Page, Guthrie Experiment With Radar Principles to Find Right Combination

(Editor's Not: By 1932, scientists at the naval research laboratory had developed radar—radio "eyes"—so that it could be used ashore to detect approaching enemy planes. But the equipment was too clumsy for shipboard use. Not until a super-short radio wave, a sort of electrical bullet or pulse, was used, was it possible to undertake design of a compact yet high-powered shipboard set. At that point the main development work was taken over by Scientist Robert M. Page and an assistant, Robert C. Guthrie. Theirs was the job of building modern radar. Here is the fourth of six daily installments of John M. Hightower's story of rada).

By JOHN M. HIGHTOWER
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WASHINGTON, June 24 (AP) Page and Guthrie started their work with the basic principles of radar, including Leo C. Young's pulse application and Louis A. Gebhard's early pulse experiments, and with a wealth of detail on how high-frequency waves and pulses behave when bouncing off of ships and airplanes.

They were like men with lead, gunpowder, iron and wood and an idea that if you got them together in the right combination, you could hit a bull's-eye at 500 yards.

Their purpose was to make a radio detection machine which would collect, automatically record and correlate data about a distant plane or ship, and come up quickly with the answer, showing position, angle and speed.

Speed Necessary

It was all well and good in the old days to pick up an airplane on a fixed radar beam and by figuring the angle of reflection determine the distance of the plane from the transmitter. Page had to transform that lead pencil operation into an adding machine calculation that could be performed at split-second speed.

Moreover, fixed antennae of the kind experimented with were no good on ship; they had to move as well as be compact, since a ship is subject to attack from any quarter.

During the time he was working on these radar problems, Page also was compelled by urgent navy request for emergency research to work on 10 other experiments which had nothing to do with radar. "But I would always steal him off those other projects and tell him to put all the time he could on radar," says Dr. Albert Hoyt Taylor, now chief navy physicist.

Complications

These complications and Page's thorough-going work stretched out radar development considerably. But this perseverance resulted in the production of one set, a sort of haywire rig of wood and metal, wires and coils and tubes—a typical experimental job—and while it got limited results, he did not consider it successful.

When Page's second set, his first conclusive radar production, was finished and put into operation, it gave "satisfactory results at long range," which is to say that it detected random airplanes to a maximum distance of five miles.

Great Moment

It was a great moment, a peak in science for all of them at the laboratory when the first pulse came flashing back from that machine.

Some time later Page and Guthrie completed a third set—their second successful one—and when it was shooting pulses down the Potomac river, they could detect planes above the naval proving ground at Dahlgren, Va., 40 miles from Washington.

Radar by this time was acquiring some powerful champions within the navy itself.

One who later became director of the laboratory after a tour of duty as chief of the bureau of engineering was Rear Admiral Harold G. Bowen. Another, who preceded Bowen at the laboratory by several years was Captain H. R. Greenlee.

Funds Low

In 1935 radar work was badly short of funds. Captain Greenlee and Dr. Taylor went to work on Rep. (now Senator) Scrugham, Nevada democrat, who then was the dominant figure and later chairman of the house naval appropriations subcommittee.

They first discussed the matter briefly and informally with Scrugham at a dinner party, and he appeared not deeply concerned. The following Sunday, Greenlee, Taylor and another scientist from the laboratory cornered the Nevadan in his capitol office and discussed their needs in as much detail as they dared and without in any way disclosing even that they were working on radio detection. Jim Scrugham listened impassively and bade them goodbye without committing himself.

Got Money

"We thought we had failed in our mission," Taylor recalled. "But next morning Jim called and said we would get the money."

Scrugham was a trained engineer and a man accustomed to deal with technicians and scientists. Even without getting more than a superficial look at NRL's work, he sensed that something of considerable importance was afoot. Through Scrugham's work primarily, the laboratory got its first $100,000 from congress for long-range research.

Greenlee's successor at the laboratory was Captain Hollis N. Cooley, a naval officer with outstanding ability to communicate his ideas and enthusiams to others. Cooley worked under Bowen, who then was chief of the bureau of engineering, and was powerfully aided and abetted by him in the high pressure salesmanship in which he engaged soon after taking office.

As fleet admirals, including on one occasion the commander-in-chief showed up at the navy department, Cooley would nab them and talk them into visiting the laboratory where they got their first look at radar in operation.

Congressional Support

While this energetic captain still was in charge of the laboratory, Bowen decided the time had arrived to deal frankly with the congressional committeemen who had been stringing along for three years furnishing money for projects they had not real facts about. Great expansion of the research center was in prospect, the admiral foresaw, and that could be accomplished only with the support of congress.

Bowen slashed through the numerous layers of red tape that then swathed radar in the navy, and he invited members of the house naval appropriations subcommittee to see for themselves what great things were in the making. They were committed to secrecy and the admiral is most proud of the fact that the confidences were never violated. The committee was so sold on radar that after the laboratory got just about any money it asked for.

First Try-out

By the end of 1936 plans had been well advanced to give radar its first try-out at sea—something that Taylor had proposed in essence in 1922. The 1936 set was vastly different from the simple tactical instrument hhe had in mind 14 years before, and its ability to pick up airplanes miles off in cloud, fog or darkness—or high in a clear blue sky, for that matter—was what gave it sharply focussed significance undreamed of in 1922.

In April, 1937, radar worked over salt water on the old-four-stack destroyer Leary. Page took out a crew of NLR scientists to operate the outfit. In appearance it was another haywire rig, but in results, while it was not all that was desired, it proved to be a successful outfit, detecting planes at considerable distances.

"We felt that although it was flimsy and hard to work, we were getting somewhere," Page says of it now.

