Radar

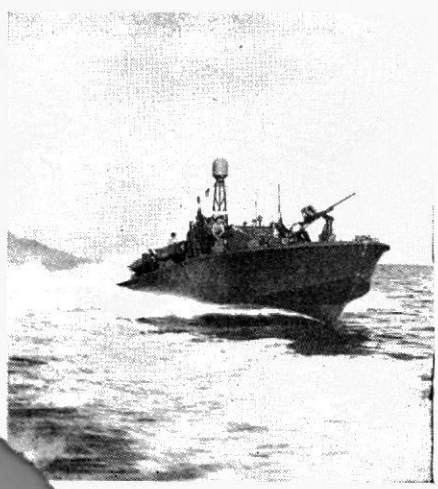
The Silent Weapon of World War 2

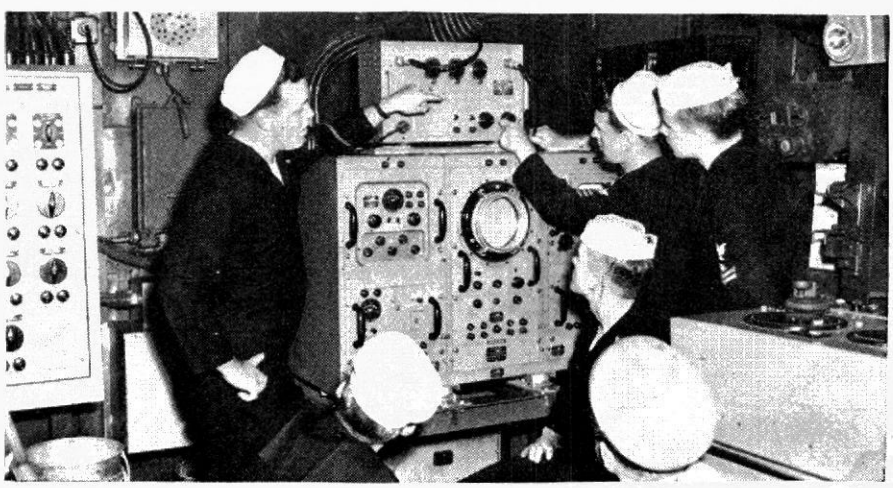
AN ELECTRONIC "eye" apparently developed independently by U.S., British, French, and German scientists in the 1930s, radar owes much of its rapid growth to the advent of war. First used in detection of surface objects in the near-distance under conditions of poor visibility, radar's range and versatility were quickly extended to provide long-range detection of air-borne, as well as surface objects, accuracy in fire-control, and identification of distant or unrecognizable planes and ships. To radar, the silent weapon of World War 2, goes much of the credit for England's doughty defense in the dark days of the "blitz", and also for "lighting the way" for our victories in the Pacific.

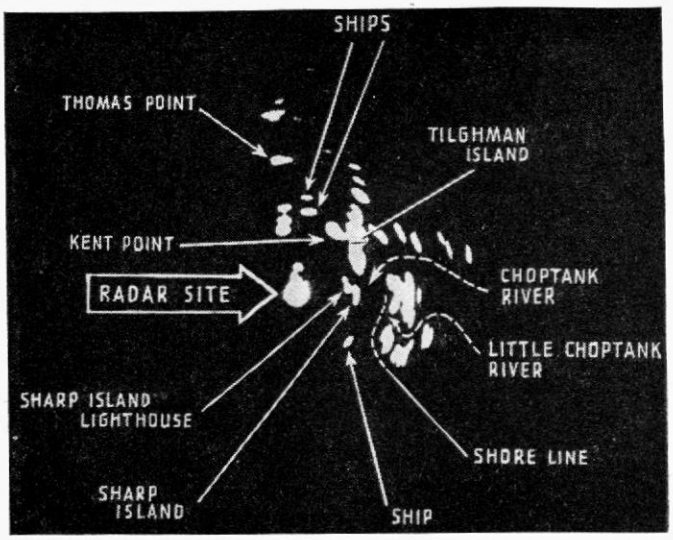
★ "Thinking cap" of the PT boats, the "radome" bulb, shown circled, houses the antenna of the radar set aboard the vessel. Invaluable to the hard-hitting PTs, because of their habitual tendency to operate under the cover of night, radar's electronic eye pierces the darkness, indicating the various targets and warning of immediate navigational dangers.

