ELECTRONICS

How Radar Saved England

It detected hostile warships from aircraft, warned of the approach of enemy aircraft, and defended harbors and coasts against small enemy vessels.

➤ HOW RADAR saved England from Hitler in the 1940 Battle of Britain and later from rocket bombs, the close cooperation of Great Britain and the United States in the development of radar even before Pearl Harbor, and the part played by radar in the air forces, on shipboard, and particularly in clearing the Atlantic of Nazi submarines, are revealed by the British Information Services.

The detection of hostile warships from aircraft, the warning of the approach of enemy aircraft, the defense of harbor and coasts against small enemy vessels, the feeding of gunnery data to predictors from "radiolocation," or radar equipment, the control of searchlights to illuminate aircraft targets, all these, the report states, were accomplished facts by the outbreak of the war in September, 1939. Outstanding improvements were, of course, made later.

The Battle of Britain, in 1940, was the turning point in the war, and it was the highly advanced system of coastal radar stations, begun in 1935, that made the victory possible, according to the report. These stations covered the east and south coasts of England. The Germans were unaware of their scope and accuracy. Nazi bombers taking off from France were watched by English radar throughout their entire flight no matter how roundabout their route. The advance information relative to the size of Nazi air squadrons and their routes is responsible for their defeat.

As the science of radar advanced, it was found possible to design complete stations so small that they could be fitted into an aircraft. They were at once installed in night fighters with such immediate success that within a few months the Luftwaffe was forced, in May, 1941, to discontinue the London blitz.

Before the Battle of Britain, the English Army and Navy, as well as the R.A.F., saw the importance of radar and set up research to find how it could be adapted to their particular needs. The Royal Navy began by using radar as an air-warning device but quickly found that as a method of range finding and gunlaying it was without a rival. Compact radar sets for gunfire control have been in British naval ships since 1940, and contributed greatly to their successes.

Robot bombs from the mainland coast directed on London were conquered largely by radar. "One of radar's most uncanny developments," the report declares, "a gun which aims itself and follows a moving target automatically and unerringly, was the climax, in 1944, of the British Army's research into radar applications.

"This British invention was incorporated into United States equipment, and quantities were manufactured and shipped to Britain, just in time to shoot down 80% of the flying bombs which were destroyed by anti-aircraft batteries."

A radar set called A.S.V. (air-to-surface vessel), which showed the presence of shipping, was installed in aircraft in 1939. Early in 1942 a version of A.S.V. was introduced which was capable of detecting surfaced submarines. This eventually robbed the commanders of these vessels of immunity from aerial attack at night when they were accustomed to surface. This equipment helped win the Battle of the Atlantic.

While the report claims for England the first operational system of radar to be installed in the world, that is, the detection towers installed along the coast, it gives credit to America for her independent development of radar, and particularly for her mass production of American, British, or cooperatively designed equipment.

In August, 1940, at the very moment when radar was proving its supreme value in the Battle of Britain, a small group of British scientists arrived secretly in Washington with complete plans of existing equipment and proposed equipment not yet fully developed. From that time on there has been a full interchange of information and research and the closest collaboration in development.

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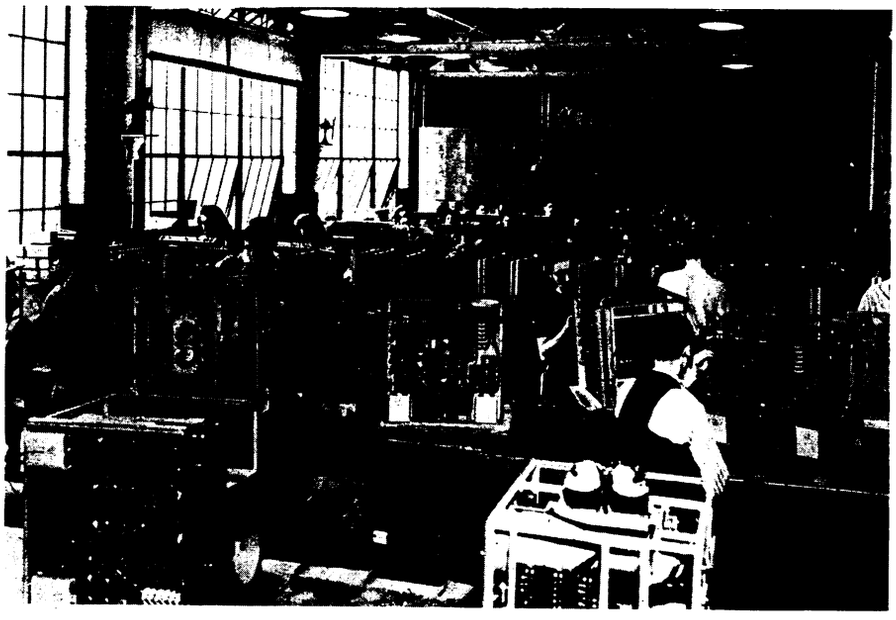

RADAR MANUFACTURE—This is the way those super-secret radar factories looked. Here the equipment is being assembled in a General Electric plant for use in the U. S. Navy. Notice that the large tube which acts as electronic eye for the set is visible in side view in the set being handled by the worker at the left. The face of the tube shows in the set in the left foreground.

