

AD-A071 228

NAVY UNDERWATER SOUND LAB NEW LONDON CT

F/G 14/2

METHOD FOR OBTAINING STATISTICAL ACCELERATION DATA IN A DESTROY--ETC(U)

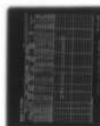
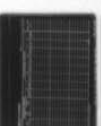
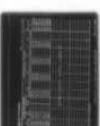
OCT 64 G E CHRISTENSEN, D A NICHOLS

USL-TM-933-355-64

NL

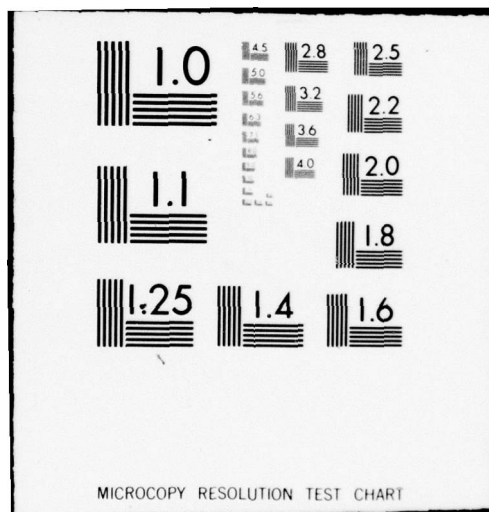
UNCLASSIFIED

| OF |
ADA
071228



END
DATE
FILMED
8-79

DDC



002226

AD A 071 228

933-355-64

DDC FILE COPY

002226

Wood
B.S.

UNCLASSIFIED

LEVEL II

MO... Project

Duships (Code 1622)

COPY NO. 12

USL Problem
No. 1-650-01-00

**METHOD FOR OBTAINING STATISTICAL
ACCELERATION DATA IN A DESTROYER AT SEA.**

By

Glendon E. Christensen

and

Donald A. Nichols

USL Technical Memorandum No. 933-355-64

19 October 1964

DDC
RECEIVED
JUL 16 1979
F

INTRODUCTION **USL-TM-933-355-64**

In the design of hoist systems, towlines, and towed bodies for variable depth sonar, it is necessary to have quantitative data on the forces acting on VDS components. These data are especially necessary in designing large VDS systems where the forces on towed bodies and in towlines may be as high as 75,000 pounds.

Among the significant forces are those that are caused by vertical ship accelerations, which can be sensed by suitable accelerometers. If statistical accelerometers on destroyers are used to obtain data in the North Atlantic, a statistical presentation of the accumulated data over a year's time can be made to form a reasonably accurate picture of vertical accelerations to be expected.

The purpose of this technical memorandum is to describe accelerometer equipment and to explain how the data should be taken and recorded.

DESCRIPTION OF EQUIPMENT AND INSTALLATION

Equipment

Each statistical-accelerometer assembly consists of two major components: (1) the sensor unit and (2) the counter-and-power-supply unit. The assembly is shown by Figure 1.

The vertical acceleration sensor unit is the Giannini Controls Corporation Model 2432; its size is about 3 inches x 1.3 inches x 1.4 inches. This unit senses instantaneous values of positive acceleration that exceed these 4 thresholds: 1.20g, 1.35g, 1.50g, and 1.65g.

DISTRIBUTION STATEMENT A
Approved for public release
Distribution Unlimited

933-356

Oct 64

-1-

254 200

LB

↑
Abstract

The counter-and-power-supply unit has an approximate size of 8 inches wide x 17 inches long x 8 inches high and an approximate weight of 35 pounds, including 45 feet of MCOS-6 cable. The multiple counter is the counting component of Giannini Controls Corporation Model 2432 statistical accelerometer. It records, on 4 electromechanical counters, the number of times the sensor experiences the positive accelerations that exceed the set thresholds. Each counter records the count for a particular threshold. The power supply converts the 115-volt AC source to 38 volts DC at 1.5 amps and requires about 100 watts input.

Operation

An example of how bow acceleration could vary with time is shown in Figure 2. The X's on the curve show the times that acceleration thresholds are counted by the multiple counter. During the period of time shown, counter #1 registered 4 instances where the acceleration exceeded the threshold of 1.20g; counter #2 registered 3 instances where the acceleration exceeded the threshold of 1.35g; counter #3 registered 3 instances where the acceleration exceeded the threshold of 1.50g; and counter #4 registered 2 instances where the acceleration exceeded the threshold of 1.65g. Counters located amidships and at the stern behave similarly.

