

ELECTRONICS

Specialized Loran

SS Loran, developed as navigation aid for overland routes where standard loran is not effective, replaced radar in bombing Berlin.

► A SPECIAL kind of loran navigating system, another important wartime scientific achievement, replaced radar bombsights on Allied bombers during the last year of the European war in assisting them to locate Berlin and other enemy targets to drop their loads of destruction, it is now revealed. The Germans, by special receivers, found a way to detect approaching radar-using planes, but not those operating on loran.

SS loran, as the method is called, is a special variation of the standard loran, the long-range aid to navigation of both air and surface ships. SS stands not for steamship but "sky-wave synchronized." SS loran is particularly for use by aircraft on overland routes where the standard loran is not effective at ranges over some 200 miles. SS loran has an overland range four or more times as great.

Like the standard loran, the SS variety is a development of Radiation Laboratory on the campus of the Massachusetts Institute of Technology, a wartime research and development institution under the sponsorship of the Office of Scientific Research and Development.

Ships at sea or in the air are able to pick up two sets of waves from the land-based loran station, one a so-called ground wave that comes to them directly, and the other "skywaves" which are reflected waves from the sky, thanks to the reflection of the signals in the 160-meter band by the ionosphere. The ground waves of standard loran are used ordinarily, particularly in daytime.

Loran itself was one of the most tightly held secrets of the war. It consists of a vast network of radio stations which in effect spread into space an electric stopwatch accurate to a millionth of a second. By means of a special receiver on board ship or plane a navigator picks up radio signals from two stations separately by about 400 miles, and by comparison can locate the geographical position of his craft with as great accuracy as is provided by celestial navigation based on shooting the stars or the sun with a sextant.

The loran receiver determines with great accuracy the difference in the time at which the two signals from the loran

transmitting stations are received. Curves are printed on a navigation chart showing the loran lines of positions for various time differences. Since the areas of frequent travel by ships and planes are blanketed by the loran signals from several transmitters, the navigator can determine three or four or more such lines of position.

Where these lines cross gives the point known as a "fix" which represents on a simple navigation chart, with which the navigator is furnished, just where the craft is located.

One of the early recognized shortcomings of standard loran was its relatively short range over land, some 200 miles for the ground waves, while over sea water the range was about 800 miles. However, after sunset the skywave signals traveled as well over land as water with a minimum usable range of about 200 miles and a maximum of about 1,400 miles. Also, analysis of skywave readings indicated unusual stability with respect to timing, a stability which increased with distance.

Early in 1943, according to Prof. J. A. Pierce, head of the loran division at Radiation Laboratory in Cambridge, Mass., an experiment was arranged between two American loran stations, one being instructed to synchronize itself with the skywaves from the other during one of the nighttime periods when regular operation was not scheduled. Excellent synchronization was made and held. The tests were observed at the laboratory, and the readings taken revealed a line-of-position error of only about 0.5 mile. This experiment marked the birth of SS loran.

Science News Letter, November 24, 1945

GENERAL SCIENCE

Cultural Reconstruction Of Devastated Countries

► THE EDUCATIONAL and cultural reconstruction of the war-devastated countries will be a principal concern of an interim commission to carry on after United Nations Educational Scientific and Cultural Organization Conference adjourns.

This commission will remain in session in London to undertake urgent problems in the coming weeks. In its reconstruction work it will operate through UNRRA.

It will also promote scientific and cultural travel by experts, professors and students, and arrange exchanges between the various nations.

Paris has been recommended by the conference as the future seat of UNESCO.

Science News Letter, November 24, 1945

SCIENCE NEWS LETTER

Vol. 48 NOVEMBER 24, 1945 No. 21

The weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St. N. W., Washington 6, D. C. North 2255. Edited by WATSON DAVIS.

Subscriptions—\$5.00 a year; two years, \$8.00; 15 cents a copy. Back numbers more than six months old, if still available, 25 cents. Monthly Overseas Edition: By first class mail to members of the U. S. Armed forces, \$1.25 a year. To others outside continental U. S. and Canada by first class mail where letter postage is 3 cents, \$1.25; where letter postage is 5 cents \$1.50; by airmail, \$1.00 plus 12 times the half-ounce airmail rates from U. S. to destination.

Copyright, 1945, by Science Service, Inc. Republication of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service.

Entered as second class matter at the post office at Washington, D. C., under the Act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature, Abridged Guide, and the Engineering Index. The New York Museum of Science and Industry has elected SCIENCE NEWS LETTER as its official publication to be received by its members.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N.Y.C., Pennsylvania 6-5566 and 360 N. Michigan Ave., Chicago, STAt 4439.

SCIENCE SERVICE

The Institution for the Popularization of Science organized 1921 as a non-profit corporation

Board of Trustees—Nominated by the American Association for the Advancement of Science: Edwin G. Conklin, American Philosophical Society; Otis W. Caldwell, Boyce Thompson Institute for Plant Research; Henry B. Ward, University of Illinois. **Nominated by the National Academy of Sciences:** Harlow Shapley, Harvard College Observatory; Warren H. Lewis, Wistar Institute; R. A. Millikan, California Institute of Technology. **Nominated by the National Research Council:** C. G. Abbot, Smithsonian Institution; Hugh S. Taylor, Princeton University; Ross G. Harrison, Yale University. **Nominated by the Journalistic Profession:** A. H. Kirchhofer, Buffalo Evening News; Neil H. Swanson, Executive Editor, Sun Papers; O. W. Riegel, Washington and Lee School of Journalism. **Nominated by the E. W. Scripps Estate:** Max B. Cook, Scripps Howard Newspapers; H. L. Smithton, Executive Agent of E. W. Scripps Trust; Frank R. Ford, Evansville Press.

Officers—President: Harlow Shapley. **Vice President and Chairman of Executive Committee:** C. G. Abbot. **Treasurer:** Frank R. Ford. **Secretary:** Watson Davis.

Staff—Director: Watson Davis. **Writers:** Frank Thone, Jane Stafford, Marjorie Van de Water, A. C. Monahan, Martha G. Morrow, **Science Clubs of America:** Joseph H. Kraus, Margaret E. Patterson. **Photography:** Fremont Davis. **Sales and Advertising:** Hallie Jenkins. **Production:** Dorothy Reynolds.