PUBLIC HEALTH

Mortality in Childbirth Cut by One-Third

➤ THE CHANCE that a mother will live to enjoy the child she brought into the world is continually improving. The

mortality of women giving birth to children was cut by more than one-third in the United States during the first three years of this decade, areas with the worst records showing the greatest improvement. Only 20 white mothers per 10,000 live births died in 1943 and 51 colored mothers per 10,000 for the same year.

In 1940 maternal mortality in the white population ranged from a high of 39 per 10,000 live births in the East South Central states, to 27 in the Pacific states, census figures show. The difference between these rates was nearly halved by 1943, when the rate for the East South Central states was 25 per 10,000, while for the Pacific states it was only 18.

Closely associated with the unfavorable record for the East South Central states, point out statisticians of the Metropolitan Life Insurance Company, is the fact that only 43% of the confinements were attended by a physician in a hospital, a percentage smaller than for any other area. In the Pacific states, where the maternal mortality was lowest, 95% of the women gave birth to their babies in a hospital.

For the country as a whole, maternal mortality among the colored was fully 2½ times as high as that for the whites. Whereas 77% of the white births were hospitalized, only 33% of the colored were so cared for. In the East South Central states only 12% of the confinements were hospitalized, as few as 28% had the care of a physician in the home and 60% were attended by a midwife. In contrast to this, in the New England states 88% of the confinements among the colored were in hospitals and 12% had medical attention at home.

Science News Letter, August 25, 1945

PHYSICS

Atom No Longer Unknown

Only a half century ago, it was believed to be minute but solid "chunk" of matter. Complex structure gradually disclosed to physicists.

➤ IF THE atom has seemed a mysterious and theoretical commodity up to now, it is so no longer. It has landed in our thought, literally like a bomb-shell. What is this atom which the physicist splits, and how does he do it?

Until shortly before the year 1900 it was purely an academic question whether matter—a lump of coal or a quantity of air—could be divided and subdivided forever, or whether, eventually, a bit would be found so tiny that to divide it would be to destroy it, or at least to change it into something different. The mind prefers the first theory, for the imagination sees each of the halves of the divided piece looking much like the original. The boundary where this no longer holds true is outside the conditions of our experience.

But chemists, who had been studying the way substances combine, had long believed that they could explain the way combinations take place only by assuming units of each material. If water is always composed of twice as much hydrogen as oxygen, as they found to be true when they weighed the materials, then it seems obvious that, divided small enough, the ultimate drop of water will be reached. This ultimate drop the chemist calls the molecule. He believes it is composed of one atom of oxygen and two atoms of hydrogen. Divide it, and you no longer have water, but only the atoms composing it.

The indivisible atom was enough to explain chemical reactions. There was no need to inquire into its constitution until the turn of the century, when the discoveries of radioactivity and X-rays posed problems that could be answered only by supposing that the light that made the new chemicals shine and the radiations that fogged photographic plates must come from the structure of the atom itself.

The amazing new science of atomic physics grew out of the study of these new and unsuspected properties of matter. As one set of new properties was tagged as belonging to the nucleus of positive electricity which seems to hold the atom structure together, and another as due to the planetary electrons which can be pictured as circling around it, the image of the atom as a miniature solar system developed.

Studying the radioactive elements, radium, uranium, thorium and the similar short-lived ones that exist temporarily as their disintegration products, scientists found them to be giving off three different kinds of rays, which they named for the first three letters of the Greek alphabet. The alpha rays are composed of a stream of nuclei of helium atoms, the first recognized case of one element appearing as a disintegration product of another element. Alpha rays travel with such enormous energy, compared with their size, that they seem usable as a source of useful work. Beta rays are composed of electrons, not matter at all, but units of electricity. Gamma rays are like light waves and X-rays.

Since these rays given off by forces within the atom are among the very few materials in the universe comparable in size to the atom, physicists thought of using them as tools for experimenting with atom structure. In 1919 Sir Ernest Rutherford shot streams of helium nuclei, the alpha rays, through oxygen, nitrogen and other common gases and succeeded in getting some of the particles to collide with the central part of an occasional atom. While he could not see the particles, he could make them take their own pictures of the luminous trails they left behind them.

After the method of observing atom-trails had been worked out, physicists were able to use it and developments of it to learn what happens when atom "bombardment" is tried under various conditions, and how the number of "hits" can be increased. Ways to speed up the bombarding particles were learned. The greater the speed, the more hits there were recorded.

Science News Letter, August 25, 1945

ENGINEERING

Shipping Vegetables in Snow-Ice Keeps Freshness

➤ VEGETABLE produce shipped bedded down in finely granulated ice keeps its freshness, crispness, and vitamin C content over a longer period, researches conducted in 21 colleges throughout the country have shown.

"This method of refrigerating produce with snow-ice is like the protective effect of the late spring snows on vegetation," Charles F. Belshaw, research consultant of the National Association of Ice Industries, said, speaking as guest of Watson Davis, Science Service director, on the CBS program "Adventures in Science."

Researches show that vitamin C retention in foods is essential in the retention of flavor and that keeping vegetables fresh through use of snow-ice will bring food to the dinner table so that it tastes better and is nutritionally better.