Installation

The three vertical acceleration sensor units must be mounted vertically and rigidly. They should be located in: (1) the after-steering ram room at the waterline and near the aft perpendicular; (2) the compartment at the midship location, and (3) in the bow at the waterline and near the forward perpendicular.

Each of the 3 counter-and-power-supply units should be mounted on a shelf within a 45-foot cable length of its sensor and such that the 4 counters of each unit can be easily read. It should also be located within a 25-foot cable length of a 115-volt AC power outlet.

The 2 units at each of the 3 locations are supplied and installed by USNUSL. Figure 3 diagrammatically shows an installation; figures 4 and 5 are photographs of the 2 units that were installed in the USS MOALE (DD-693). The MOALE installation was for 2 months of use only; the clamped sensor is not typical of a 1-year installation.

INSTRUCTIONS

Accelerometer Data (Bow, Midship, Fantail):

1. Connect the counter-and-power-supply unit to a 115-volt AC source. (See figure 1).

Dist.	Avail and/or special
A	

Codes

2. Turn counting unit switch to "ON" position upon leaving port. (The light above the switch will then be on).

Note: The counting unit should run continuously throughout the test; do not turn it off or permit the AC source to be disconnected. If power failure occurs, record the duration of same on the proper data sheet or sheets.

3. Record simultaneously, on the data sheets provided, the accelerometer readings and other required data every 4 hours, on the hour, during the time at sea. See figures 6, 7, and 8 for specimen and blank data sheets for use in recording acceleration data for the fantail, midship, and bow locations.

4. Turn counter-and-power-supply unit switch to "OFF" position upon entering port.

Bridge Data

1. Record bridge data once every 4 hours, on the hour, simultaneously with recording data from each counter-and-power-supply unit. Fill in bridge data sheet (see Figure 9) as explained below:

- a. ship speed - obtain from most accurate and reliable source.
- b. direction of sea - make best estimate in degrees relative to ship's heading.
- c. wave height- make best estimate from observation at ship's fantail.
- d. wind direction - read directly from indicator in degrees relative to ship's heading.
- e. wind speed - read directly from indicator.
- f. ship's position - determine approximate position to nearest minute.
- g. ship's heading - give in degrees, true.

2. Bridge data are to be derived from readings taken at the time of reading and not as an average over the previous 4-hour period.

REMARKS

Blank data forms USNUSL-917, USNUSL-917A, USNUSL-917B, and USNUSL-917C will be supplied by USNUSL. One of the writers will contact each ship about once every two months to collect the data and to discuss any problems that may occur.

