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NRL Report No. B-1290

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NAVY DEPARTMENT  
BUREAU OF ENGINEERING

Report on

Test of Buzzer - Navy Type B-2  
Manufactured and Submitted  
by  
C.V. McBroom  
DesPlaines, Illinois

NAVAL RESEARCH LABORATORY  
ANACOSTIA STATION  
Washington, D.C.

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Date of Test: July 1936.  
Tested by: J.S. Bryant, Sr. Engr. Aide  
Prepared by: W.B. Roberts, Pr. Engr. Aide,  
Chief of Section.  
Reviewed by: J.A. McNally, Lieut., USN  
Approved by: H.M. Cooley, Captain, USN  
Director  
Distribution: BuEngr.(5)

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## AUTHORIZATION

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

Reference: (a) BuEng.let. S65-4/L5(6-19-Ds) of 7/9/36.  
(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 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 Navy Type B-2, and manufactured by C.V. McBroom, Des Plaines, Illinois, complies with the requirements of the specifications, reference (b), concerning electrical characteristics and sound output. During the test and under inspection, however, the following deficiencies were noted:

- (1) Under test for watertight integrity, the case leaked 40 cc of water, the leak occurring around the screws securing the chassis and diaphragm. For this reason, the dielectric and insulation resistance tests following immersion were not conducted.
- (2) Single silk covered enameled copper wire is used for the winding instead of double silk enameled wire as required.
- (3) As noted under test results, the case has not been painted as required.
- (4) Brass machine screws are threaded into the aluminum chassis and brass pipe plugs are furnished for the bosses in the aluminum case, contrary to the requirement concerning dissimilar metals. Also, the steel screws and armature contacting the aluminum chassis should be zinc coated instead of copper plated.
- (5) No drain holes have been provided in the case cover. Four (4) 1/8" holes, equally spaced, are required.
- (6) Although the diaphragm is painted, the paint does not appear to be of a quality that would satisfactorily protect the diaphragm from corrosion. "Glyptal" lacquer or its equivalent, should have been used.
- (7) It is noted that the terminal block which is made of sheet phenolic material is fractured in several places. Molded material would be preferable.

## Recommendations

- (a) Inasmuch as this buzzer complies with the specifications concerning electrical characteristics, sound output and endurance, it is recommended that it be approved for Naval use, subject to correction of deficiencies, noted under "Conclusions" of this report.
- (b) In the event that recommendation (a) is concurred in by the Bureau, it is recommended that a sample buzzer, embodying the corrections desired, be forwarded to this Laboratory for inspection and suitability tests prior to the acceptance of any on order or contract.
- (c) It is further recommended that the Bureau consider the advisability of having the case cover and projector cast integral of aluminum alloy, using steel inserts for the screws securing the chassis to the case cover. In order to insure watertightness, these screws and inserts should not penetrate the cover. The manufacturer stated on a visit to this Laboratory, during a period of this test, that his latest modification included such a change and that he had discussed it with the Bureau.

## 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 circuit is made up of thick iron punchings of "U" shape and on one of its legs rests a form wound single winding. The distance between the poles of this assembly and the armature is adjustable due to the elongated holes where the securing screws are located.

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 round head brass machine screws tapped into the aluminum chassis.

7. The case is of cast aluminum alloy, having two bosses, tapped for standard 3/4" terminal tubes and two mounting lugs. A flat rubber gasket, placed between the case and cover, is employed to insure watertightness.

8. The case cover is of cast BE metal and the projector is of formed steel, copper plated. Eight (8) round head brass machine screws, equipped with steel lockwashers and used as through bolts, secure the cover to the case.

9. The total d.c. resistance of the winding is 185.5 ohms at ambient temperature of 26.7°C.

10. The diaphragm is of steel, 0.015 thick and 4.50 in diameter. It is finished in black.

11. A nameplate of corrosion resisting steel, having etched markings, is secured to the side of the case with two steel drive pins.

12. The case and cover are painted gray on the outside but are unpainted on the inside.

## METHOD OF TEST

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

14. It was then tested for its 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).

15. The buzzer was next 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.

16. It was then 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.

17. 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.

18. The test for watertightness was made by placing the buzzer in water to a depth of three feet for a period of twelve (12) hours.

19. The usual inspection of the buzzer to determine whether the materials, design and workmanship complied with the specifications concluded the test.