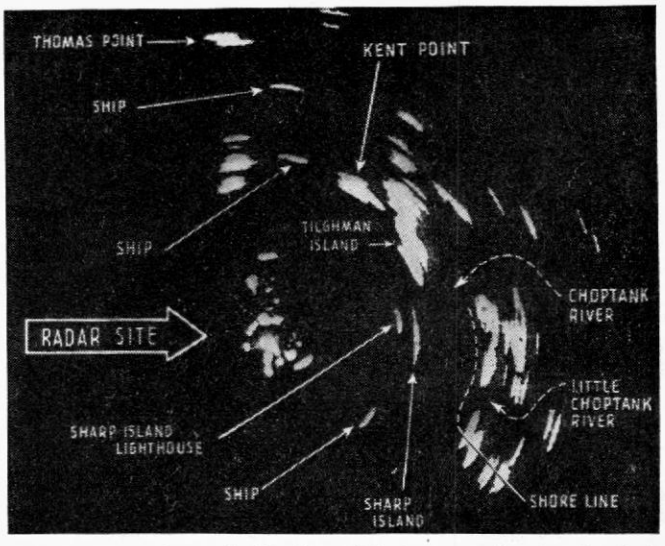
★ The trellis-work of this ship's radar, outlined against the sky, is in contrast to the small antenna on the wing of the General Motors Avenger torpedo-bomber shown in foreground. Close inspection of this plane installation will reveal the "teeth" of the antenna affixed to the terminal of the white strut. This installation is a Yagi-type antenna. The vessel is a Navy escort aircraft carrier, photographed while at sea.

★ Enlisted men in a radar unit listen to instruction during shakedown cruise of a Navy warship. Instructors are also enlisted men chosen for their aptitude and actual experience.

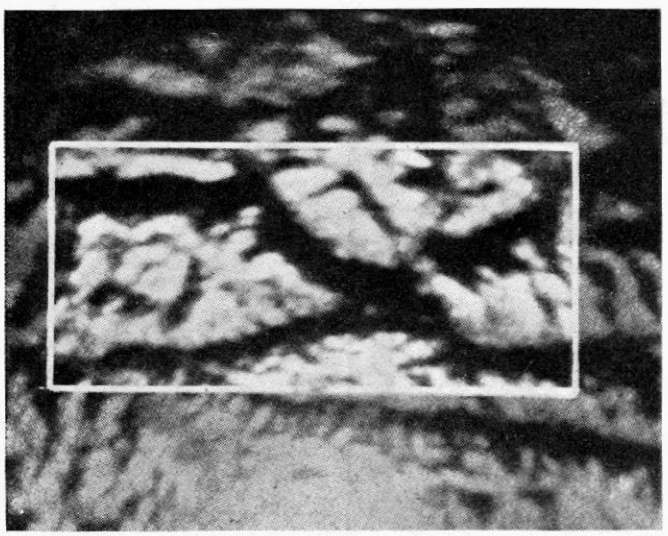


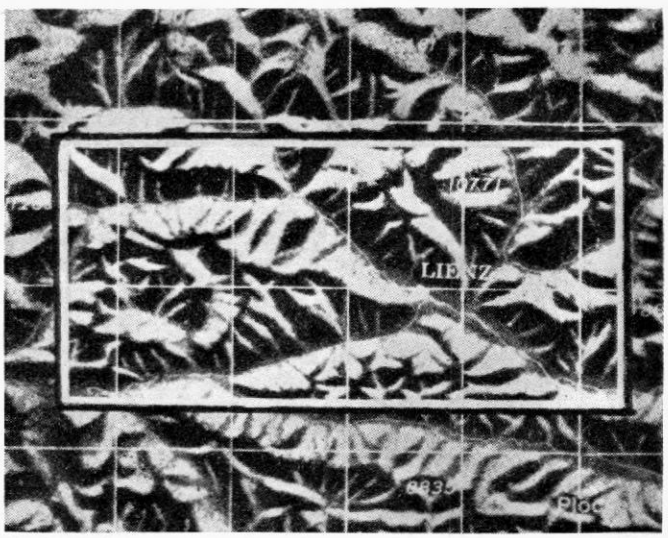






★ Radar equipment at the Naval Research Laboratory, Chesapeake Bay Annex, recently made this "search" of surrounding terrain. Lettered on the photographs of the PPI (Plan Position Indicator) scope are designations of points picked up by radar pulse. Compare the photograph (left) made with a considerably larger range with the photograph (right) made with a substantially lesser range, both of which represent scope of the same area. Notice how "pips" converge when the range is widened and diverge when the range is lessened.

