

Radar Checks Ability of Plane to Attack With Demoralizing Surprise

(Editor's Note: The basic principle of radar, the radio "eyes" of the armed forces, was discovered in 1922 by Dr. Albert Hoyt Taylor of the naval research laboratory. He noticed that radio waves were deflected by passing ships despite fog or darkness. The navy did nothing about his discovery, but with several loyal associates he persisted in research until in 1930 it was found that those same waves would detect airplanes—a revolutionary fact in warfare. John M. Hightower of the Associated Press takes up the story at that point in this third of six daily installments.)

By JOHN M. HIGHTOWER
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WASHINGTON, June 23 (AP)—At that time—June, 1930—the developers of radar realized that their discoveries had gone far beyond original expectations.

Here was a method which sharply limited the airplane's then unchecked ability to attack with surprise and demoralize defenses before they got into action.

Here was one of the greatest tactical advances in warfare since the original evolution of the military uses of aircraft.

Experiments

There followed several months of intensive experiments with aircraft detection. Various radio frequencies were tried out. Dr. Albert Hoyt Taylor and his associates, including Carlos B. Mirick, who then directed the naval research laboratory's aircraft radio section, spent weeks bouncing waves off planes around the naval air station and along the Mount Vernon boulevard on the Virginia side of the Potomac. Mirick's job was to keep a photographic record of the experiments, which he did with outstanding success, Taylor said.

Even the dirigible Akron, which happened to be in the vicinity, was subjected to a few wave bombardments just to make sure that airships as well as planes could be picked up.

Used Regular Waves
All this work was carried on with regular radio waves, rather than with the pulses used in measuring the Kennelly-Heaviside layer (the world's electric roof, about 150 miles up). These waves required comparatively clumsy apparatus, including two widely separated antennae—one for sending, the other for receiving.

This bothered Taylor considerably, for he was a naval scientist seeking to develop a machine compact and simple enough to install on a ship without cluttering it up and antagonizing the officers.

The apparatus was entirely effective, however, and not too clumsy for use on land. At one time Taylor worked out a complete defense system for the city of Washington using the detection equipment then developed. So information about the experiments and their possibilities in defense of the country against air attack was turned over to the army in 1932.

Army research, like that of

of all those encountered, before and after, in radar development. The scientists were always reaching out for the unknown and the untried; a new electrical gadget, a different coil, or sparkgap or vacuum tube, might be the missing link needed to bring weeks of brain-racking labor to fruition.

By this time a number of individual navy officers, including Harold G. Bowen, then a captain, were much interested in the plane detection work. To understand the intensity of their interest it is only necessary to recall that for 10 years, General William Mitchell, the prophet of air power, had been preaching the doom of the warship.

Technical Progress

During those 10 years the commercially valuable airplane had made enormous technical "progress" shipboard anti-aircraft defense, seemingly with no conceivable commercial uses, had not.

Busy with civilian goods, private research agencies were not interested in solving problems in preparation for some distant dreamed of war. If there wasn't a predictable percentage of profit in a project through public exploitation, no board of directors could afford to approve it. Whatever progress was made would have to be made by the government itself.

Taylor Report
Back in November 1930, Taylor had made a comprehensive report to the navy's bureau of engineering, of which Bowen was then assistant chief, entitled "Radio-Echo Signals From Moving Objects."

The paper told about detection of ships and planes, how and why they were detected and what the tactical possibilities were.

The admirals at the navy department did not even have to digest the thing. It was all there in highly assimilable form, like pre-cooked baby food. This time Taylor got results.

Obeyed Orders
For 10 years he had taken funds from other research projects and disobeyed orders to divert physicists from work the navy thought more important. In all that time he and his loyal associates, like men following a vision, never had become really disheartened, never had decided to throw down their tools in disgust and wait until the navy and the nation got ready to help them. Always, whenever a moment could be spared or stolen, they worked on radio detection.

The engineering bureau's radio division studied Taylor's re-

port, which contained the first formal statement of airplane detection work, for two months, then officially assigned the laboratory this problem:

"Investigate the use of radio to detect the presence of enemy vessels and aircraft. Special emphasis is placed on the confidential nature of this problem."

The emphasis on confidence by those whose responsibility it was to handle security was a bit belated. Publication of the articles of Kennelly-Heaviside measurements had given our future allies, the British—and it must be assumed our future enemies as well—the tip-off on radio detection.

Secret Not Kept
Had the ban been placed when Taylor first proposed his destroyer experiments in 1922, the secret might have been kept from the Germans and Japanese—and could have been given to the British as many other secret devices, including our bombsights, were given. The belated secrecy order did serve to keep confidential from January, 1931, until April, 1943, the main facts and technical progress of radar.

Following the order, other navy bureaus were informed of the work in progress, and some got busy with ideas for practical application. In October, 1931, Bowen sent along to the laboratory a number of these ideas and suggestions for possible experiments. Taylor and his men had so far anticipated radars potentialities that he was able to reply immediately that all the proposals had previously been studied and found to be practical and possible. He urged intensification of research.

Taylor Struggles
While Taylor, whose field was much broader than radar study alone, struggled for necessary recognition and funds. You in his laboratory worked almost day and night to discover and prove a technique for the pulse system of plane detection. He was convinced that only with pulses would a workable system ever be evolved.

"After three or four months, during which Young was more or less alone," Taylor says, "I told him he had to have some help. And that's when I threw Mr. Page in. Not long after he got on the job he did so well that we gave him an assistant, and he carried on."

"Page has made more contributions to modern radar than any other man."

