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NAVY DEPARTMENT
BUREAU OF ENGINEERING

FR-1330

Report of Test

on

Buzzer, Navy Type B-1

Submitted by

Bendix Marine Products Company

Brooklyn, New York.

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D.C.

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14 November 1936.
Date of Test: November and December 1936.
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APPENDICES

Buzzer, fully assembled	Plate 1
Buzzer, unit removed from case ...	Plate 2

AUTHORIZATION FOR TEST

1. This test was authorized by reference (a) and another reference pertinent to this problem is listed as reference (b),

- Reference: (a) BuEng. ltr. S65-4/L5 (11-2-Ds) of
14 November 1936.
(b) Specifications SGS(65)-103a, Buzzers,
Interior Communication, of 1 June 1936.

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 the Naval service.

ABSTRACT OF TEST

3. The subject buzzer, as received, was set up at this Laboratory in suitable test circuits and carefully checked for conformance with the specifications, after which it was inspected for suitability in design, and quality of workmanship and materials.

Conclusions

(a) The subject buzzer, submitted as a Navy type B1, and manufactured by Bendix Marine Products Company, Brooklyn, New York, complies with the specifications, reference (b), but for the following requirements:

- (1) The power consumption of the buzzer is 24.73 watts. The maximum allowable is 15 watts.
- (2) The amplitude of motion of the movable contact is approximately 0!025. The specifications require an amplitude of 0!093.
- (3) The maximum allowable weight of 5 pounds is exceeded by 2 ounces.
- (4) No nameplate has been provided, and raised and stamped lettering has been substituted.
- (5) Threaded steel inserts have not been provided for the screws securing the chassis and diaphragm to the case cover.
- (6) Drain holes have not been provided on the case cover at the lowest point of the recess. Four 0!125 holes, equally spaced, should have been drilled in the cover.
- (7) There is insufficient clearance between the armature and the form wound coil. At present, the armature strikes the coil once the buzzer is energized.
- (8) There is no evidence to indicate that the case has been painted with zinc chromate and aluminum paints prior to the finish coat of gray paint.
- (9) The fixed resistor, shunting the contacts, should be so located that a greater clearance is provided between it and ground.

(b) The salt spray test was not conducted as the case is identical to that employed in the manufacturer's type B2 buzzer, which was recently subjected to the required test. An inspection of this unit, after having been washed in fresh water and dried, showed that corrosion had started at most points where there were sharp edges on the case. In addition, the "Glyptal" coated blue steel diaphragm had begun to corrode. The corrosion of the stamped spaces show that the method used is not a satisfactory substitute for a nameplate. This case is being delivered to the Bureau for inspection.

Recommendations

(a) In view of the good workmanship and of its satisfactory performance during the entire period of the test, it is recommended that the subject buzzer be approved for Naval use subject to the correction of the deficiencies noted under "Conclusions," herein.

(b) It is further recommended that the Bureau consider the waiving of the $3/32$ -inch amplitude of motion of the movable contact requirement, as the buzzer required no adjustments during the entire period of the test.

(c) It is also recommended that the Bureau consider waiving the maximum power consumption requirement in this instance, as this is the first sample B1 buzzer tested under specifications, reference (b), and it is doubtful whether the required sound output of 75 decibels could be obtained in this type of device with less power.

DESCRIPTION OF MATERIAL UNDER TEST

4. The subject buzzer, shown by Plates 1 and 2, was manufactured by the Bendix Marine Products Company, Brooklyn, New York, as a Navy type B1-115 volts, direct current, low pitch, high intensity buzzer.

5. It is of the vibratory type, employing a set of contacts for interrupting the current. The contacts are shunted with a 2000-ohm fixed resistor to reduce the arcing.

6. The buzzer mechanism is mounted on a steel chassis, secured to a cast aluminum alloy case cover, incorporating a "V" edge, with six 10-32 fillister head steel screws. The unit is of watertight construction, employing a 1/4-inch square rubber gasket recessed into the rim of the case. The cover is so designed that the compression of the gasket is limited. Six fillister head screws, cadmium plated, and equipped with nuts and washers, secure the cover to the case. The projector is cast integral with the case cover which has raised letters and stamped spaces for identification. The chassis serves as a clamping ring for the diaphragm and diaphragm rubber gasket.

