MOST Project 2 24 May 1954
REPORT 516

(1) NW

(9) Service test rept.,

~~service test report:~~

(6) Modification and Repair of Surface-Vessel Bathythermograph BC-2B/S.

(10) R. C. HINCK ENGINEERING DIVISION

(11) May 54

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(14) NEL-516

U. S. NAVY ELECTRONICS LABORATORY, SAN DIEGO, CALIFORNIA
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ORIGINATING CODE 847c NAME S.Meyers EXTN. 66811 DATE 6/3/54

ROUTE TO CODE	RELEASED INITIAL	RELEASED DATE	COMMENTS
847a	EWP	6/9	this report, the result of the problem set up at
847	[illegible]	6/7	NEL to determine a repair procedure for
			defective BT's, has been forwarded to the
810	WH	6/8	repair facilities. 883 is making arrangements
			to have all OC 1B/S, 2B/S and 3B/S BT's in
847	[illegible]	8/2	stock to be sent to lead units for
S	file		repair and ~~recalib~~ to recalibration before
			issue to the fleet. It is understood that
			the funds for the repair are available and
			the rate of repair will equal or slightly
			exceed the rate of issue.
			S.Meyers 847c 66811

SIGNATURE, EXTN., AND CODE ARE TO FOLLOW COMMENTS

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This report covers work to May 1954 and was approved for publication 24 May 1954. The work was done under ST-60 (NEL T1-8, formerly 4G16).

STATEMENT OF PROBLEM

Conduct an engineering investigation of the defects and the probable cause of the defects of, and repair and modify, ten damaged OC-2B/S Surface-Vessel Bathythermographs submitted by the Bureau.

CONCLUSIONS

The following defects, caused by the shock and vibration conditions encountered in handling and transit, were evident in the subject bathythermographs:

1. The stylus arms had received a permanent set such that the stylus would no longer touch the glass slide.
2. The instrument calibration was no longer accurate.
3. Screws holding the nose and tail pieces to the body tube were loose.

RECOMMENDATIONS

The following are recommended to bring the BT's up to the requirements of the Navy:

1. Install an adjustable stop in body tube to prevent overtravel of the pressure element.
2. Fabricate and install new stylus arms.
3. Install split lock washers on screws holding nose and tail pieces to the body tube.
4. Recalibrate the BT's.
5. Provide the BT's with a carrying case equipped with vibration and shock isolators.[1]

WORK SUMMARY:

The investigation was conducted by the author and the modifications and repairs were made by Hal Murray.

[1] R. C. Hinck, Evaluation of Preproduction Model of Surface-Vessel Bathythermograph AN/SSH-2 (Navy Electronics Laboratory, Report 464) 17 Dec 1953.

CONTENTS

ILLUSTRATIONS

INTRODUCTION

This report covers the inspection and repair of ten Surface-Vessel Bathythermographs OC-2B/S. An investigation of the defects was made and causes were determined. The defects were repaired and modifications were made to prevent recurrence of damage.

DESCRIPTION OF EQUIPMENT

The function of the Surface-Vessel Bathythermograph OC-2B/S is to obtain the relationship of temperature and depth down to a maximum of 450 feet. The bathythermograph, normally referred to as BT, is cylindrical in shape, approximately 2 inches in diameter and 31 inches in length (fig. 1). The pressure element, mounted inside the center portion of the instrument (fig. 2), supports a smoked slide which it moves longitudinally with respect to a stylus, as a function of depth. The thermal element is mounted in the aft end and moves the stylus transversely across the smoked slide as a function of temperature.

INSPECTION

The instruments were disassembled and carefully inspected to determine the defects and the magnitude and probable cause of the damage. It was determined that the following defects existed:

1. The screws holding the tail piece and nose piece were loose as a result of either insufficient tightening during assembly or the vibration and shock encountered during transportation.

2. A shock blow along the longitudinal axis of the BT in its shipping case caused the pressure element to elongate and come in contact with the end of the stylus. This caused the stylus arm to be bent such that it would not touch the glass slide.

MODIFICATION PROCEDURE

Disassemble the bathythermograph. At the aft end of the body tube, drill two holes (no. 28 drill), for attaching a stop base (fig. 3). Attach the assembled "stop" inside of the body tube. File smooth any protuberance on the outside of the body tube. Holding the pressure element securely, gently raise or straighten the pressure relief tube (1/32 inch sealed copper tubing at aft end of element) and bend it slightly outboard to clear the stop base. If necessary, bevel the forward corner of the stop base to clear the solder seal at the base of the tubing. Care must be taken to avoid breaking the tubing at the solder seal.

