NAVIGATION

U.S. Subs Out of Date

German snorkel and speed have made our U-boats obsolete except in their strength of build and the superior craftsmanship of the U. S. Navy.

By VICE ADMIRAL CHARLES A. LOCKWOOD

Inspector-General of the Navy

In a radio talk on "Adventures in Science" given over the Columbia Broadcasting System.

➤ THE NAVY has been celebrating an anniversary. Just 47 years ago the first submarine was accepted by the Navy. It was the *USS Holland,* named after the American inventor who built this submersible torpedo boat, as it was then called.

It was the great-grand-daddy of the modern fleet type submarine which is 310 feet long, displaces 1,700 tons, and is propelled by four powerful diesels totaling 6,400 horsepower.

This fleet-type submarine was the type of craft that destroyed a large number of Japanese vessels, both merchant and navy.

Our fleet-type submarines numbered only 39 at the beginning of the war. Records prove our submarines were the longest-range and most consistently effective weapon against the economy of maritime Japan.

Bikini Test Results

The United States submarines which were submitted to the power of the two atomic bombs at Bikini last summer came out remarkably well. At the risk of over-simplification, it can be said that of all vessels tested during Operation CROSSROADS the submarines were consistently least affected and displayed the greatest potential resistance to the ravages of a "fission" bomb. This is not to imply in any way that had either of the bombs directly struck any of the target submarines, they would not have been completely destroyed.

A submarine has a relatively small above-water structure and a tough, tubular hull designed to withstand the shock of depth-charging. However, the unfortunate part about this splendid vessel is that it is becoming obsolete!

Two things have made the American submarine of World War II behind the times. By late 1944 the superiority of our own anti-submarine measures against the German U-boats in the battle of the Atlantic was sufficient also to render United States submarines relatively ineffective against such counter measures. Fortunately, the Japanese were less skilled in combating American submarines and the advance of Allied surface and air forces was such that U. S. undersea craft had just about worked themselves out of business. The Navy did not wish to develop and build an advanced type of American submarine when it had no prospect of being employed at the time.

German Developments

The Germans were faced with extinction unless something could be done to turn the tide of battle in the Atlantic. They summoned their best scientists and engineers in desperation with orders to overcome the superiority which Allied anti-submarine measures had over them. When the war in Europe was over, our scientific investigating teams made astounding discoveries. They found something which, had it been put into operation, might well have prolonged the whole European phase of the war.

The Germans had been mass-producing a new type of submarine which had the snorkel, the breathing tube that could be raised and lowered like a periscope to provide air for the ship's diesel engines and the crew. In addition to the snorkel, the German subs had a radically streamlined hull to take full advantage of the increased battery capacity, both resulting in higher speed submerged.

The snorkel had already appeared on the standard German submarines. This allowed them to remain submerged the entire time they were away from their own ports. It made the already tough job of locating them submerged even more difficult, and they were never any longer caught on the surface. In the newer German types the streamlining and higher battery capacity resulting in an increased submerged speed, although of limited duration, would have definitely added to the difficulties of our searching anti-submarine craft. Submarines thus equipped could not only catch up to fast convoys and deliver their torpedoes, but they could get farther away in shorter time following the attack, making the area to be searched much larger.

The day of the submersible or the surface craft that could dive is past. The true submarine, or the vessel that can remain submerged indefinitely, has made its appearance, although it must still get its air from the surface. Not only that, it is a vessel of greatly improved tactical characteristics in a field where such developments will contribute enormously to chances for survival of such a craft following an attack.

Germans Too Late

The German understanding of the importance of seapower was really the thing that was too late. Actually the advanced craft could have been in operation well before the end of the war. About 80 of them were completely built in 1944; but the Germans had suddenly resorted to hydraulics in an effort to avoid the use of electric motors. Hydraulic installations are tricky and require a lot of "know how". The Germans didn't have it and saved the Allies a lot of headaches as a result. They were still trying to overcome hydraulic deficiencies when the war terminated.

These German submarines, submerged, could make about 15 knots compared to nine knots for our fleet type vessels. Allied investigators found German blueprints for a submarine which was to have even greater submerged speed.

