watson-Watt and his wife undertook the dangerous task of traveling disguised as ordinary tourists through Germany, searching for signs of German radar stations. By the outbreak of the Second World War in 1939 Watson-Watt had designed and installed a chain of radar stations along the East and South coast of England. This radar system was known as Chain Home and Chain Home Low (see web pages 1&2). During the Battle of Britain these stations were able to detect enemy aircraft at any time of day and in any weather conditions. British fighter aircraft and bombers were soon fitted with radar sets as were patrol vessels and other ships. Robert Watson-Watt's invention helped the Royal Air Force win the Battle of Britain, in 1940.

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Radar is system or technique for detecting the position, movement, and nature

of a remote object by means of radio waves reflected from its surface. Although most radar units use microwave frequencies, the principle of radar is not confined to any particular frequency range. There are some radar units that operate on frequencies well below 100 megahertz (megacycles) and others that operate in the infrared range and above. The term radar, an acronym for radio detection and ranging, is also used to denote the apparatus for implementing the technique.

Watson-Watt became scientific adviser to the Air Ministry in 1940 and the following year went to the United States where he providing advice of building radar stations. In 1942 Watson-Watt was knighted for his role in the development of radar.

After the war Watson-Watt was awarded £50,000 by the British government for his contribution in the development of radar. He was also awarded the US Medal of Merit. Watson-Watt spent much of his life after the war in Canada. Robert Watson-Watt, who published Three Steps to Victory in 1958, died in Inverness, Scotland on 5th December, 1973, leaving as his legacy one of the most accurate electronic machines the world has known.