Install the pressure element in the body tube, and with a screwdriver adjust the stop screw for a clearance of approximately 1/32 inch against the end of the pressure element (without clearance the pressure element may not return to the zero position). Tighten the lock nut to hold the screw in place.

REPAIR PROCEDURE

Note or mark the position of the stylus arm on the temperature element and with a small soldering iron remove the stylus arm. Remove and save the stylus point from the arm. Make from bronze spring sheet stock (0.010 to 0.016 inch thick), a duplicate stylus arm. Cut the new arm lengthwise across the grain of the stock to permit bending. Drill a no. 70 hole in the center of the small end of the arm and solder the stylus point in place (fig. 4). Solder the new stylus arm on the temperature element, holding to the original stylus position as closely as possible. Bend the stylus arm as necessary to insure firm pressure of the point on the glass slide. Reassemble the BT, installing split lock washers on screws of the nose and tail pieces. Stamp the letter "A" following the serial number to indicate first recalibration. Calibrate the BT and make new corresponding viewing grids as per standard calibration procedure.

CONCLUSIONS

The following defects, caused by the shock and vibration conditions encountered in handling and transit, were evident in the subject bathermographs:

1. The stylus arms had received a permanent set such that the stylus would no longer touch the glass slide. This set was caused by overtravel of the pressure element during shock.

2. The instrument calibration was no longer accurate.

3. Screws holding the nose and tail pieces to the body tube were loose.

RECOMMENDATIONS

The following recommendations are made to bring the BT's up to the requirements of the Navy:

