

B' Ομάδα Θεμάτων

Writing Activity Seven: The History of Aviation VII

Lead-in

Answer the following questions.

1. How did radar help the British during the battle of Britain?
2. How did radar locate enemy planes at a distance?

Focused Reading

Circle the correct answer in the table below.

	Radio waves
1. Basis for the radar. (circle one)	radar / sonar
2. Type of wave. (circle one)	compression / transverse
3. Travels best in... (circle one)	air / water
4. Best in detecting... (circle one)	submarines / aircraft

THE SCIENCE AND TECHNOLOGY OF WWII

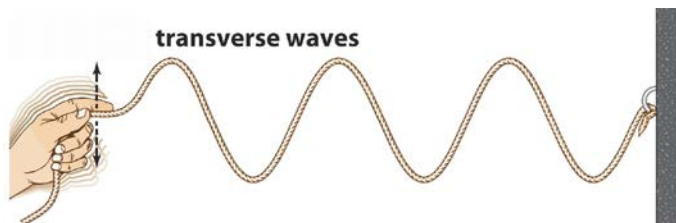
~ How Waves Helped Win the War: Radar in WWII ~

Technological advances that figured prominently in the Allied victory in World II were radar (Radio Detection and Ranging) and sonar (Sound Navigation and Ranging), both techniques for detecting the location and speed of enemy aircraft or submarines.

During World War II, radar played a critical role in the British victory in the Battle of Britain, an aerial battle fought largely between August 1940 and the end of that year. In August of 1940 Britain stood alone in the war in Europe, the German army having defeated Britain's Polish allies in September of 1939, and the French in June of 1940. By August, Hitler had given up attempts to persuade the British to sign a peace treaty favorable to Germany. He started planning an invasion of Great Britain, but first he had to deal with the British air forces. Hitler had reason to be optimistic. The British had only 800 aircraft to try to hold back the onslaught of over 3,000 German planes. The British victory in this battle was largely due to a series of radar stations that had been built along the south and east coasts of Britain in 1939. These radar stations enabled the British to determine the direction, altitude, and speed on oncoming German aircraft while they were still 50 to 60 miles away, and thus concentrate their limited fighter forces against them.



Radar locates enemy planes at a distance by sending out invisible waves that strike the planes and bounce off and return to a wave detector. The returning waves provide information as to the direction of the enemy aircraft, as well as their velocity. Radar waves exhibit the properties of all waves, including wavelength, frequency, velocity, reflection, and changes in wavelength resulting from the motion of the wave source relative to a stationary detector (the Doppler Effect).



Radar uses radio waves which are more like light than sound¹. Radar makes use of radio waves to detect distant objects. As already mentioned, radio waves are more like light than sound. Why? First, because like light (which also travels in waves), they travel at the same velocity as light; 300,000 kilometers / second or 300,000,000 meters / second. This is enormously faster than sound waves travel. Second, like light, and unlike sound, radio waves are transverse waves, not compression waves. You can simulate this in two dimensions with a long spring,

¹ The use of sonar was "invented" by bats and dolphins long before it was employed by humans. Bats locate flying insects at night by producing sound waves with such a high frequency that they cannot be heard by the human ear. These waves strike the insect and are reflected to the bat's ear, allowing the bat to detect the location of the insect. Biologists call this echolocation.

like a slinky toy. Stretch the spring and then move one end of the spring from side to side at right angles to the length of the spring. Waves similar to those on the surface of water can be seen to form. Third, neither radio waves nor light waves travel as far in water as sound waves. Radio waves are different from light waves in at least two ways. First, unlike light, we cannot see radio waves because the wavelength of these waves is too long for the human eye to detect. Second, radio waves are not scattered as much as light waves by gas and dust, and can penetrate clouds.

Source: Adapted from the lesson plan written for The National WWII Museum by Louis Garcia (Teacher of science at the New Orleans High School for Math and Science).

Express your opinion

Give extensive answers to the questions below.

1. What does “necessity is the mother of invention” mean? Do you agree with it? Justify your opinion.
2. What role can science play during wartime?
3. Is science always good?