Glendon E. Christensen

GLENDON E. CHRISTENSEN
Mechanical Engineer

Donald A. Nichols

DONALD A. NICHOLS
Senior Project Engineer

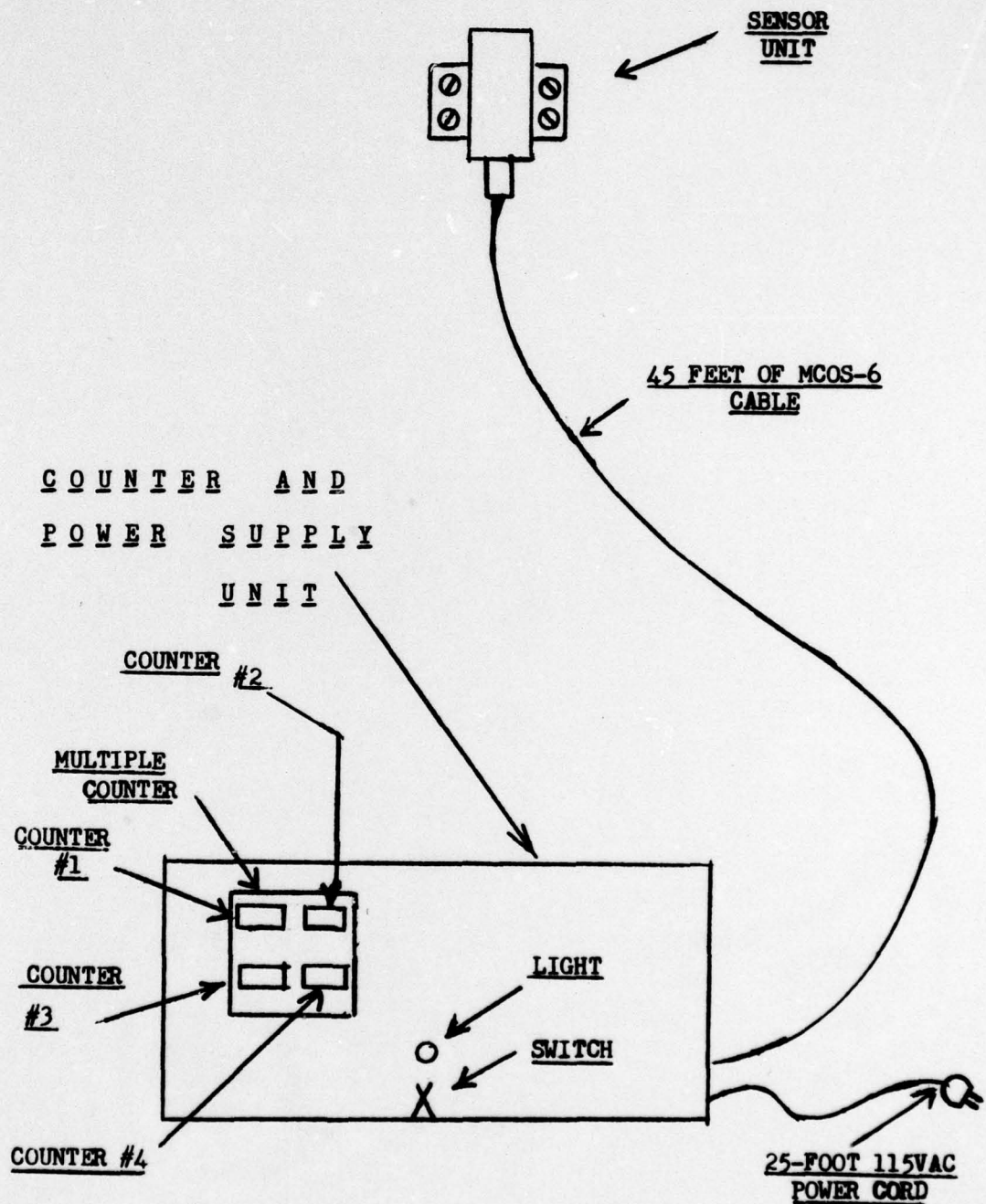