1. Install an adjustable stop in the body tube to prevent overtravel of the pressure element.

2. Fabricate and install new stylus arms.

3. Install split lock washers on screws holding the nose and tail pieces to the body tube.

4. Recalibrate the BT's.

5. Provide the BT's with a carrying case equipped with vibration and shock isolators.

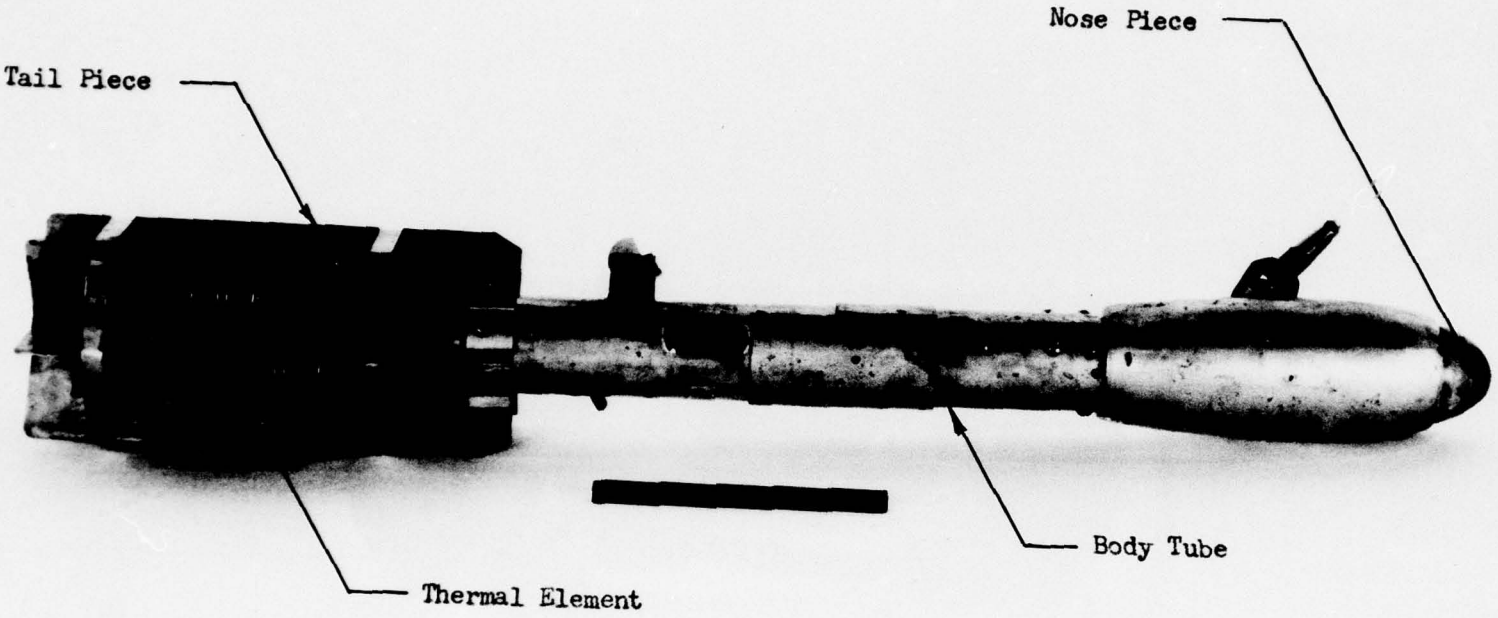


Figure 1. Side View of OC-2B/S Bathythermograph

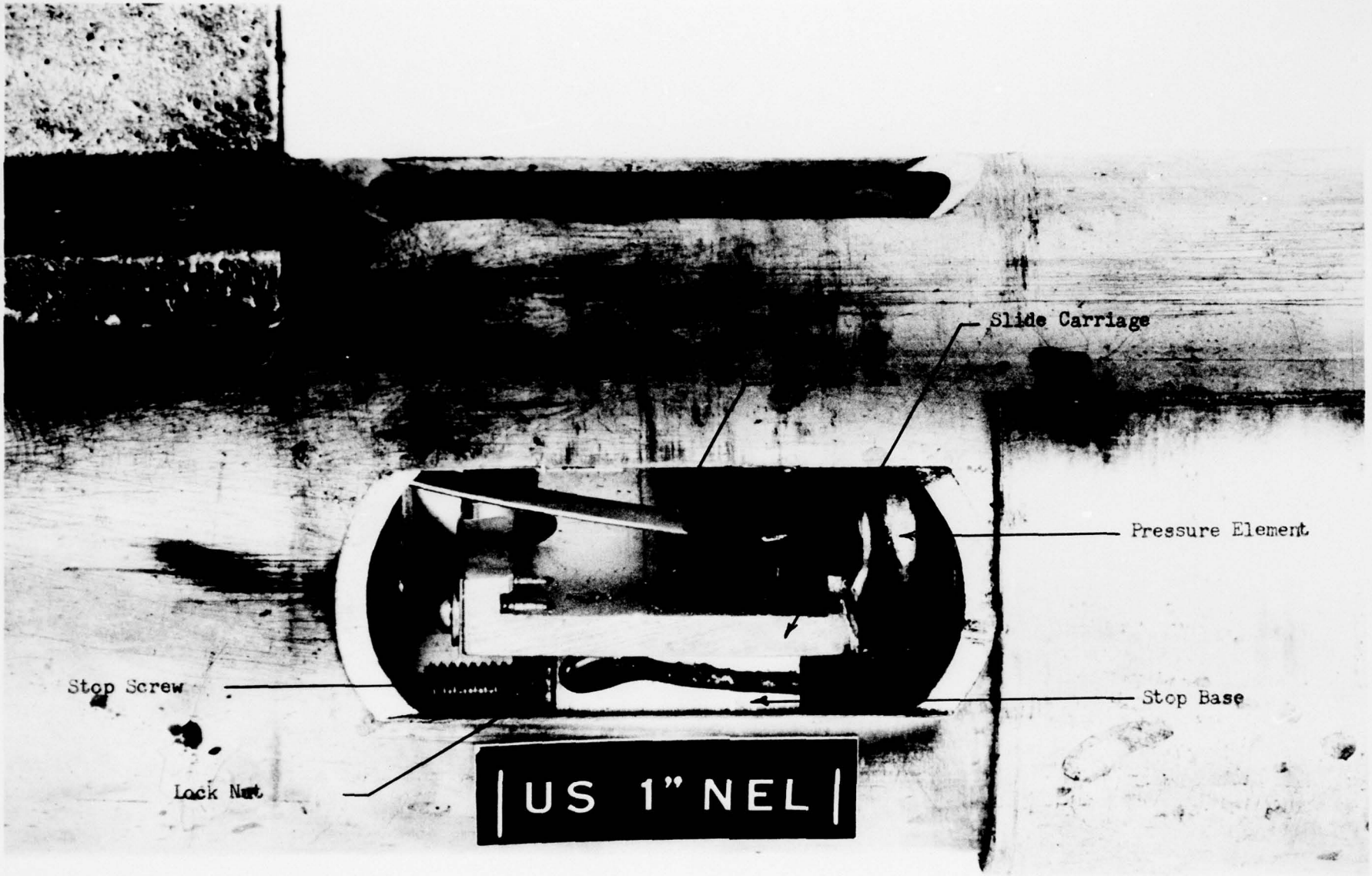


Figure 2. View of Installed Stop in OC-2B/S Bathythermograph Body Tube.