#### RESULTS OF TEST

20. The test results obtained were as follows:

<u>Requirements</u>	<u>Test Values</u>
Voltage: 115 volts	115 volts.
Current: Alternating	Alternating.
Frequency: 60 cycles	60 cycles.
Watts: Not over 15.	9.0 watts.
Power Factor: Not less than 30%.	47.42%.
Amperes: Not specified.	0.165 amps.
Temperature Rise: Not more than 30°C at ambient temperature of 70°C by resistance method.	22.51°C rise.
Sound Output: Shall be not less than 75 db under conditions specified under paragraph E-5.	82 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 cycles input.
Insulation: Shall operate satisfactorily in any plane 45° from vertical at 10% over and 10% under normal voltage.	Buzzer operated satisfactorily under conditions specified.

Voltage and frequency variations: Shall operate satisfactorily at 103.5 volts at 65 cycles and 126.5 volts at 55 cycles.

Endurance: Shall operate 700 cycles of one minute on, every alternate minute, at ambient temperature of 70°C and 700 cycles at 0°C.

Shock integrity: Shall withstand 20 blows of 250 foot pounds each under conditions specified under paragraph F-2g(3).

Watertight integrity: No leaks shall occur when placed in water to a depth of 3 feet for a period of 12 hours.

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.

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.

Total Weight: Shall not exceed 5 pounds.

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

Terminal Block and Terminals: Shall be of phenolic material equipped with 1841-L terminals.

Nameplate: Corrosion resisting steel, specifications 47S20 or phenolic material when specifically approved.

Painting: One priming coat of zinc chromate paint followed with two coats of aluminum paint prior to finishing coat.

Buzzer operated satisfactorily under conditions specified.

Buzzer operated satisfactorily throughout the specified test.

Buzzer withstood the required test.

\*Case leaked 40 cc of water, the leak occurring around screws securing the chassis and diaphragm.

Satisfactory, no breakdown occurring before immersion.

\*Test not conducted following immersion due to leak in case.

Following dielectric test: 200 megohms by 1000 V. Megger.

\*Test not conducted following immersion due to leak in case.

3 pounds, 10 ounces.

\*Single silk covered enameled copper wire.

Terminal block is of sheet phenolic material equipped with 1841-L terminals.

Nameplate of corrosion resisting steel with etched lettering furnished.

\*No paint used on inside of case and no zinc chromate or aluminum paint used on any part of case.

\*Denotes non-compliance with the specifications.

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

Diaphragm Material: Not specified.

Armature Material: Not specified.

Dimensions: Not specified.

\*Brass screws threaded into  
aluminum chassis used to com-  
press diaphragm gasket.

Steel, finished in black,  
0.015 x 4.50 diameter.

Steel, copper plated.

