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16 September 1927 NRL Report No.B-1398

NAVY DEPARTMENT
BUREAU OF ENGINEERING

Report

on

Test of Buzzer - Navy Type B-2

Manufactured and Submitted

by

Control Instrument Company,
34 - Thirty-Fourth Street,
Brooklyn, New York.

FR-1398

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D.C.

Number of Pages: Text - 6 Plates - 2.

Authorization: BuEng. ltr. S65-4/L5(7-16-Ds) of 26 July 1937.

Date of Test: August 1937.

Tested by: _____
J.R. Coomes, Sr. Engr. Aide.

Prepared by: _____
W.B.Roberts
Pr. Engr. Aide, Chief of Section.

Reviewed by: _____
R.A. Gano, Lieutenant, USN.

Approved by: _____
H.M. Cooley
Captain, USN, Director.

Distribution:
BuEng. (5)

mts

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APPENDICES

AUTHORIZATION

1. This test was authorized by reference (a) and other references pertinent to this problem are listed as references (b) and (c).

Reference: (a) BuEng.ltr. S65-4/L5(7-16-Ds) of 26 July 1937.
(b) Specifications SCS(65)-103a, Buzzers, Interior Communication, of 1 June 1936.
(c) Manufacturer's Plan N-367.

OBJECT OF TEST

2. The object of this test was to determine how closely the subject buzzer complied with the specifications, reference (b), and its suitability for use in the Naval Service.

ABSTRACT OF TEST

3. The sample buzzer, shown by Plates 1 and 2, was set up at this Laboratory and its performance carefully observed while under test in conformance with the specifications, reference (b). The usual inspection of the buzzer relative to materials, design and workmanship, concluded the test.

CONCLUSIONS

(a) This buzzer, designated as a Navy Type B-2, and manufactured by the Control Instrument Company, 34 Thirty-Fourth Street, Brooklyn, New York, complies with the specifications relative to electrical characteristics and sound output. However, the following deficiencies were noted pertaining to materials and case construction.

(1) Plain enameled wire is used instead of double silk or cotton covered enameled copper wire.
(2) The terminal blocks are not equipped with 9-S-1841-L terminal lugs. A single block mounted in the base of the aluminum chassis would be preferable.
(3) The monel nameplate has been omitted.
(4) A steel diaphragm is used, while that required is "Inconel".
(5) The tapped bosses should be 3/4-inch (IPS) instead of 1/2 inch.
(6) Drain holes have not been provided in the projector, although they are shown on plan, reference (c). Four holes, equally spaced, at least 3/16-inch in diameter, should be provided.
(7) A compression stop has not been provided in the projector to limit the compression of the rubber gasket.

(b) It is noted that the manufacturer's drawing, reference (c), shows proposed changes in materials and mechanical design. The weights and dimensions given under "Test results" would not apply for the proposed design.

(c) It is also noted that the diaphragm gasket is shown on plan as located between spider, piece 11, and diaphragm, piece 10. However, the sample submitted was correctly assembled with gasket between diaphragm and projector, piece 5.

RECOMMENDATIONS

(a) It is recommended that the sample buzzer be approved for Naval use, subject to the correction of the minor deficiencies noted under "Conclusions" of this report.

DESCRIPTION OF MATERIAL UNDER TEST

4. The sample buzzer, designated as Navy Type B-2, and shown by Plates 1 and 2, is designed to operate from a supply of 115 volts, a.c., 60 cycles. It is of the vibrating type, possesses no contacts and produces a note of 120 CPS.

5. The magnetic core is made up of thick iron punchings of "U" shape and on one of its legs rests a form wound single winding.

6. The magnetic core assembly is supported by a cast aluminum chassis which also supports the armature and a phenolic terminal block. The chassis serves as a clamping ring for the diaphragm and diaphragm gasket and is secured to the cover with six fillister head steel machine screws, tapped into the aluminum chassis.

7. The case is of cast aluminum alloy, having two bosses tapped for 1/2-inch terminal tubes and two mounting lugs. A 1/4-inch square rubber gasket, recessed in the rim of the case, is employed to insure watertightness. A flat rubber gasket is provided between the case cover and the diaphragm.

8. The aluminum alloy case cover, of which the projector is a part, is secured with six fillister head 1/4-inch No. 20 machine screws, cadmium plated, equipped with steel lockwashers and used as through bolts.

9. The d.c. resistance of the winding is 167.2 ohms at ambient temperature of 25° C.

10. The diaphragm is of steel 0".0165 thick and 4".50 in diameter and is cadmium plated.

11. Both the case and cover are painted gray inside and outside.

METHOD OF TEST

12. The buzzer, as received, was first tested for power consumption, power factor, and sound output in decibels, at rated voltage and frequency.