New Experiments

Characteristic of radar's progress at this stage, as real funds began to come available, was that while development along proved workable lines was pressed forward as rapidly as possible, new experiments were simultaneously being made into the unknown. Thus in the years that the first crude instruments were going to sea, Dr. Claude Cleeton, who had done some work on extremely short radio waves at the University of Michigan, L. R. Philpott from the University of Idaho and John P. Hagen from Connecticut Wesleyan undertook pioneer work in frequencies previously almost undreamed of for radio detection purposes.

Pulse Altimeter

One experiment by this group was the pulse altimeter, a miniature radar for airplanes which receives echoes from the earth's surface and thus gives a pilot constant information on his altitude regardless of weather. Philpott, Hagen and Cleeton all did work on this and all three men hold important positions at the laboratory now.

After their adventures and experiments on the destroyer Leary, the NRL scientists returned to their benches and made several additional inventions which gave the detectiol equipment greatly improved performance.

Operation Started

By February, 1938, high-powered pulse radar equipment was in operation at the laboratory—and planes were detected at a range of 50 miles.

The following month Dr. Taylor directed the formation of a task group under Gebhard, then head of the laboratory's development section and creator of the original pulse transmitting equipment a dozen years before. The purpose of this group, largest yet assigned to a single radar project simultaneously, was to develop and perfect a prototype for commercial manufacture.

Model XAF

The force included Page, Guthrie, H. E. Reppert, A. A. Varela, I. H. Page and Lt. E. Luke. During that year they built radar model XAF and were ready for a full-scale test at sea.

This set, which still is in working order at the laboratory and probably will go into the Smithsonian institution museum some day, was installed on the battleship New York in December, 1938, and for the next three months underwent extensive tests during battle maneuvers.

Kisses for Ground and Girl

Back from a year in the Aleutians, Navy Seabee Frank J. Nasta kisses the soil of the good old U. S. A., then smacks Seattle reporter Jerri Jacobs, who came down to interview the sailors. Fellow Seabees get a kick out of both osculations.

Elk Hills Oil Contract Fair, Says Standard Oil

SAN FRANCISCO, June 24—H. D. Collier, president of the Standard Oil Company of California, in a statement just given out here, asserts that the original agreement between the navy and the oil company covering development of the Elk Hills oil reserve is fair to both parties, accomplished the navy's long-desired objective and is in the public interest and adds that if the navy desires to terminate the contract, Standard of California will of course continue to own and operate its own in the Elk Hills pending further negotiations with the navy.

The statement reads:

"Standard of California has been advised that for technical, legal reasons, the contract between the navy and Standard of California for development of the Elk Hills oil reserve has been declared by a representative of the department of justice to be invalid. This contract was proposed by the navy department and was designed to consolidate the area under navy control in the interest of conservation and to insure perpetuation of the area as a naval reserve in the public interest. As compensation, Standard of California was to operate the combined properties as a single unit in the navy's behalf and to secure its proportionate and legitimate compensation for its percentage of the total reserves out of production.

"The agreement, approved by the president, was based on authority contained in a congressional statute of 1938 which both the navy department and Standard of California believed fully adequate to support the type of agreement ultimately concluded. It would appear from information so far available to this company that the sole question is one of interpretation of the law under which the navy department and this company proceeded to negotiate. Fundamentally, the agreement was fair to both parties, accomplished the navy department's long desired objective, and was in the public interest."

"If the navy, in the light of the justice department's opinion, desires to terminate the contract, the company will of course continue to own and operate its lands in the Elk Hills pending further negotiations with the navy. This company desires to cooperate with the navy in every way possible in serving the best interests of our country."

OREGON AFL MEET ADOPTS RESOLUTIONS

EUGENE, June 24 (AP)—Continuation of the referendum system for election of officers at the Oregon State Federation of Labor convention was approved last night without an anticipated battle.

Convention forecasts had been that a resolution calling for selection of officers by direct vote from the floor would be a bitter issue.

Other resolutions adopted yesterday opposed a state sales tax, urged a retail price rollback to levels of May 15, 1942, protested importation of alien labor, asked that insurance under the new state motor vehicle responsibility act be made available by the state and not limited to private companies, objected to the national youth administration's vocational training program, supported the Wagner-Dingle bill for extension of social security.

Kaiser Yards to Start 'Victory' Ship Building

PORTLAND, June 24 (AP) — Oregon Shipbuilding corporation, one of the nation's fastest producers of Liberty ships, soon will start a $5,000,000 alteration and expansion program for the switchover to Victory ship construction.

Plans were announced last night by Edgar F. Kaiser, vice president and general manager of the three Henry J. Kaiser yards in the Portland-Vancouver, Wash., area. He said the expenditure to provide facilities for building the new type craft was authorized by the maritime commission while he was in Washington recently.

WPB Gives Okay to Aluminum Plant

WASHINGTON, June 24 (AP) The war production board (WPB) has approved the application of the Columbia Metals corporation, Portland, Ore., to construct a plant to develop a process for recovering alumina from clay, Rep. Angell (R-Ore.) said today.

Angell said he was told the WPB will arrange immediately with the proper government agency for a contract to finance construction of the plant.

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Oregon News Notes

By The Associated Press

The Keep Oregon Green committee urged the enrollment of Oregon youth in the Green Guard to protect the state's forests this summer . . . Dr. Horace C. Terrell, English department head at Linfield college, has been granted a leave of absence to serve in the Red Cross foreign service . . . Marshall Leathers and John Osburn, Astoria hotel men, announced purchase of the Hotel Gearhart . . .

Bandon city officials reported the municipal bonded debt has been reduced to $100,300 . . . A visit by Vice Admiral John H. Towers, Pacific fleet air force commander, to the Astoria naval air station was disclosed by the 13th naval district.

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