U.S. NAVAL TECHNICAL MISSION IN EUROPE

GERMAN "AMT" MINE UNITS

September 1945

BEST AVAILABLE COPY

DISTRIBUTION STATEMENT A
Approved for public release; Distribution Unlimited

U.S. NAVAL TECHNICAL MISSION IN EUROPE

AD-A953 449

UNCLASSIFIED

GERMAN "AMT" MINE UNITS

September 1945

BEST AVAILABLE COPY

DISTRIBUTION STATEMENT A
Approved for public release; Distribution Unlimited

U.S. NAVAL TECHNICAL MISSION IN EUROPE

AD-A953 449

UNCLASSIFIED
19 September 1945.

UNCLASSIFIED

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


Enclosures: (A) (H7) Five (5) complete copies of subject report as listed in distribution.
(B) (H7) Nine (9) copies of subject report Nos. 17-25, without photographs, as listed in distribution.
(C) (H7) One set of negatives of photographs in subject report with copy No. 26, without photographs.

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

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

L. V. HONSINGER
Capt. U. S. N.
Acting.

DISTRIBUTION To:

CNO (OP-16-PT) ......................... Copy Nos. 1 - 5
FIAT .................................. Copy No. 6
CNO (OP-30-RT) ......................... Copy No. 7
BuShips (Code 620) ..................... Copy No. 8
BuOrd (Ro) ............................. Copy No. 9
BuOrd (Ro 6) ........................... Copy No. 10
BuOrd (Ro 7a) .......................... Copy No. 11
Office of Research and Invention .... Copy No. 12
ComNavBu ............................. Copy No. 13
ComNavBu for Admiralty ............... Copy No. 14
NOL .................................. Copy No. 15
Mine Disposal School .................. Copy No. 16
CNO (OP-16-PT) w/o photographs .... Copy Nos. 17-25
CNO (OP-16-PT) w/Enclosure C ......... Copy No. 26
GERMAN "ANT" MINE UNITS

SUMMARY

This report contains information on the German ANT 1 and ANT 2 mine firing units. These units consisted of already-existent influence firing components and constitute a combination firing unit requiring acoustic (sonic), magnetic and subsonic influences to fire. These combinations were in the development stage at the end of the war in Europe and were not used operationally.

September 1945

U.S. NAVY TECHNICAL MISSION IN EUROPE.

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>3</td>
</tr>
<tr>
<td>2. General</td>
<td>3</td>
</tr>
<tr>
<td>3. Mounting</td>
<td>3</td>
</tr>
<tr>
<td>4. ZR II Mechanism</td>
<td>4</td>
</tr>
<tr>
<td>5. Blocking</td>
<td>4</td>
</tr>
<tr>
<td>6. Operational Characteristics of AMT 1</td>
<td>4</td>
</tr>
<tr>
<td>7. Operational Characteristics of AMT 2</td>
<td>5</td>
</tr>
</tbody>
</table>

LIST OF ILLUSTRATIONS

<table>
<thead>
<tr>
<th>Fig. No.</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mounting of AMT 1 in LMB</td>
<td>6</td>
</tr>
<tr>
<td>2. Mounting of AMT 2 in MB/TMC</td>
<td>6</td>
</tr>
<tr>
<td>3. Blocking Circuit Diagram</td>
<td>6</td>
</tr>
<tr>
<td>4. Sequence of Switching Operations for AMT 1</td>
<td>7</td>
</tr>
<tr>
<td>5. Sequence of Switching Operations for AMT 2</td>
<td>7</td>
</tr>
</tbody>
</table>
1. Introduction

(a) Due to some operational shortcomings, the AT 2 (AA:2) and AT 3 (AA:3) units were considered unsatisfactory. Combination of these units with 114 unit was in development at the end of the war in Europe. The resultant combinations are known as AMT 1 and AMT 2. (Acoustic-Magnetic-Subsonic).

(b) No samples of the AMT units were captured, and all information herein contained has been obtained through preliminary examination of documents and interrogation of prisoners of war.

2. General

(a) The operational AMT units had two faults:
   i. Both AT 2 and AT 3 tend to detonate spontaneously in strong currents.
   ii. Due to constant switching in the vicinity of a sound source, the life of the AMT units is short, especially AT 2. (50 hours for AT 2 - 14 days for AT 3).

(b) Combination of AT 2 and AT 3 with 114 into AMT 1 and AMT 2, respectively, is designed to overcome these two faults, and, in addition, make the mine more difficult to sweep. Combination is made with the use of a ZR II motor-driven cam system to set the time interval relations between the three influence components of the unit.

3. Mounting

(a) The AMT 1 is mounted in LMB IV as indicated in Fig. 1. The AT 2 component is mounted normally. The 114 component is rubber-mounted with its associated batteries in fixed orientation within an aluminum tube running axially through the mine. Fixed orientation of the 114 is possible since it is capable of compensating fields from 700 mg Red to 400 mg. Blue.