7. The case is provided with four mounting lugs and two bosses, one tapped for a standard 3/4-inch terminal tube.

8. The stationary part of the magnetic circuit is made up of a laminated core, "W" shaped, on which rests a single form wound coil. The armature is mounted on a supporting steel spring and linked to the formed steel diaphragm by means of a bolt.

9. The contacts are adjustable and are actuated by the armature bolt which locks to the diaphragm. The "W" shaped core assembly is supported by three steel studs riveted to the chassis. The studs are threaded, and with the use of two machine nuts, located on each of the studs, the air gap between the core and the armature can be regulated.

10. The steel diaphragm is painted with a red material which appears to be a "Glyptal" lacquer. The case and cover are painted gray internally and externally.

11. The d.c. resistance of the winding is 65.5 ohms at an ambient temperature of 40°C. (104° F.).

12. A right angle brass bracket secured to the chassis supports a terminal block of phenolic material equipped with 9-S-1841-L terminal lugs.

13. All steel parts used in the construction of the buzzer, with the exception of the diaphragm, are cadmium plated.

METHOD OF TEST

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

15. It was next placed on a Bureau of Engineering shock stand and given 20 blows of 250-foot pounds each while mounted in the positions outlined in paragraph F-2g(3) of reference (b).

16. Following this, without having made any adjustments, it was tested for endurance by operating it 1400 cycles of one minute duration 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 obtained during the first part of the test, using the resistance method.

17. The buzzer was next tested for operation when inclined 45 degrees from the vertical in all planes and energized at 10 per cent over and 10 per cent under rated voltage.

18. The insulation resistance was determined with the use of a 1000-volt megger and the buzzer was given a dielectric strength test of 1500 volts a.c., 60 cycles, applied for one minute between all electrical parts and ground.

19. Its watertight integrity was determined by placing the buzzer in water to a depth of three feet for a period of twelve hours.

20. The salt spray test was omitted for reasons stated under "Conclusions" of this report.

21. The test was concluded with an inspection of the buzzer pertaining to the quality of workmanship and suitability of design and materials.

RESULTS OF TEST

22. The test results obtained were as follows:

<u>Requirements</u>	<u>Test Values</u>
Voltage: 115 volts.	115 volts.
Current: Direct.	Direct.

<u>Requirements</u>	<u>Test Values</u>
Amperes: Not specified.	0.215 amperes.
Watts: Not over 15.	24.72 watts* (IE).
Temperature rise: Not over 30°C. at ambient of 70°C. by resistance method.	28.23°C. rise.
Sound output: Shall be not less than 75 db. under the conditions specified under par. E-5.	78 db. measured 18 feet from the buzzer and on the axis thereof in a soundproof room, using a General Radio noise meter, type 559.
Pitch of note: 60 to 500 CPS.	350 CPS.
Inclination: Shall operate satisfactorily in any plane 45° from the vertical at 10% over and 10% under rated voltage.	Buzzer operated satisfactorily under the conditions specified under par. F-2h(2).
Endurance: Shall operate satisfactorily 700 cycles of one minute on every alternate minute at an ambient temperature of 70°C. and 700 cycles at 0°C.	Satisfactory operation throughout the specified test. The buzzer also operates satisfactorily at an ambient temperature of -10°C.
Shock integrity: Shall withstand 20 blows of 250-foot pounds each under the conditions specified in par. 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.	Satisfactory, no leaks occurring.
Dielectric: Shall withstand 1500 volts a.c., 60 cycles, applied between any electrical point and ground for a period of one minute, and 500 volts a.c., 60 cycles, following the immersion test.	Satisfactory, no breakdowns occurring.

Requirements

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.

Adjustment of contacts: Amplitude of motion of moving contact shall be not less than 3/32-inch.

Salt spray test: Specified under par. F-2e.

Total weight: Shall not exceed 5 lbs.

Terminal block: Shall be of molded phenolic material equipped with 9-S-1841-L terminals.

Nameplate: Corrosion resisting steel, or phenolic material when specifically approved.

Tap bolts in aluminum: Bolts shall be threaded into screwed-in steel bushings.

Diaphragm material: Not specified.

Dimensions: Not specified.

Windings: Shall be of double silk or cotton covered enamel wire.

Test Values

Following dielectric test: 200 megohms.

Following immersion test: 100 megohms.

0V025* (approximately)

Test omitted for reasons stated under "Conclusions" herein.

5 lbs. 2 oz.*

Material furnished as specified.

None furnished, raised lettering substituted.*

Machine screws threaded into aluminum to secure chassis to cover.