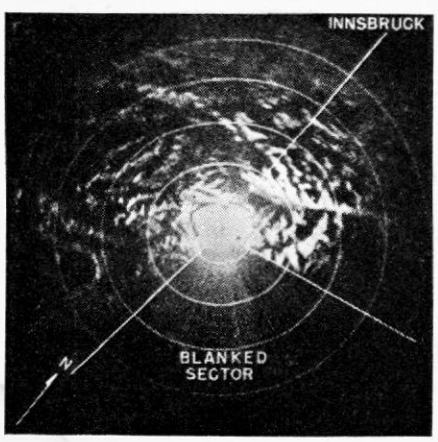


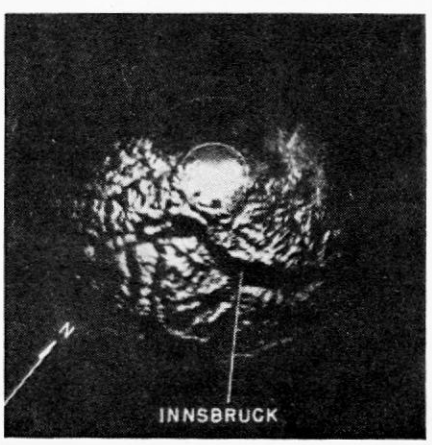


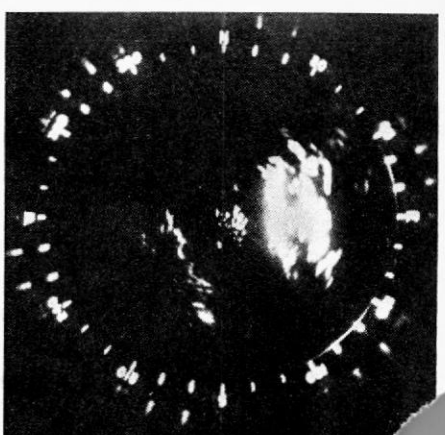
★ Radar takes a lot of the woe out of mountain flying. A navigator equipped with relief maps and scope pictures can determine his position without any trouble at any hour of the day or night, as the radar scope will show a pattern almost identical with his maps. Above photographs show scope picture (left) compared to same section on relief map (right).

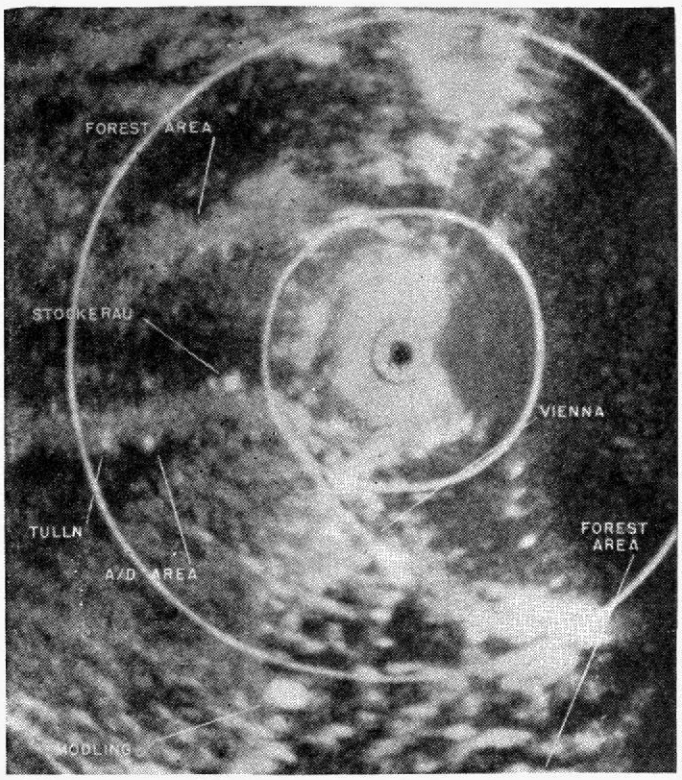
★ This photograph of a ship's PPI (Plan Position Indicator) scope was taken during the invasion of Lingayen on Luzon. The cluster of white dots shown in the photograph represents warships in the bombardment group; the large white mass, the coast, headlands, and highlands of the island; behind the attack flotilla, transports and the other ships composing the large invasion armada throw light pips on the radar scope.

★ Radar's directional characteristics are such that its results can be minimized by contour of terrain below. These two pictures of Innsbruck, Austria, illustrate what directional approach can do. Picture at left made on approach from south, shows city. Picture at right made on approach from north, spots general contour of valley, but fails to show the city proper.

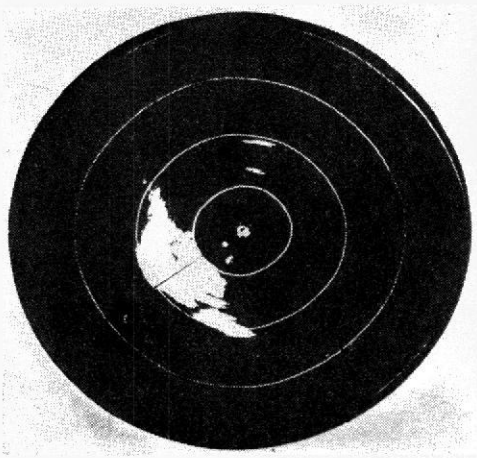








★ P-38 radar reconnaissance missions provide scope photographs for routes to and from the targets, as well as series of target runs, made from the cardinal points of the compass and from the logical axes of attack. The scope photographs made by reconnaissance planes are plotted on maps and reproduced for reference by Pathfinder operators during the actual bombing missions. In the photograph at left, forest areas around Vienna, Austria are resolved on scope in droopsnoot P-38. Returns are good enough to be used as check points in radar navigation. Map at right covers same area as shown on scope.



★ "Scope picture" of Oahu in the Hawaiian Islands made by a Navy plane on a radar test. Blob of light in center of the photograph marks the position of plane as shown on indicator of its radar; the island itself is the largest white area, with low points in the topography in black. The two "pips" between the inner and second circles are ships.