Figure 1 to USL Tech. Memo. No. 933-355-64

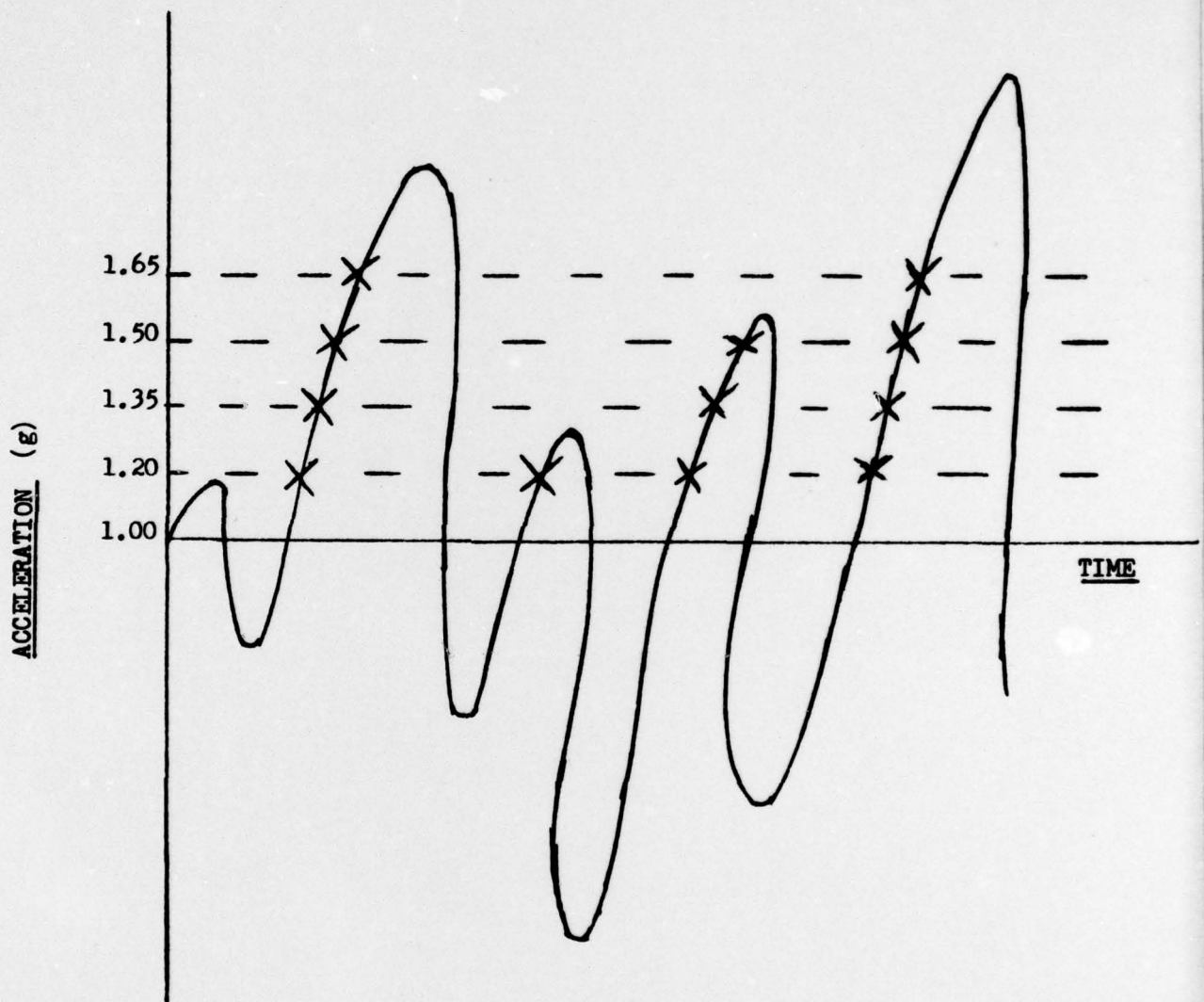
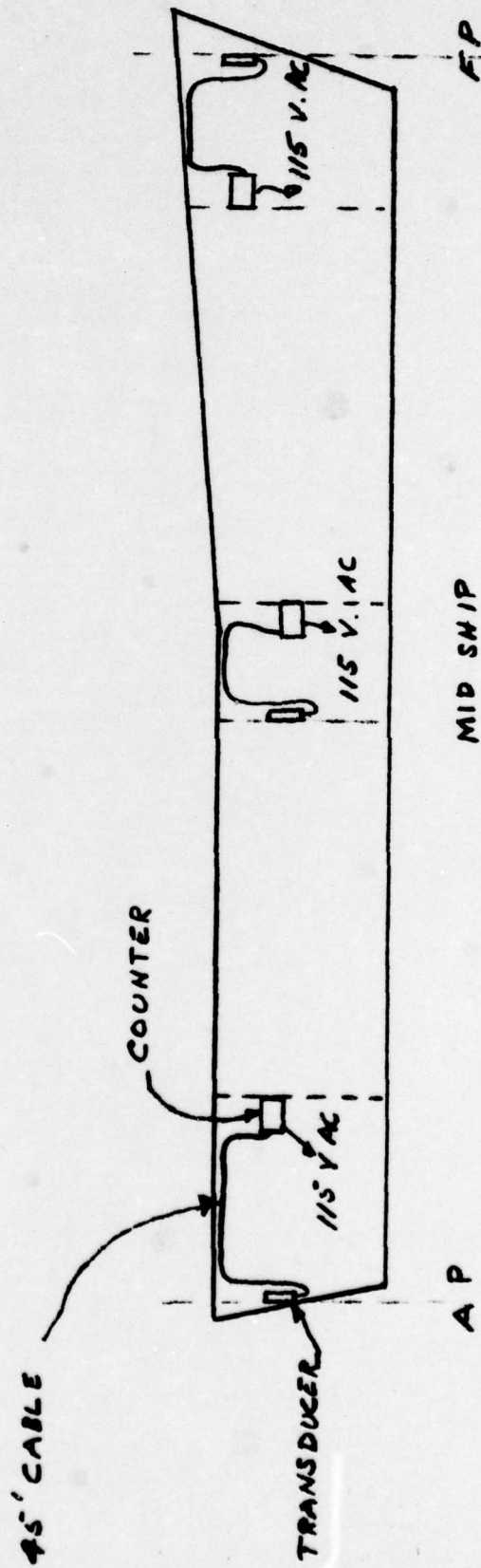
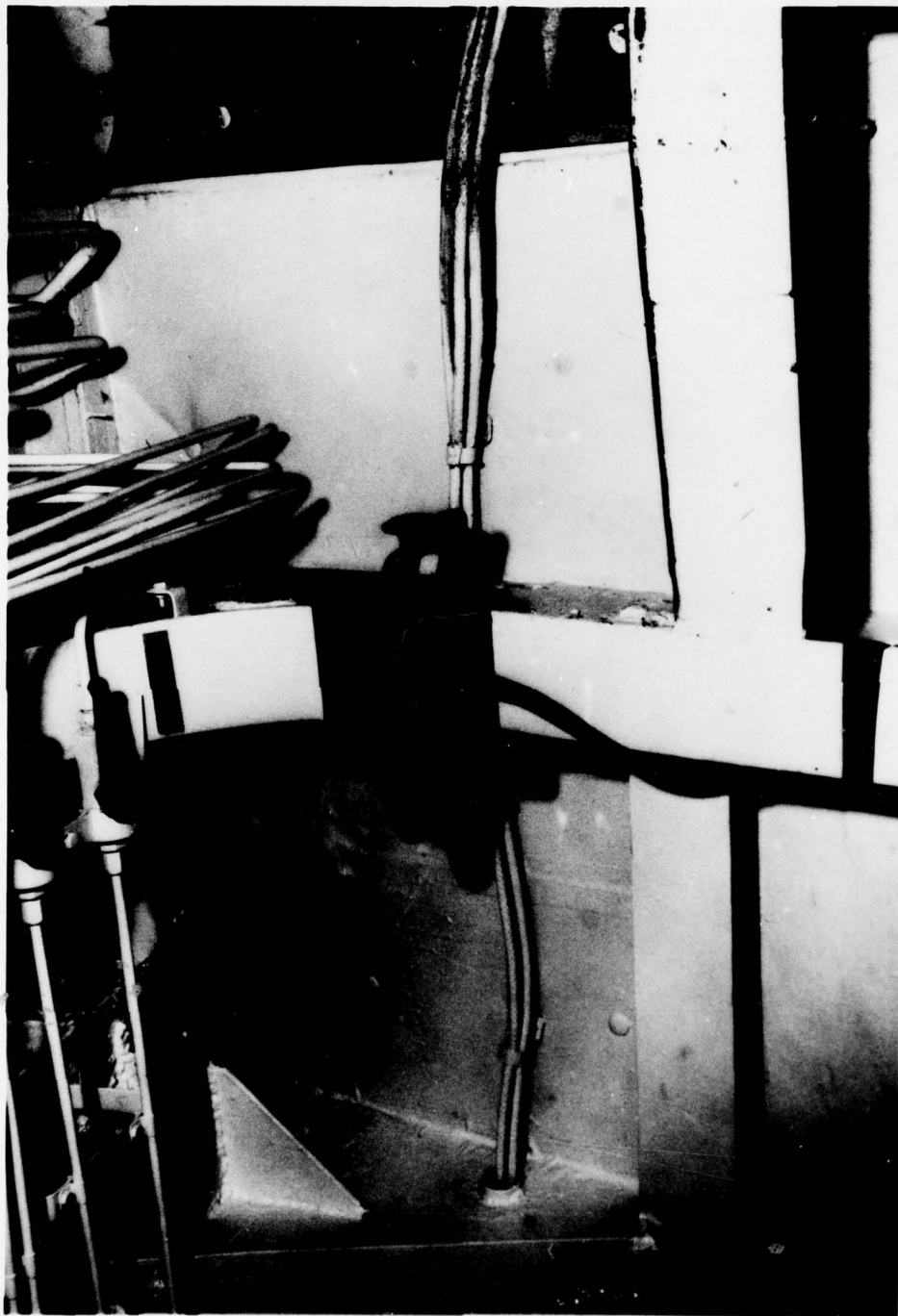


