radar

from Encyclopedia of Intelligence & Counterintelligence

View article on Credo

Radio detection and ranging technology, popularly known by the acronym “radar,” has been credited with winning World War II for the Allies. Radar operates by sending a radio pulse into the atmosphere. If the waves strike an object such as an airplane, ship, or submarine, information is reflected back to the reflecting station. The distance from the transmitting object can be calculated be the angle and direction of the incoming echoes provide information on the exact location of the alien object.

Before the use of radar, aircraft pilots were directed by ground observers through radio contact. This method of navigation was impossible for ships in the open seas, and it often presented problems for airplane pilots during night flights. The early days of radio technology were focused on detecting enemy aircraft; but as the need for offense became more urgent during the course of World War II, the focus shifted toward using radar to pinpoint targets for Allied fighter planes.

As early as 1904, Christian Hillsmeyer, a German engineer, received a patent for the *telmobiloskop*, a primitive radar that was used to protect ships from colliding with objects. The first modern radar system was developed in the United States in December 1934 at the Naval Reserve Laboratory in Washington, D.C. Germany, France, Russia, Italy, and Great Britain soon realized the potential of radar and developed their own systems.

Radar in Great Britain

On January 18, 1935, the British government asked Scottish atmospheric physicist Robert Watson-Watts to develop a “death ray” of electromagnetic beams that could virtually reduce human tissue to ashes or automatically explode bombs. Watson-Watts suggested that such a device was beyond the scope of current radar technology and suggested that the government divert its focus to the detection uses of radar. Watson-Watts began working with R.V. Jones, an agent with British Scientific Intelligence, to expand this concept. The first successful test in which one aircraft detected another in flight was conducted in April 1937. Jones continued tests on the use of infrared in detecting enemy aircraft and later proposed a pulsed searchlight that would guarantee even greater accuracy. His idea was that an aircraft could follow the beams of the searchlight to drop bombs that would ignite when they hit the ground, with the pilot at a safe distance from enemy response.

In 1938, in Great Britain, where advancement of radar technology was fast becoming a necessary priority, the British Air Ministry asked the Post Office to develop a network of defensive radar systems because the Post Office had previously observed that static ensued when aircraft flew close to their receivers. The Post Office hypothesized that the technology developed by Guglielmo Marconi in 1922 to guide ships by reflected radio waves could be used to detect enemy aircraft. The result was a connecting network of reporting stations along Britain's southern and eastern coasts. This radar system would become the core of Britain's defense system. Two years later, technology was in place to cover all existing stations in order to monitor likely areas of enemy approach to the British Isles.

From this point onward, the Chain Home Network, a radar defense screen, was established to monitor the approach of enemy aircraft from anywhere in Great Britain. Mobile stations were also developed that allowed intelligence agents to transmit information from safe houses within Britain and from designated spots abroad. At least 66 different kinds of radar stations were developed, and the number of stations in operation rose to 365 fixed facilities and 644 mobile units. The radar stations used an electrical calculator to transmit intelligence information concerning map reference positions, the height in feet, and the number of nearby enemy aircraft. Pilots could transmit this information directly to a voice recorder that conveyed the intelligence to the proper personnel.

During the Battle of Britain in 1940, offensive radar technology had developed to the point that the Allies were able to destroy the German Knickebein, “X,” and “Y” radar systems. This was due in part to the extensive intelligence work that R.V. Jones had conducted on German radar. In his intelligence work, Jones had identified a major difference between British and German outlooks on radar. The British saw it as a high-priority defense measure and a way to save British lives through selected offense, while the Germans viewed it as another way to wage all-out war.

Radar in the United States

Advancing radar technology was less a priority in the United States than in Britain because of geography and the fact that America was nominally neutral until the attack on Pearl Harbor on December 7, 1941. Nevertheless, by 1938, the air corps war urging the signal corps to use existing radar technology to develop an early warning radar that would cover a range of 120 miles. The result was the development of the SCR-270 and the SCR-271, which provided the technology for both mobile and fixed early warning detectors. On February 26, 1940, the first Air Defense Command was activated at Mitchell Field in New York. The advancement of radar technology became a priority in the United States when, in September 1940 during the Battle of Britain, the British government secretly transported the results of the Tizard Mission, a box containing a revolutionary radar transmitter, the cavity magnetron, to Washington, D.C., by way of Canada.