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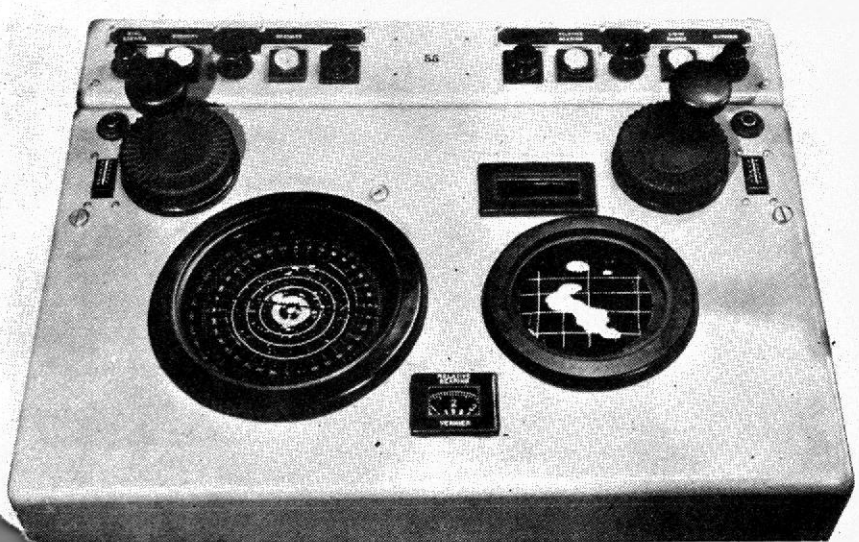
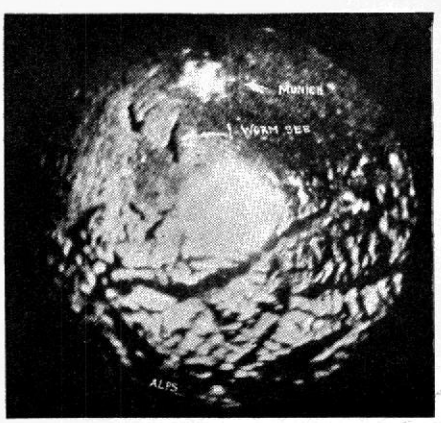
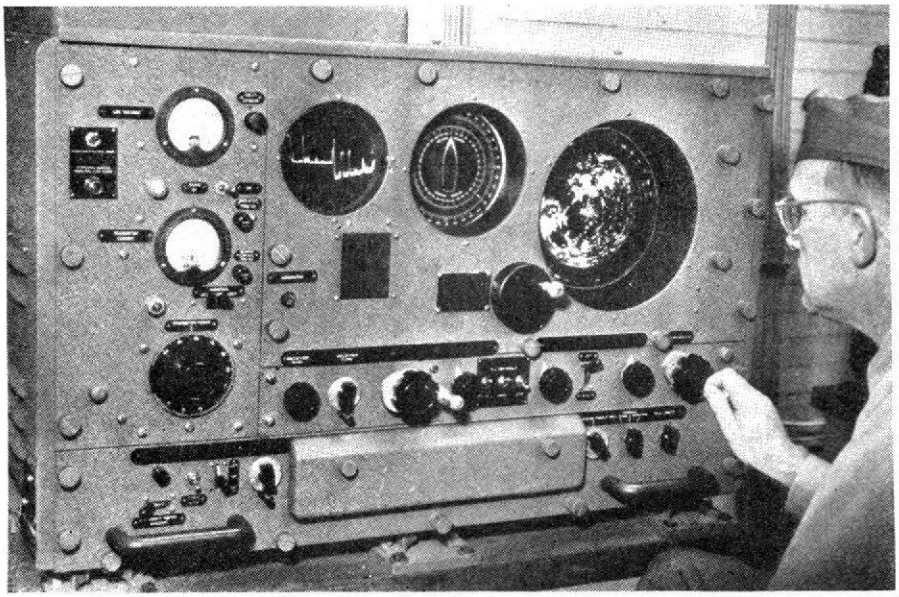
★ Radar repeater unit which repeats information from main SG type radar so operator in remote position may have indication exactly the same as main unit. Units of this type enable several positions to simultaneously monitor main radar unit, thus eliminating much delay in transmitting information to all locations at one time and affording multiple checks.

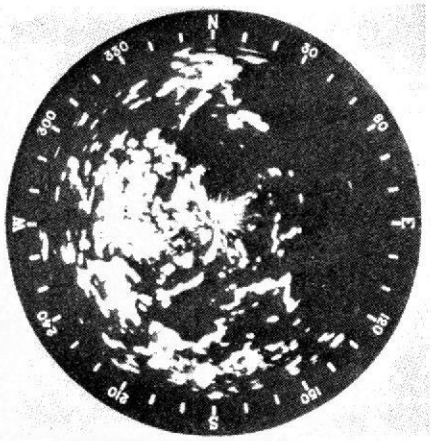


★ Radar photography experts consider this picture one of the best of its type. It was taken over the Munich area, with Munich proper shown as the light spot at the top.