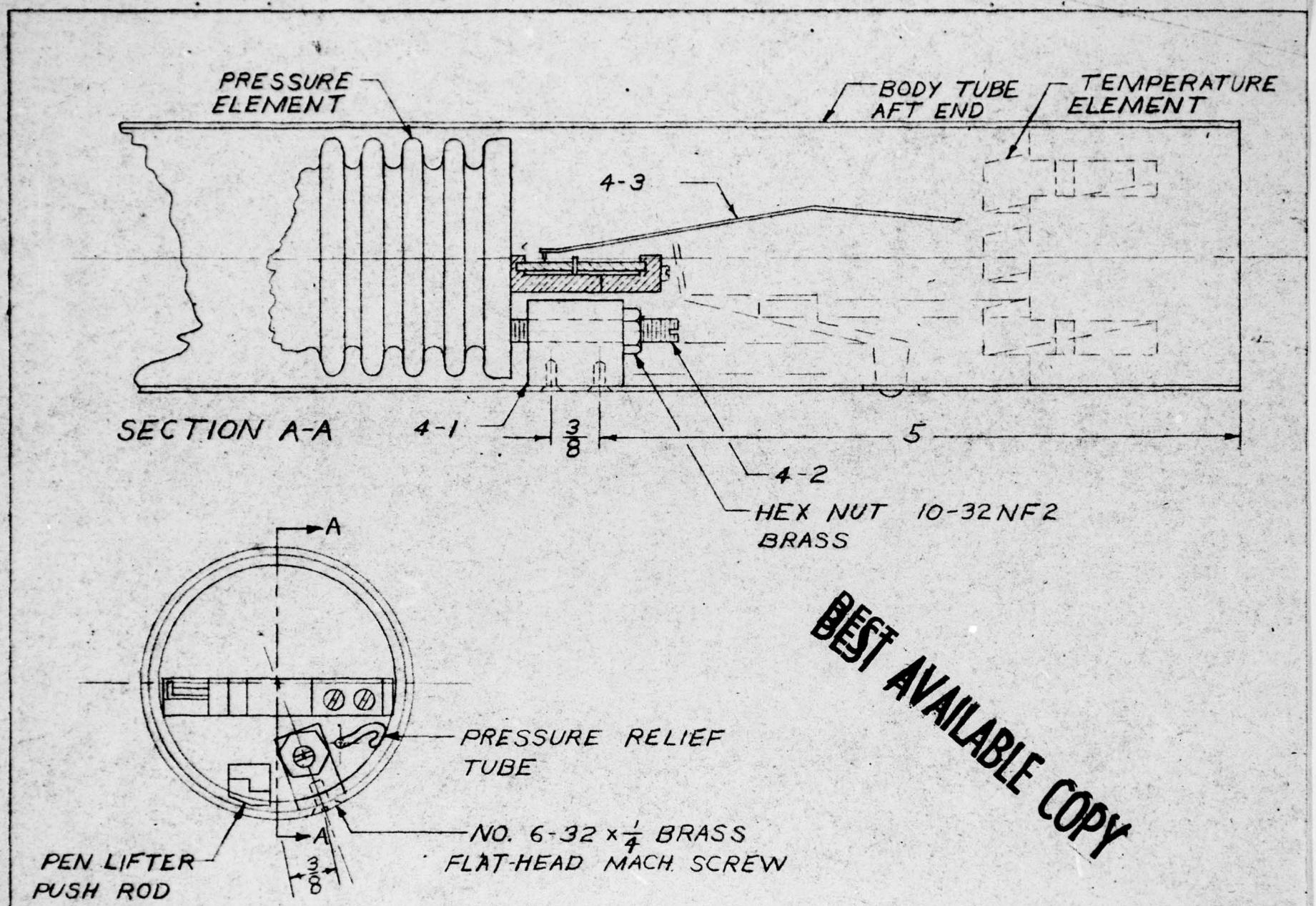
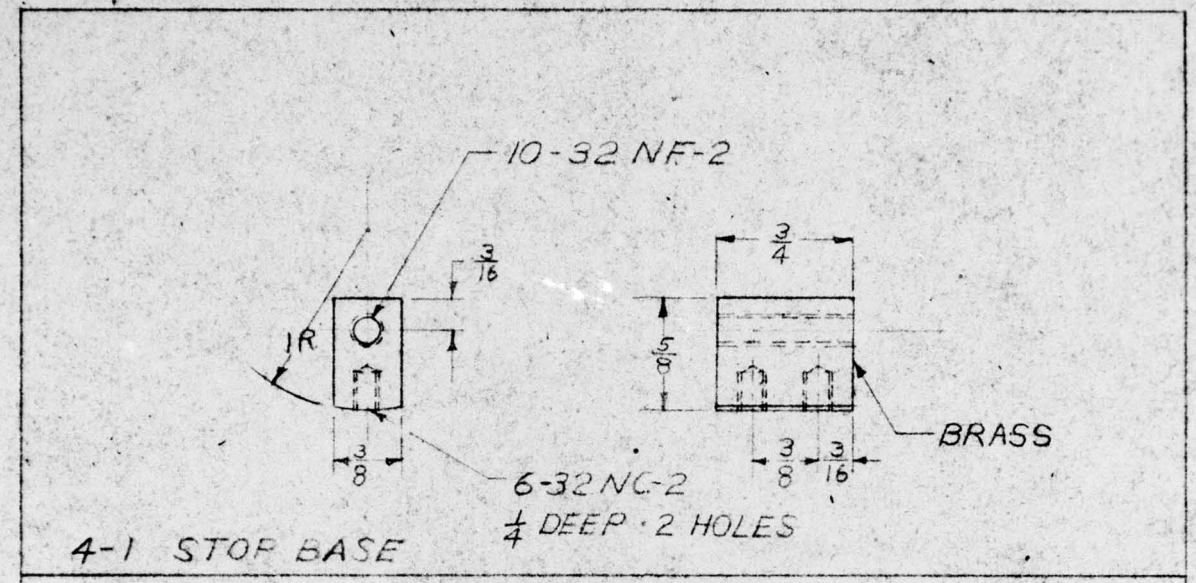
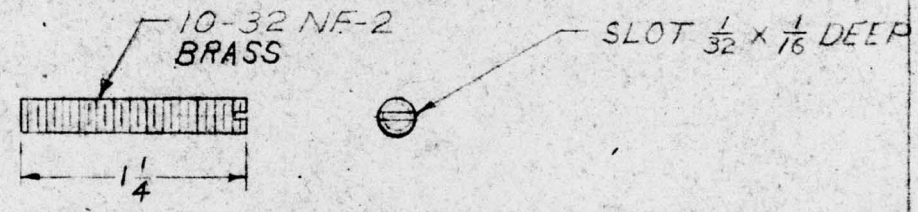