(b) The AMT 2 is mounted in TMB or MB as indicated in Fig. 2. The AT 3 component is mounted normally. The 114 component is mounted...
4. **ZR II Mechanism**

The ZR II mechanism determines the time relations between the influence components of the AIT units. Due to the shorter life of the AT 2 component, additional switching is necessary to conserve the battery in AIT 1, so a different type of ZR II mechanism is used. Two such mechanisms are known (ZR IIb and ZR IIc), but it is not known which is used in each of these combinations. The basic switching is similar, however. The ZR II mechanisms are motor-driven cam systems. Typical operation is described in Technical Report No. 291-45.

5. **Blocking**

A blocking circuit, (Fig. 3) is used to block firing if the subsonic influence causes the "\( T \)" component to react prematurely. (Contact \( r_2 \) closes when the "\( T \)" component fires). If the "\( T \)" component reacts prematurely, ZR II cam \( \delta \) will be on its blocking contact when \( r_2 \) closes. The low-resistance coil of \( R_5 \) (\( R_{5H} \)) is energized and \( r_5 \) switches over, energizing the high-resistance coil, (\( R_{5H} \)) which acts to produce self-holding of \( R_5 \) as long as \( r_2 \) remains closed, and the resistance of \( R_{5H} \) prevents detonator firing.

6. **Operational Characteristics of AIT 1**

(a) The sequence of switching operations is shown in Fig. 4. The acoustic component is normally alive and, in the usual case is actuated first. If, now, the "\( M \)" component is actuated, the ZR II mechanism is energized and runs for 120 seconds. After 1.5 sec., the vacuum-tube heaters of the "\( T \)" component are switched on and are given 5 sec. to heat. After 6.5 sec., cam switch \( \delta \) of ZR II operates, switching out the blocking circuit and switching in the firing circuit of the "\( T \)" component. If "\( T \)" (subsonic) actuation occurs before 25 sec. after "\( M \)" actuation the mine fires.

(b) If the mine does not fire after 25 sec., the ZR II switches out the plate supply to the "\( T \)" amplifier. At 26 sec., the "\( T \)" ampli-
Operational Characteristics of AHT 1 (Cont'd.)

After heater current is turned off. This 3-sec. interval is allowed to prevent premature firing due to the cooling of the vacuum-tube heaters.

(c) At 90 sec. the plate supply is again switched on, and the "U" component is run through latitude adjustment to assure proper adjustment in case of faulty adjustment or small changes in the prevailing magnetic field. This procedure continues until complete and is switched out at 117 sec. If this 27 sec. period is insufficient (as in the case of initial latitude adjustment) the ZR II will go through successive cycles until adjustment is complete.

(d) At 100 sec., cam switch 6 goes back to its blocking contact.

(e) If the action is triggered by "M" actuation, the "T" component amplifier will not be switched on until acoustic actuation is complete. In the normal case (M-T sequence) the unit will be fired by a subsonic actuation between 6.5 and 25 sec. after magnetic actuation.


(a) The sequence of switching operations is shown in Fig. 5. The ZR II mechanism does not control the switching of plate and heater supply to the "T" component amplifier tubes, since the battery has much longer life than in the AHT 2 component of AHT 1.

(b) The acoustic component is normally actuated first and switches on the "T" component when actuated. However, the "T" component is blocked by cam switch 6 until 1.5 sec. after "M" actuation. The mine is then active for "T" firing from 1.5 sec. to 25 sec. after "M" actuation. As in AHT 1, the interval from 90-117 sec. is allowed for re-setting of the-"M" unit.

Prepared by:

Lt. W. C. HOLMES, USNR
Lt. R. J. FRANZ, USNR
Lt. C. J. OLENIACZ, USNR
Lt. H. G. VOGEL, USNR
Fig. 1
Mounting of ANT 1 in JMB

![Diagram of ANT 1 mounting]

Fig. 2
Mounting of ANT 2 in TMB/TMB

![Diagram of ANT 2 mounting]

Fig. 3
Blocking Circuit

![Blocking Circuit Diagram]

Legend:
- UBS = Hydrant 11: Click
- S6 = Gas Switch 6 in 3W II
- Z = Wiring Contact
- B = Blocking Contact
- R5H = High-resistance coil
- R5L = Low-resistance coil
- R5S = Contact of R5 coil
- R5, R3 = Contact 3 of AT
- F = Falsies
Fig. 4

1 = Unit Blocks, 2 = T. Operates
2 = Cam Switch #6 switches from "A" to "B"
3 = Unit is Subject to Timing
4 = Cam Switch #6 switches from "B" to "A"
5 = 4 Component and, etc.
6 = #4 Automatic Selector
7 = #4 Automatic Selector
8 = Heater Current 11 = Anode
9 = Heater Current 12 = Potential
10 = Anode Potential On

Fig. 5

1 = Heater, 2 = Anode
3 = Heater
4 = Anode
5 = Heater
6 = Anode