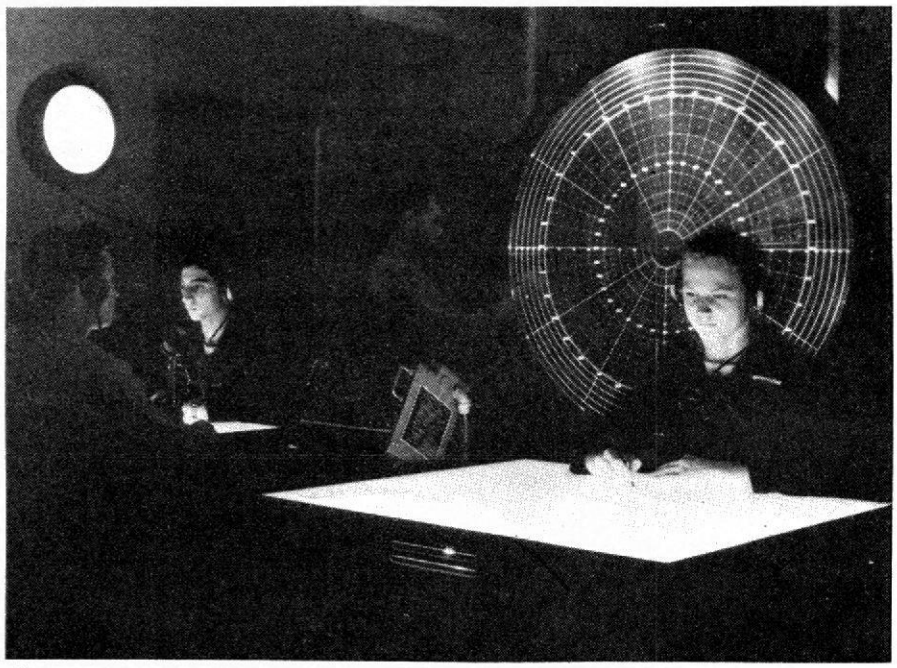




★ Operator using a type SG radar indicator to obtain the range and bearing of target. The relative bearing of operator's ship may be seen in center, just to the left of scope. Equipment of this nature is also used for plotting position of ship.

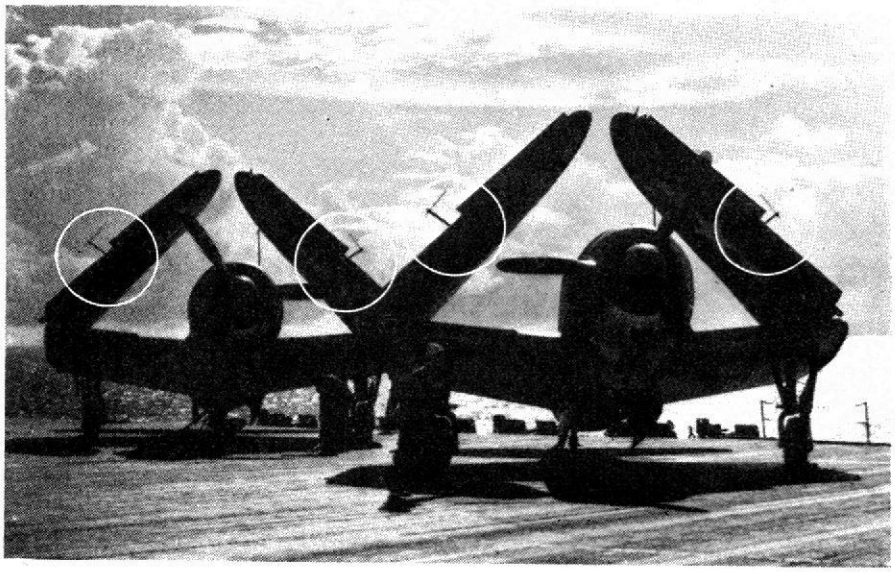


★ Closeup of a typical pattern as seen on an SG radar scope. A picture such as this affords the operator a complete picture of the territory in all directions from the ship, in spite of the fog or darkness, and may be quite readily compared with ordinary, conventional maps.

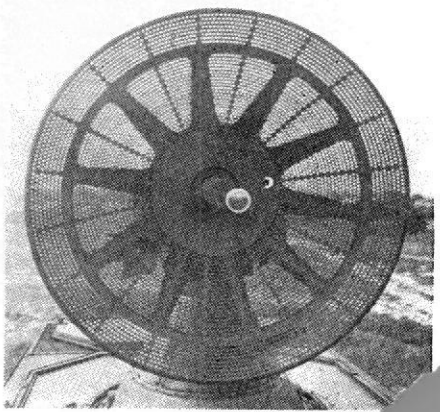


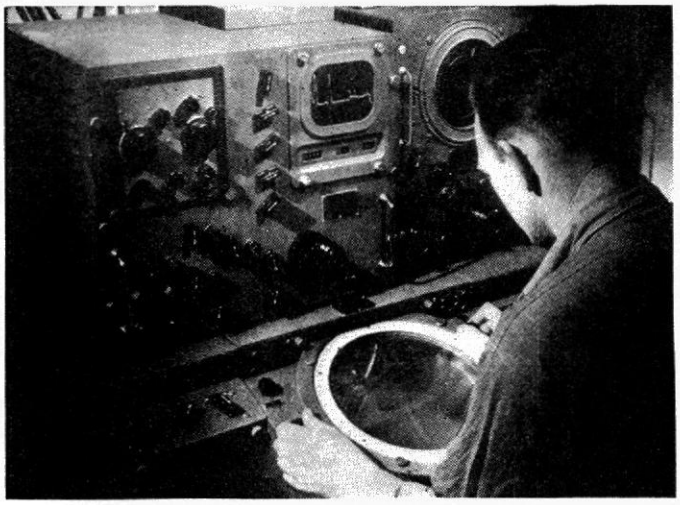
★ Study in black and white—radar training at a naval air station in U. S. Officers and men spend long hours, that will later pay dividends, studying intricacies of the "electronic eye" in simulated plot room.