13. It was then tested for shock integrity by placing it on a standard Bureau of Engineering shock stand and giving it 20 blows of 250-foot pounds each while mounted in the positions described in Paragraph F-2g(3) of reference (b).

14. The buzzer was tested for endurance by operating it 1400 cycles of one minute of operation, every alternate minute. The first 700 cycles were conducted at an ambient temperature of 70° C and the second 700 cycles at 0° C. The temperature rise of the winding was determined during this test by the resistance method.

15. It was also tested to determine its operating characteristics when energized at 10% under voltage at 65 cycles and 10% over voltage at 55 cycles. Under these conditions, the buzzer was tested for operation when inclined 45° from the vertical in all planes.

16. The insulation resistance was determined by a 1000-volt "megger" and the buzzer was given a dielectric test of 1500 volts, a.c., 60 cycles, applied for one minute between the winding and ground.

17. The test for watertightness was made by placing the buzzer in water to a depth of three feet for a period of twelve hours.

18. Following the salt spray test, an inspection of the buzzer to determine whether the materials, design and workmanship complied with the specifications, concluded the test.

RESULTS OF TEST

19. The test results obtained were as follows:

Requirements	Test Values
Voltage: 115 volts	115 volts.
Current: Alternating	Alternating.
Frequency: 60 cycles	60 cycles.
Watts: Not over 15.	4.75 watts.
Power factor: Not less than 30%	46.41%.
Amperes: Not specified.	0.089.
Temperature rise: Not more than 30° C at ambient temperature of 70° C by resistance method.	14° C rise.
Sound output: Shall be not less than 75 db under conditions specified under paragraph E-5.	81 db, measured 18 feet from the buzzer and on the axis thereof in a sound-proof room, using General Radio noise meter, Type 559.
Pitch of note: 60 to 500 CPS.	120 CPS at 60 cycle input.
Insulation: Shall operate satisfactorily in any plane 45° from vertical at 10% over and 10% under normal voltage.	Buzzer operated satisfactorily under the conditions specified.
Voltage and frequency variations: Shall operate satisfactorily at 103.5 volts at 65 cycles and 126.5 volts at 55 cycles.	Buzzer operated satisfactorily under the conditions specified.

Endurance: Shall operate 700 cycles of one minute one, every alternate minute, at ambient temperature of 70° C and 700 cycles at 0° C.	Buzzer operated satisfactorily throughout the specified test.
Shock integrity: Shall withstand 20 blows of 250-foot pounds each under the conditions specified under paragraph F-2g(3).	Buzzer withstood the required test.
Watertight integrity: No leaks shall occur when placed in water to a depth of 3 feet for a period of 12 hours.	Watertight.
Dielectric: Shall withstand 1500 volts, a.c., 60 cycles, applied between any electrical point and ground for a period of one minute before, and 500 volts, a.c., 60 cycles, following the immersion test.	Satisfactory, no breakdown occurring.
Insulation resistance: Shall be not less than 10 megohms between any electrical point and ground following the dielectric test, and 1 megohm following the immersion test.	Following dielectric and immersion tests - 200 megohms by 1000-volt megger.
Total weight: Shall not exceed 5 pounds.	3 pounds, 2 ounces.
Windings: Shall be of double silk or cotton covered enameled copper wire.	* Plain enameled copper wire.
Terminal block and terminals: Shall be of phenolic material equipped with 9-S-1841-L terminals	* Terminal block is of sheet phenolic material but is not equipped with 9-S-1841-L terminals.
Nameplate: Specifications 17N1.	* None furnished.
Painting: One priming coat of zinc chromate paint followed with two coats of aluminum paint prior to the finishing coat.	Complied with.
Salt spray test: Paragraph F-2e.	* Satisfactory except for steel diaphragm which showed pitting.

* Denotes non-compliance with the specifications.

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Diaphragm material: Inconel.	* Steel, cadmium plated, 0".0165 x 4".50 diameter.
Armature material: Not specified	Steel.
Dimensions: Not specified.	Maximum diameter - 6".25 Maximum depth - 4".25

* Denotes non-compliance with the specifications.