Steel, 0V023 x 4V875 diameter.

Maximum diameter - 7V125
Maximum depth - 5V25

Double silk magnet wire.

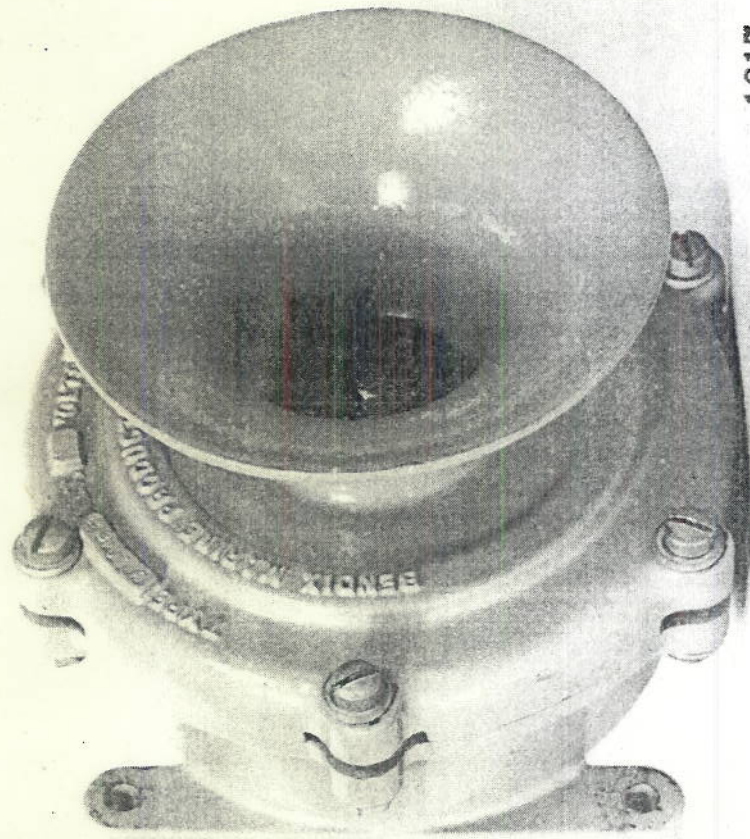
* Denotes failure to comply with the specifications.

CONCLUSIONS

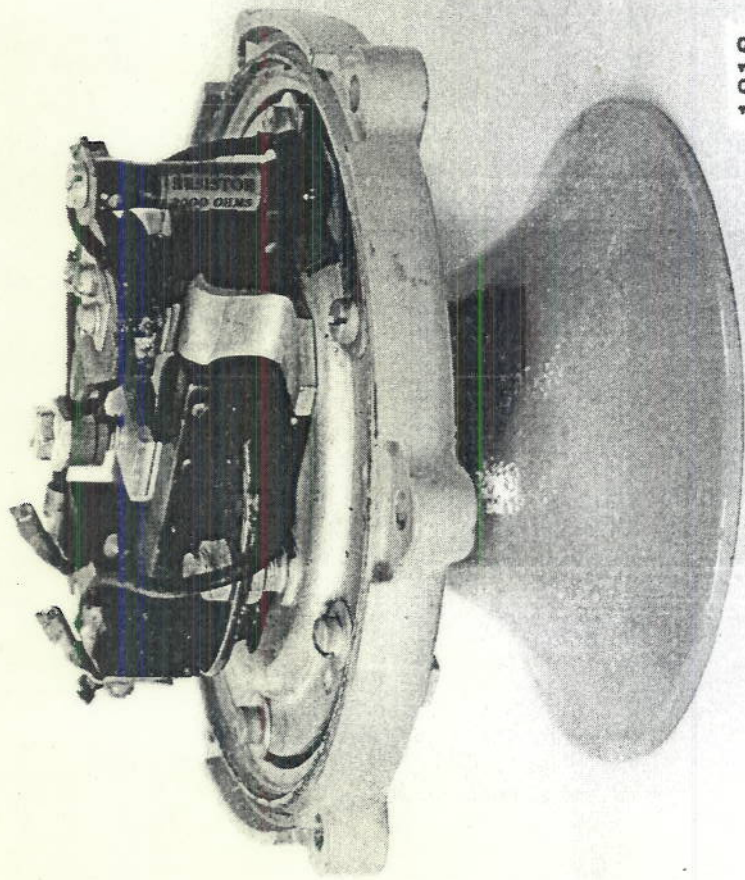
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