To: Chief of Naval Operations (02-16-PT).


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1. Enclosures (A) and (B) are forwarded herewith.

2. CHO (02-16-PT) is requested to make complete additional copies of this report for forwarding to such other agencies as may be interested.

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Acting
This report contains information on the German "Wellonsonde" mine firing unit. This unit is dependent for operation on the distortion produced in an alternating field originating in the mine by a target vessel. It was designed for use in the LMB ground mine. This device was in the development stage at the end of the war in Europe and had not been used operationally.

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U.S. NAVAL TECHNICAL MISSION IN EUROPE

DISTRIBUTION STATEMENT A
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1. Introduction.

(a) One of the special developments carried on in mine firing devices by the Germans was in the distortion caused by target vessels to high-frequency alternating current fields. The only experimental product of this development is the so-called "Hellensonde", a development of Dr. Ing. Rudolf Hell. The "Hellensonde" is an experimental device and never reached advanced development or trials.

(b) No specimens of or documents relating to the "Hellensonde" were captures. All information contained herein has been obtained through interrogation of German prisoners of war.

2. General.

The "Hellensonde" (wave-sounder) creates and alternating electromagnetic field around the mine case, when this field is distorted by the transit of a ship or other body, the mine fires. The firing unit devised consists of a transmitter, a receiver, antennae for both transmitter and receiver, and firing circuit. The transmitter has an output of 5 watts at 5000 cps. Each antenna is rectangular, made of metal tubing, and 50 x 80 cm, in size. The two antennae are mounted in the LiB IV mine-case as shown in Figure 2, and cast into the explosive. Since the antennae are mounted at right-angles to each other there is a little or no mutual induction. The mine-case is made of plasticized pressed paper (press-stoff) for minimum interference with the field pattern. If the symmetry of the field produced by the transmitter is disturbed by the metal mass of a ship passing overhead, a small amount of alternating current appears in the receiver's antenna, and the firing circuit of the receiver output fires the mine.

3. Characteristics.

The distortion effect at the receiving antenna through field disturbance varies inversely with the 5th to 6th power of the distance to the disturbing force. Thus, the sensitivity is greatly dependent upon the depth of water. A change in depth of water from 20 to 22 meters will result in a reduction of sensitivity by 50 per cent.
3. Characteristics (Cont'd).

The high battery consumption of such a system make it necessary to use a triggering system which will allow the "Kellen sonde" to stabilize before the firing impulse arises. It was intended to use a simple acoustic triggering system. A few seconds are necessary for the "Kellen sonde" to come to equilibrium. A high geometric and electrical symmetry of the antennas and amplifiers is necessary to make the system operate properly. However, after a long period these characteristics tend to vary somewhat, and spontaneous firing may occur after the "Kellen sonde" has been repeatedly switched on. In order to avoid this, a rate-of-change circuit is used in the firing circuit to allow firing only when sudden surges occur. This principle, however, was not adopted due to the great variation in sensitivity with depth and was considered of no operational value in a mine.

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Fig. 1
SCHEMATIC DIAGRAM

Transmitting Antenna

Receiving Antenna

Amplifier Resonance
5000 cps

Fig. 2
MOUNTING IN IMLB MINE

Plasticized Paper

Metal

Antennae (cast into explosive)

Triggering Microphone

Pinging Device
Abb. 17
Zündgerät Wellensonde -- Übersichtsschaltplan


Abbildung 18 zeigt die Gesamtanordnung mit dem Gefäß LMB 1 (links) und (rechts) den Metalteil des Gefäßes ohne Isolierstoff-Zylinder. Die

Abb. 18
Zündgerät Wellensonde -- Einbau in die Fallschirmung