CONCLUSIONS

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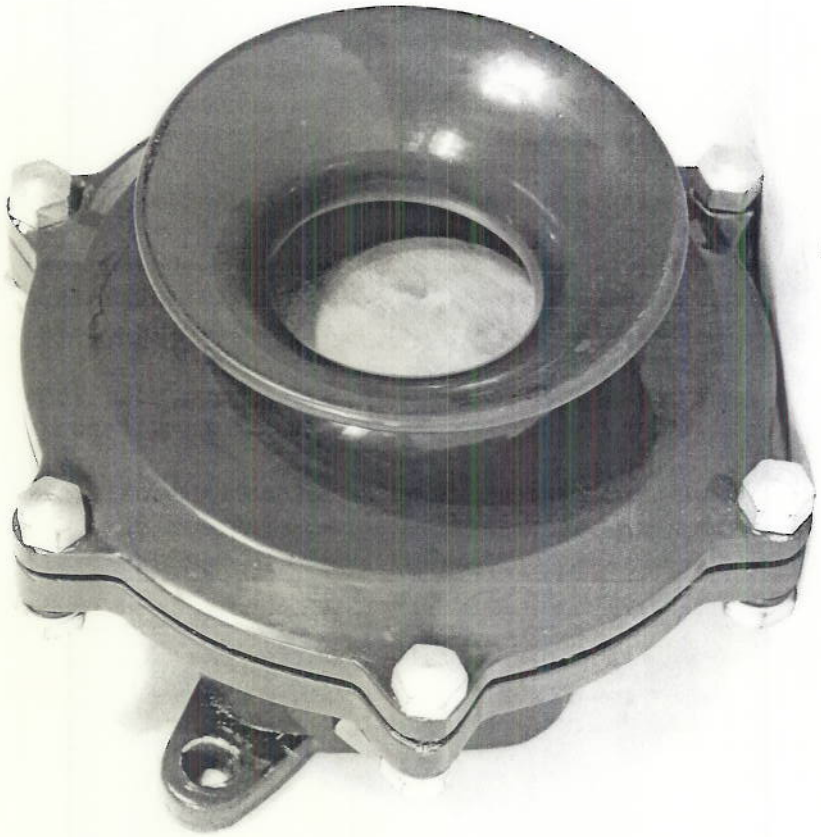

Plate 1

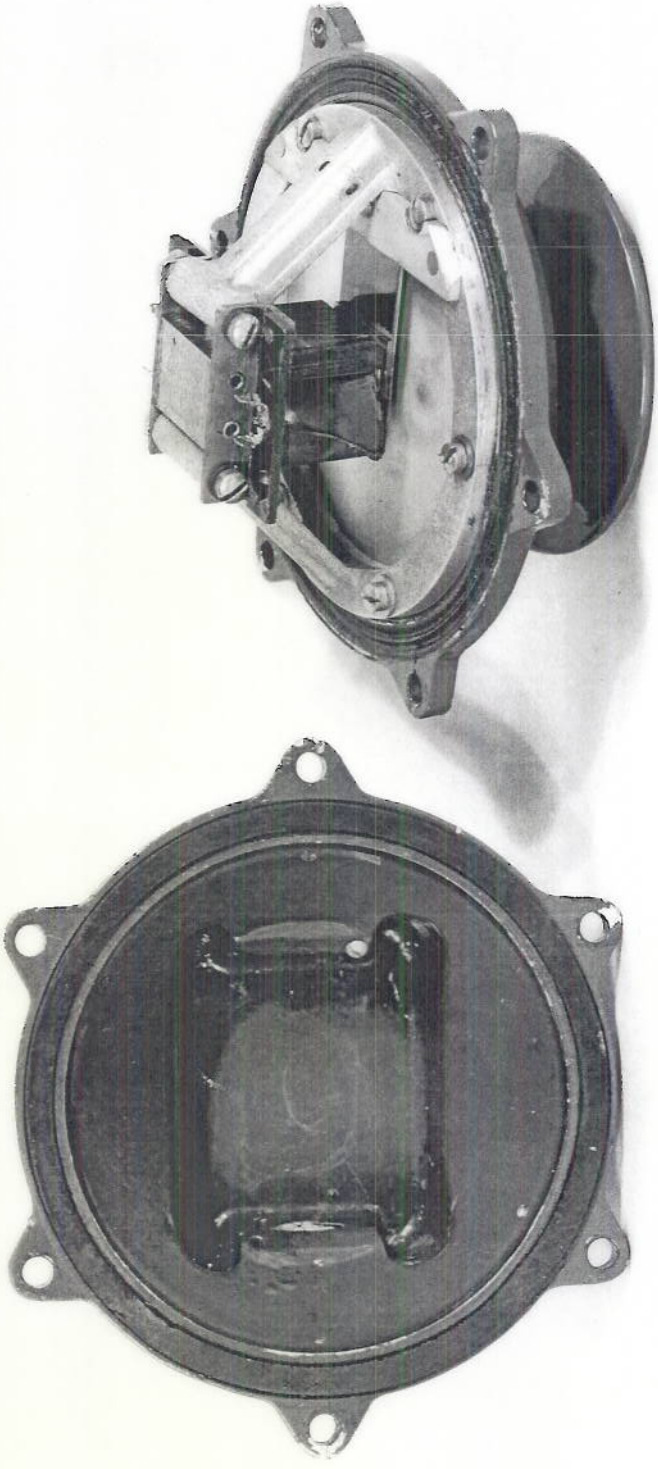

Plate 2