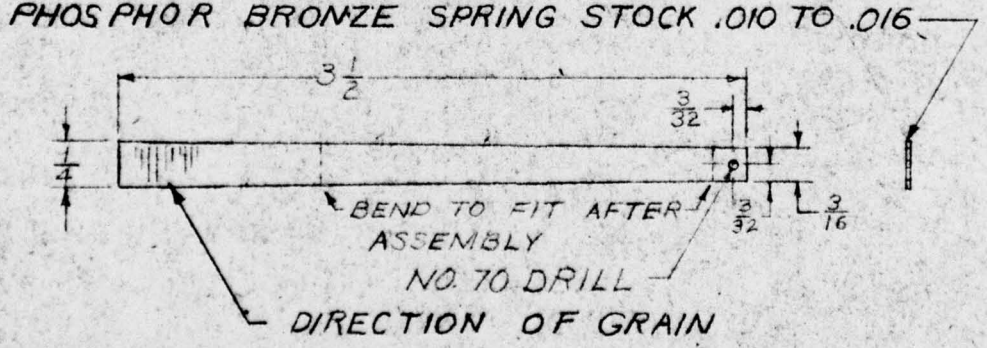
FIGURE 3 ~~ASSEMBLY~~ OC-2B/S BATHYTHERMOGRAPH ASSEMBLY-CROSS SECTION



4-1 STOP BASE



4-2 STOP SCREW



4-3 STYLUS ARM

FIGURE 4 STOP AND STYLUS DETAILS FOR QC-2B/S BATHYTHEROGRAPH