Width..... 5.875

Height.... 5.875

Depth..... 4.125

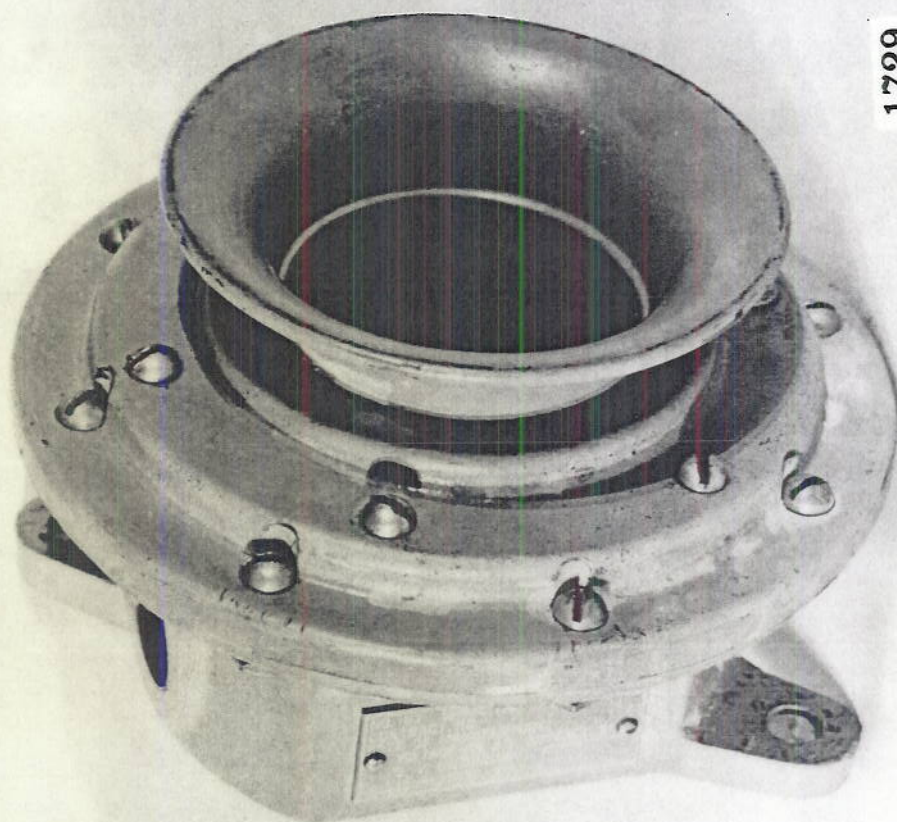
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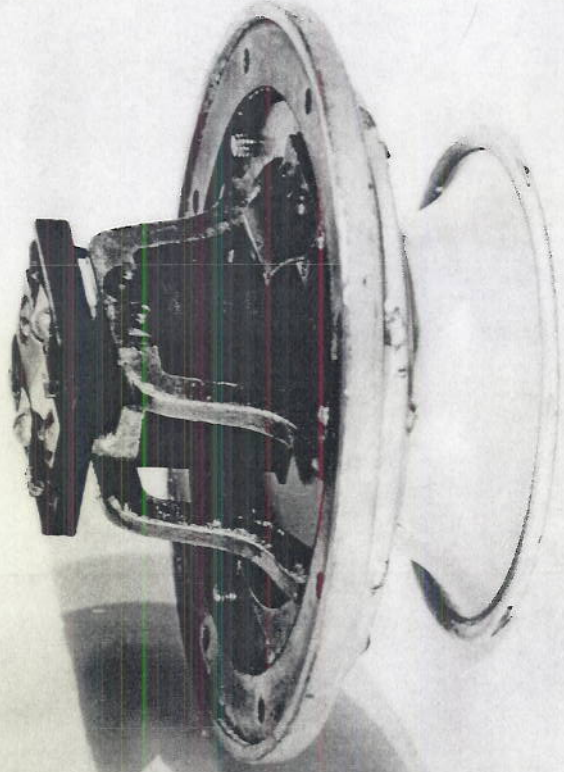
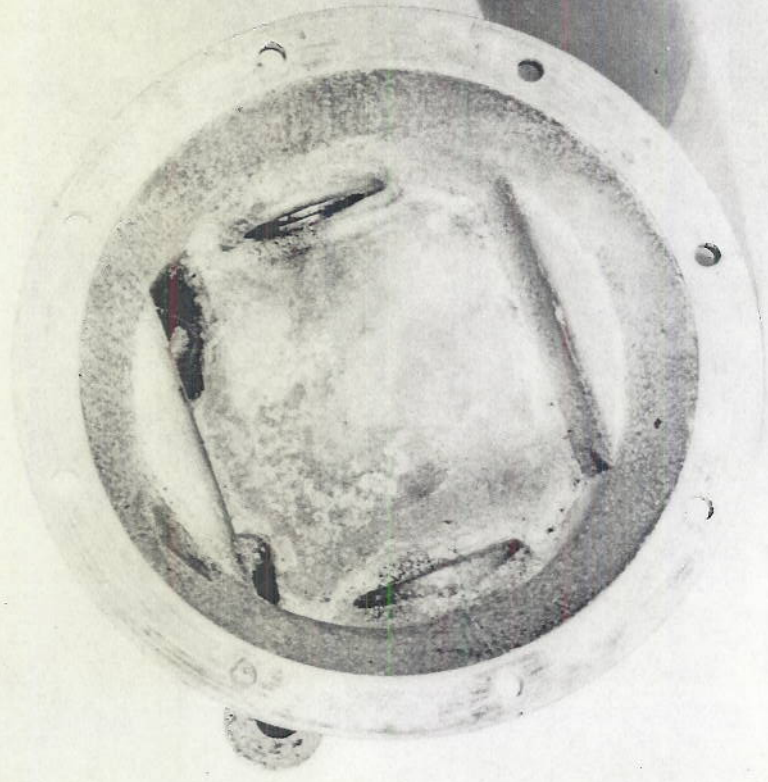
## CONCLUSIONS

21. This buzzer, designated as Navy Type B-2, and manufactured by C.V. McBroom, Des Plaines, Illinois, complies with the requirements of the specifications, reference (b), concerning electrical characteristics and sound output. During the test and under inspection, however, the following deficiencies were noted:

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