The House of Representatives recently passed a bill allocating $30,000,000 for the construction of two new experimental submarines. That bill is now in the Senate and, if passed, will be one of the more obvious steps the Navy is taking to maintain submarine superiority.

Navy Making Tests

The Navy has two of the German so-called Type 21 submarines now in operation for testing and evaluating purposes. It is true our own submarines, when the war ended, had few if any of some of the more important German advancements. We had submarines that were materially much better built than the Germans. We had superiority in electronic, sonar and torpedo fire-control gear. These, however, were simply improvements in the established practices of submarine construction and operation.

But the United States has one supe-

riority. The experience gained by the American Navy in using carefully trained personnel and developing by trial and error a superior tactical use of the submarine, mutually supported by all elements of the Navy team, is ours alone. It cannot be taken from us nor can it be readily imitated.

There are countless indications of the increased importance of the submarine in the navies of tomorrow. Atomic energy is certainly the perfect answer to submarine propulsion requirements. Once worked out it becomes an unlimited power source and, more than that, it would require no oxygen supply for operation. Atomic propulsion would eliminate the link with the surface provided oxygen could be carried in sufficient quantities to support the life of the crew members.

Unfortunately, one of many innumerable obstacles to the installation of atomic propulsion in a submarine is the present limited space available in an undersea vessel. An atomic propulsion plant is going to require a lot of room.

The U. S. Navy probably will lay out several submarine types for the future so that we may do varying tasks better. In a future world of guided missiles, atomic warheads, and atomic propulsion the submarine will be a vessel with missions to perform which in many cases are now designed to be done by surface ships and aircraft alone.

Science News Letter, April 19, 1947

AERONAUTICS

Teleran for Safe Landing

➤ A NEW AIRPLANE navigation and bad weather landing system has come out of the laboratories and is ready for development by engineers into a form suitable for airport installation.

The system, developed by the Radio Corporation of America, is named "Teleran." The name was coined from the chief ingredients of the new device, television and radar.

RCA engineers told scientists and aviation writers that Teleran as a practical device is not here, but "just around the corner."

In the new aircraft navigation and landing aid, ground-based radar, the same or similar to that in the Ground Control Approach equipment (GCA), scans the sky for miles about an airport.

Television brings the picture on the ground radar scope to the pilot in his cockpit in the plane.

The pilot sees not only the shadow picture on the radar scope but at the same time a superimposed map of the airport area. He sees his own plane as well as others represented by spots on light. The same television can also give the pilot weather maps or written traffic instructions. The picture is simplified by a screening process and made brilliant with special phosphors.

A special transmitter and receiver unit, called a transponder, gives the pilot a separate radar picture for each altitude.

The transponder has a receiver and transmitter connected together so that the transmitter emits one or more pulses when the receiver picks up a pulse separated at a time interval that corresponds to the plane's altitude.

An automatic device called a discriminator circuit can be made to sort out automatically the responses sent by the ground station according to the altitude.

RCA scientists have been engaged for a half-dozen years in developing Teleran. A recently-perfected part of the system is a simplified television camera that is compact. Teleran can be used in air navigation, traffic control, collision prevention and instrument approach to an airport.

The same apparatus in the plane is used for all operations, and its total weight is about 100 pounds.

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VETERINARY MEDICINE

Eggs Found to Carry Serious Poultry Disease

➤ EGGS MAY BE the "Typhoid Marys" of one of the most serious of poultry diseases. Dr. W. A. Boney, Jr., of the Texas Agricultural Experiment Station, has discovered that turkey eggs can harbor the germs of the disease known as fowl typhoid. Although he has been able to isolate the organism from only one egg out of 374 examined, research men regard his findings as significant. Eggs have long been suspected as carriers of fowl typhoid, but efforts of earlier workers to locate the causal organism in them apparently were unsuccessful.

Dr. Boney states, in his report in the *American Journal of Veterinary Research,* that the organism can be isolated easily from the reproductive systems of both male and female birds. He points out that transmission by way of eggs may in some cases explain why outbreaks of fowl typhoid occur in brooder houses or on ranges where it seems impossible to account for its introduction from an outside source.

Science News Letter, April 19, 1947

TELERAN—The new RCA television-radar air navigation and traffic control is installed in the cockpit of a flight simulator. Data are shown on a screen on the instrument panel.