Figure 2 to USL Tech. Memo. No. 933-355-64



INSTALLATION ARRANGEMENT



USL Tech Memo No. 933-3/5-64

U. S. Navy Underwater Sound Laboratory
NP24 - 24837 - 10 - 64

Official Photograph



USL Tech Memo No. 933-365-64

U. S. Navy Underwater Sound Laboratory
NP24 - 24838 - 10 - 64

Official Photograph

SHIP

[illegible]

9/23/64-500-FIRST RUN-EXPERIMENTAL

SHIP

U.S. 917-917A

9/23/84-500- FIRST RUN- EXPERIMENTAL

SHIP

USN-USL-9 17

9/23/64-500 - FIRST RUN - EXPERIMENTAL

USL Tech. Memo.
No. 933-355-64

Distribution List

External

BUSHIPS (Code 1633)
COMCRUDESANT (Code 413)(2)
COMDESDEVGRU TWO (CMDR H. Fridge)(2)
CO, USS HUGH PURVIS (DD-709)(2)
CO, USS MOALE (DD-693)(2)
BUSHIPS (Code 1633D)(2)
BUSHIPS (Code 1622)

Internal

Code 100
Code 101
Code 900
Code 900A
Code 900B
Code 900C
Code 930
Code 930A
Code 933
Code 933.2
Code 933.3
G. Christensen
S. Rupinski
Code 930S(3)
Code 902
Code 904
Code 904.2(5)