★ The slim and angular "elbows" of radar antennas are silhouetted atop folded wings of these Curtiss Helldivers spotted on flight deck of a Navy Essex-class carrier somewhere at sea. Adding this equipment to Navy planes gave the effect of applying telescopes to the "eyes of the Fleet," as aircraft are often known.



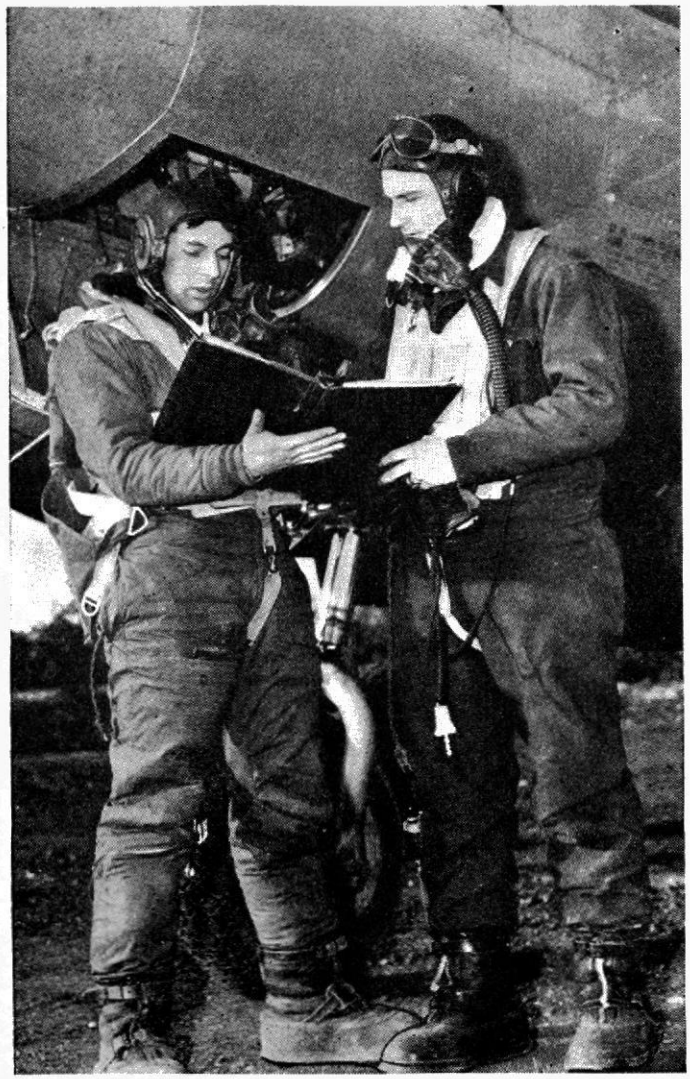
★ A typical parabolic antenna used with many types of radar equipment. By employing a parabolic antenna, very high gain and a highly directional beam are obtained.

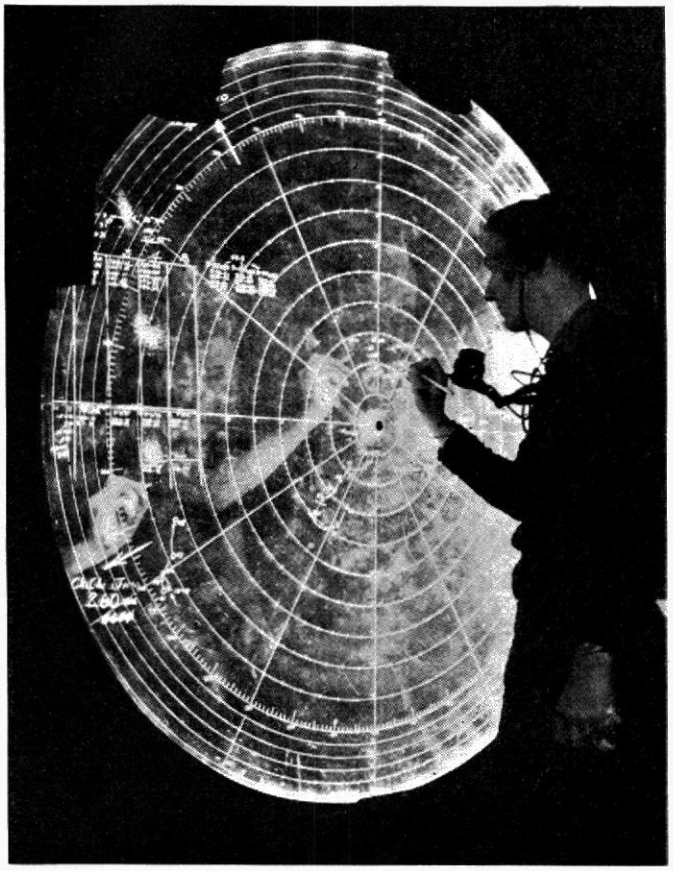




★ Through the electronic eye of radar, a Navy man determines distance and bearing of his "target" during experiments at the Naval Air Station, Anacostia, D. C. The indicator bearing the graph-like line in the center of the equipment is an A-scope; the large disc into which he is peering is a PPI scope—Plan Position Indicator.