While Taylor, Young, Gebhard and most of the others at the laboratory were veterans, Robert M. age was a youngster, but a brilliant worker, passionately devoted to physics. He had gone directly to NRL from Hamline university, St. Paul, Minn., in 1927. Jens M. Rysgaard, physicist at Hamline, had given Page such a glowing recommendation that when a new man was needed, he was chosen.

Despite his extraordinary record in physics, Page had not always been interested in that work.

Hamline was a sectarian college and he had first gone there to become a Methodist minister. The jump to physics, which he explains as due to "my natural tendencies," is not so odd as it might seem since he gives his work the same burning inner enthusiasm with which he might have embarked upon a ministerial career.

Quiet Man
Outwardly he is a quiet, shy man distinguished in appearance by a slight professional stoop, a tuft of chin whiskers and neat, grayish hair topping a still youthful face. He is in sharp contrast to Taylor, who is a man of rugged qualities and easy, colorful flow of language.

During 1934 Taylor gave Page the radar job as a full-time assignment and later detailed to him, as an assistant, a young physicist from the University of Montana, who had been at NRL since 1929.

Young, alert, affable in an easy, square-cut manner, Robert C. Guthrie was a natural working mate for Page. The two men have been closely and profitably associated for a decade.

Their advent on the radar scene marked the passing of the main radar development into the hands of a new generation.

Checking Point
This fact serves as a checking point for what had happened in radio development outside the naval research-laboratory at that time, and it is interesting to note that while great strides had been made in such potentially commercial fields as television, there was but little that contributed directly to work on radar. This instrument in America was basically developed from start to finish by the scientists on the Potomac.

One type of equipment for which they had gone to the outside world all along, and continued to go, was the vacuum tube. Early in the game they tried out a variety of tubes and quickly found that only two were suitable for their hard use. Both of those were manufactured for radio amateurs, "hams." Taylor and Page give the anonymous thousands of old-time hams great credit for their unwitting contribution to radar.

Tough Fellows
"A ham," said Taylor, "was a tough fellow to please when it came to tubes. If he was trying to talk with Des Moines and he couldn't reach it, he would merely turn up the power. It didn't bother him if he put 150 watts on a 50-watt tube. If the tube burned out, he just thought it wasn't any good. So he'd raise hell and get a new one."

"Those tubes we used were built to meet the demands of the ham. Anything less rugged was not suitable for our purposes."

Page and Guthrie were using those ham tubes in their first experiments and it was not until several years later that funds became available for adequate purchases of tubes specifically designed for radar requirements.

BANKERS NAME TILLOTSON AS VICE PRESIDENT

PORTLAND, June 23 (AP)—Oregon bankers are demanding abolition of the federally sponsored production credit associations and the Home Owners Loan corporation.

Resolutions at the annual State Bankers' association convention yesterday charged the organizations are wasting public funds and competing unfairly with private lenders.

L. E. Calbe, Portland, was elected president; Mitchell Tillotson, Klamath Falls, vice president; S. E. Gjerde, Portland, treasurer; Joseph Rogers, Baker, chairman of the executive committee.

SEVEN HELD IN FAULTY BOMB CASE

WASHINGTON, June 23 (AP)—J. Edgar Hoover announced Tuesday that seven persons had been arrested at Rochester, N. Y., on charges of sabotage in connection with the allegedly faulty manufacture of incendiary bombs and hand grenades for the United States armed forces and their allies at the Antonelli Fire Works Company, Inc., Spencerport, N. Y.

Hoover, director of the FBI, said those arrested were charged with "willfully failing to properly load the powder charge in the bombs and grenades," and it was charged that there were attempts made also to pass material previously rejected by the army inspectors.

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Trade News

Interesting Notes of Herald and News Advertisers, Their Products and Activities

At the very tip of Cape Cod is a quaint old village, Provincetown. For years actors, writers and artists have made it their summer playground. One of those artists is named Peter Hunt. Peter Hunt owns a shop called the Peasant Village. There, for years, he has taken old, outdated furniture, much of it just plain junk, and with a screwdriver and saw and a little paint and his own keen sense of humor, turned it into new furniture; furniture that style-conscious home owners are proud to have in their homes.

A picture frame may become a coffee table, a battered bureau may become a charming chest for bedroom or hall. It doesn't matter if the piece is marred or ugly. Some of the worst atrocities in your attic come out best of all.

So, a new 30-page DuPont booklet in color, largely by Peter Hunt, tells you how to transform outdated, cast-off furniture into sparkling, charming, colorful pieces that are in tune with modern times.

You may secure a copy of "How to Transform Outdated Furniture" from F. R. Hauger, 515 Market street. This is practical war-time thrift—thrift with fun—suggested by DuPont.

TRAFFIC VIOLATORS PAY BAIL TO CITY

Bail for six traffic tickets handed out by city police over the weekend have been paid. They are as follows:

Rollin Tuter, improper parking. Bail of \$2 paid.

Emil Pastega, parking in loading zone. Bail of \$1 paid.

H. B. Baker, overtime in theatre parking. \$1 paid.

John Compton, overtime parking. \$1 paid.

C. H. Reeves, overtime parking. \$1 paid.

Carroll Chapin, overtime parking. \$1 paid.

PROHIBITIVE PRICES
LOGANSPOUT, Ind., (AP)—A sign in a Logansport barber shop announces "shaves \$1" because, explained owner Pat Branigan, "I just don't like to shave people."

He said he likes only to cut hair, so he put up the sign to discourage bewildered customers. In the three months that the sign has been in the window only two customers have insisted upon shaves regardless of the cost, Branigan said.

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