The device was sent to the Massachusetts Institute of Technology. The top physicists from the United States gathered at what became known as the Rad Lab, which opened on November 19, 1940. Ten of the physicists would later win Nobel Prizes for their work on the magnetron. By the following year, both American and British aircraft were equipped with magnetron radar, and ships were equipped with the Huff Duff, a high-frequency detection finder.

This advanced radar technology allowed the Allies to target German U-boats with devastating accuracy, and the Allies were able to destroy German submarines before Allied targets could be reached. Rad Lab set up a civilian training center in Jamestown, Rhode Island, which became known as Mickey. The project was so secret that it was housed in a farmhouse with the radar receivers in a disguised water tank. It was from Mickey that pilots set out to test the interception and night-fighting capabilities of the magnetron, which were instrumental in the Allied triumphs of World War II.

A radar mast, which could track enemy ships and planes, is adjusted on a U.S. Navy ship in 1945.

Radar in the Cold War

The advent of the Cold War necessitated a continued dependence on radar technology. Radar allowed the Allies to guide aircraft into Berlin during the Berlin Airlift in 1948-49 and provided the basis for interception and defense measures in the Korean War. Britain's Royal Air Force (RAF) continued to use magnetron radar until 1957. Once the Soviet Union gained nuclear weapons technology, it became even more important for the United States to have a sophisticated early warning system to prevent surprise attack. By the late 1950s, the United States and Canada had blanketed the area from the southern tip of the United States to the northernmost arctic tundra with ground-based radars, an entire fleet of early warning aircraft, and a civilian corps of ground observers. Additionally, the United States had embedded the Texas Towers, a radio platform, on the floor of the Atlantic Ocean. In case of an attack on either country, fighter interceptors, antiaircraft artillery, and both short- and long-range surface-to-air missiles were ready for deployment.

Radar remains an important element of national and global security. In 1999, for example, the United States military announced that the AV-8B Harrier II plane with radar capabilities could be used to locate unfriendly aircraft before it could be spotted visually. This capability become even more important when hijacked aircraft attacked the World Trade Center and Pentagon in 2001.

SEE ALSO: Huff Duff; reconnaissance.

BIBLIOGRAPHY

- Allen, William Slater “Mickey and the Night Flyers,” Naval History (October 2003).
- Jones, R. V. Most Secret War (Coronet Books, 1979).
- King, Joseph “Eyes in the Sky,” Marines (September 1999).
- Marchant, P. A. et al., “Post Office Equipment for Radar,” www.radarpages.co.uk.
- Moorman, Robert W. “The Technology Store,” Air Transport World (August 1999).
- Schaffel, Kenneth “The Emerging Shield: The Air Force and the Evolution of Continental Air Defense, 1945-1960,” www.airforcehistory.hq.af.mil.

ELIZABETH PURDY, PH.D.
INDEPENDENT SCHOLAR

APA

PURDY, E. (2005). radar. In R. P. Carlisle, *Encyclopedia of Intelligence & Counterintelligence*. London, UK: Routledge. Retrieved from https://search.credoreference.com/content/entry/sharpint/radar/0

Chicago

PURDY, ELIZABETH. "radar." In *Encyclopedia of Intelligence & Counterintelligence*, by Rodney P. Carlisle. Routledge, 2005. https://search.credoreference.com/content/entry/sharpint/radar/0

Harvard

PURDY, E. (2005). radar. In R.P. Carlisle, *Encyclopedia of Intelligence & Counterintelligence*. [Online]. London: Routledge. Available from: https://search.credoreference.com/content/entry/sharpint/radar/0 [Accessed 5 December 2017].

MLA

PURDY, ELIZABETH. "radar." *Encyclopedia of Intelligence & Counterintelligence*, Rodney P. Carlisle, Routledge, 1st edition, 2005. *Credo Reference*, https://search.credoreference.com/content/entry/sharpint/radar/0. Accessed 05 Dec 2017.