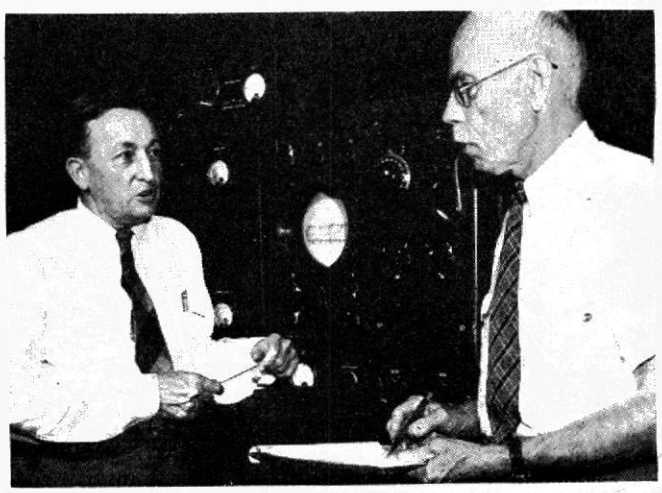
★ Radar equipped P-38 "Lightning" reconnaissance plane, its "droop snoot" nose crammed with special electronic devices, readies for a take-off. Trips like these precede visits of giant bombers against enemy industrial targets. Intensive preliminary planning characterizes reconnaissance trips of this nature since the plane carries no armament and is under orders to avoid combat. Pilot and radar operator agree on final details of flight plan which will be followed.

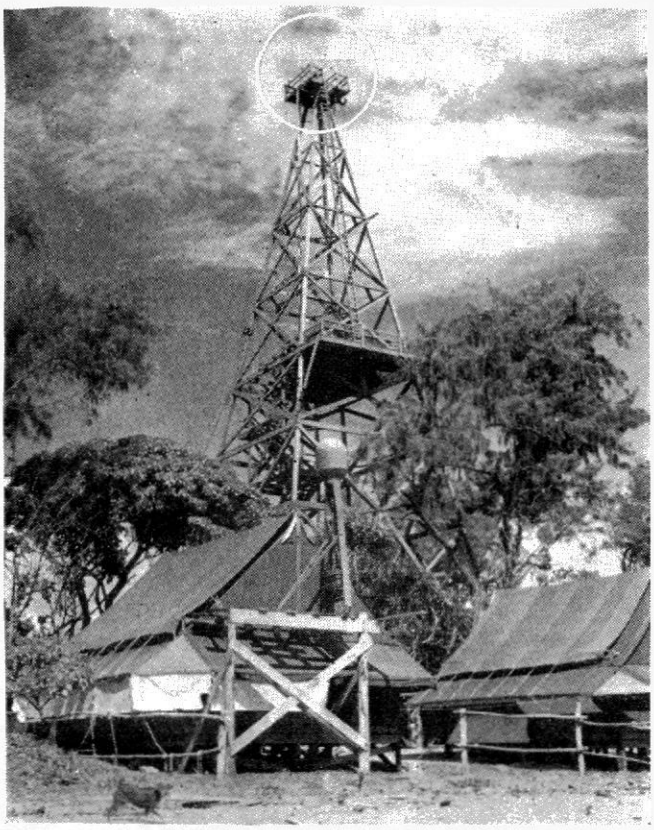




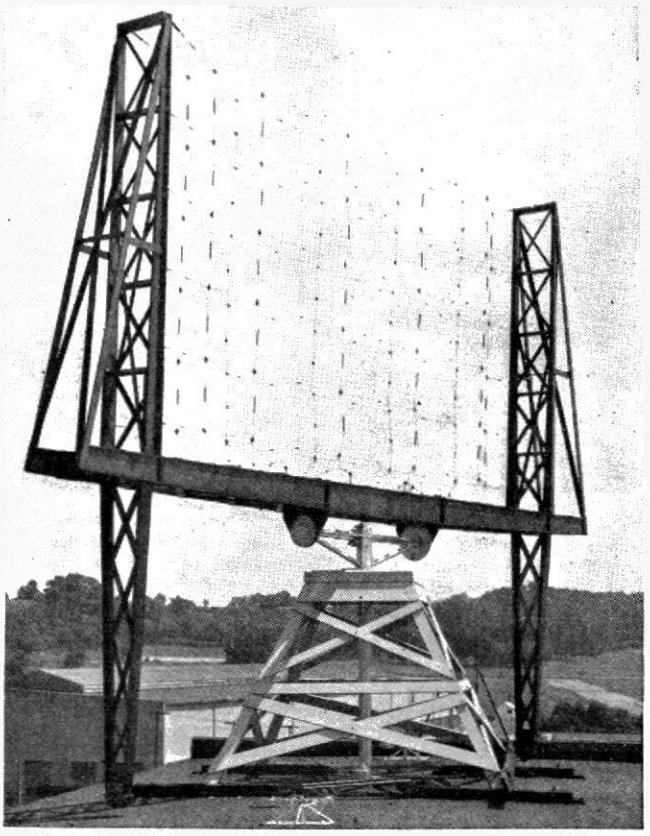
★ Information provided by radar's electronic eye is marked down on a vertical chart in the radar plot room of an Essex-class carrier during strikes against the Japs early in 1945. Behind the transparent expanse of the giant circle, other enlisted men can be seen working on various additional aspects of the incoming flow of information.

★ Pioneer workers in radar, Dr. A. Hoyt Taylor (right), Chief Consultant and Chief Coordinator of Electronics at Naval Research Laboratory, Anacostia, D. C., and his long-time associate, Leo C. Young, reminisce over the "scope" of radar's history beside the first radar set at the Research Laboratory. Few men know the history better. In 1922, while experimenting with communications equipment for the Navy, they made the initial discovery of distortion in radio reception caused by the intrusion of objects between transmitter and receiver. Working from this discovery, the two men and a number of associates and assistants made giant strides forward into the vast sphere of scientific fields covered by the word "radar" today. The equipment in the background, crude and elementary in comparison with the sets of today, was a breathtaking innovation when first used in 1937.





★ Instruction and improvements in radar are constant necessities in the Navy. At this station on Espiritu Santo, two types of radar antennas can be seen—one housed in a radome near the ground, the other installed on a towering "mast." By their use, Navy men on duty instruct or get instruction on latest in radar operations.



★ Close-up of the antenna of the first complete radar, installed "topside" of a building at Naval Research Laboratory in Anacostia, D.C. in the late 1930s. It is a "dirigible" antenna, meaning it is so mounted that it can be turned to allow for around the compass search. See photograph lower right for below-decks equipment.

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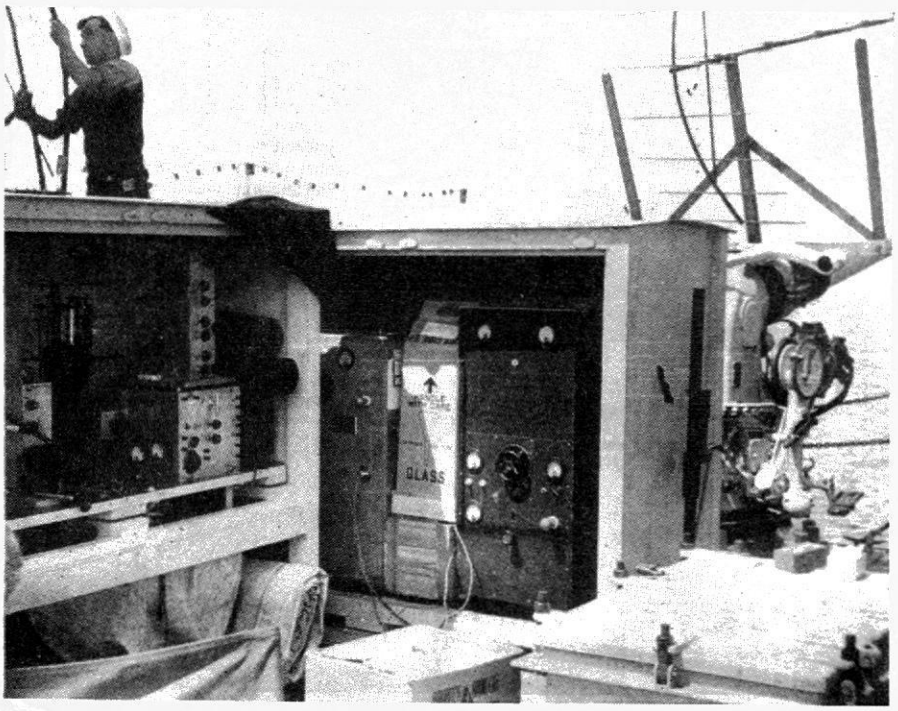
★ Photograph of the first radar installation on a ship. Shown in the upper right-hand corner is a Yagi-type antenna mounted to a five-inch gun on the old USS Leary in 1937. The antenna was swung about by moving the gun. The photograph was taken during epochal tests in Chesapeake Bay, when equipment marked a monumental milestone in radar's history.



★ Below-decks view of the first complete radar set. The "dirigible" mast in the very center of the photograph pierces the ceiling and its upper extension bears the mattress antenna of the radar. Thus the operator below can turn the mast to cover the compass while making a search. The antenna can also be tilted, with the handle visible on the side of the mast. This equipment was so heavy, compared to present sets, that in order to tilt and turn it, two men had to do the job.