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NAVY DEPARTMENT  
BUREAU OF ENGINEERING  
WASHINGTON, D.C.

Report on  
Test of Buzzer - Navy Type B-2  
submitted by  
Batteryless Telephone Company  
Pittsburgh, Penna.

FR-1333

NAVAL RESEARCH LABORATORY  
ANACOSTIA STATION  
WASHINGTON, D.C.

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Authorization: Bu.Eng. ltr. S65-4/L5(11-12-Ds) of 14 November 1936.  
Date of Test: November and December, 1936.  
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APPENDICES.

Photograph of buzzer assembled in watertight case.....	Plate 1
Photograph of buzzer removed from watertight case .....	Plate 2

AUTHORIZATION.

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

Reference: (a) Bu.Eng. ltr. 565-4/15(11-12-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 use in the Naval Service.

ABSTRACT OF TEST.

3. The subject buzzer, shown by Plates 1 and 2, was set up at this Laboratory, in suitable test circuits, and its performance carefully observed while under test in conformance with the specifications, reference (b), conducted in the specified order. The test was concluded with the usual inspection of the buzzer to determine whether the material submitted was in strict accordance with the specifications in the matter of materials, design, and workmanship.

CONCLUSIONS.

(a) The subject buzzer, under test for conformance with the specifications, reference (b), failed to meet the following requirements:

- (1) The temperature rise of the winding, obtained during the first part of the endurance test, at an ambient temperature of 70° C., was 48.5° C. The maximum allowable is 30° C.
- (2) The buzzer failed to withstand the required dielectric test of 1500 V.A.C., 60 cycles, failure occurring between the form wound coil and the core, due to faulty insulation.
- (3) The insulation resistance, following the dielectric test, by 1000 volt megger, was zero. The minimum allowable is ten megohms.
- (4) The terminal block is not equipped with 9-S-1841-L terminals as required.
- (5) No nameplate has been provided.
- (6) The steel diaphragm is not protected against corrosion. Two coats of a "Glyptol" lacquer, or its equivalent, should have been used. Diaphragms, generally used on this type of buzzer, vary from 0.015 to 0.025, while this buzzer is provided with a diaphragm 0.032 in thickness.
- (7) The case and cover are not protected with the required coats of paints.
- (8) The magnet core, armature, and steel mounting screws, are not protected against corrosion.
- (9) The case mounting lugs should be re-located in order to facilitate the installation of the buzzer.

RECOMMENDATIONS.

(a) The subject buzzer, as at present manufactured, does not comply with the specifications. Therefore, it is recommended, that approval of the same be withheld until such time as the manufacturer submits a sample buzzer, having none of the defects, noted under "Conclusions" herein, and fully complying with the specifications.

#### DESCRIPTION OF MATERIAL UNDER TEST.

4. The sample buzzer, submitted as a 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 consists of thick iron punchings of "U" shape. On one of the poles, rests a form wound coil. The armature, made of spring steel, 1/16 inch thick and 1 inch in width, completes the magnetic circuit.

6. The magnetic core assembly is supported by a cast aluminum chassis, which also supports the armature and a 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 #6-32 steel screws, equipped with steel lockwashers. The securing screws thread into steel inserts.

7. The case and cover are of cast aluminum alloy, having two bosses, tapped for 3/4" terminal tubes, and two mounting lugs. A flat leather gasket is used between the case and cover to insure watertightness. Eight fillister head #10-24 steel machine screws, equipped with nuts and lockwashers, and used as through bolts, secure the cover to the case.

8. The D. C. resistance of the form wound coil, at an ambient temperature of 40° C. is 209 ohms.

9. The diaphragm is of blue steel, 0.032 thick and 4.375 in diameter.

10. The case and cover are unpainted and the buzzer weighs approximately 3 pounds.

#### METHOD OF TEST.

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

12. It was then placed on a Bureau of Engineering shock stand and tested for its shock integrity by applying 20 shocks of 250 foot pounds each while mounted in the positions required under paragraph F-2g(3) of reference (b).

13. Then followed the test for endurance, accomplished by operating the buzzer 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 obtained during the first 700 cycles of operation by the resistance method.

14. The buzzer was next 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, it was tested for operation when inclined 45° from the vertical in all planes.

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

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

17. The salt spray test was not conducted, as the case and cover are unpainted.

18. The usual inspection of the buzzer, pertaining to the quality of workmanship, and suitability of design and materials, concluded the test.

#### RESULTS OF TEST.

19. The test results obtained, follow:

<u>REQUIREMENTS</u>	<u>TEST VALUES</u>
Voltage: 115 volts	115 volts
Current: Alternating	Alternating
Frequency: 60 cycles	60 cycles
Watts: Not over 15	14 watts
Power Factor: Not less than 30%	58%
Amperes: Not specified	0.210 amperes
Temperature rise: Not more than 30° C. at ambient temperature of 70° C. by resistance method.	*48.5° C. rise by resistance method, obtained during first 700 cycles of endurance test.
Sound Output: Not less than 75 db. under conditions specified under para. E-5.	78 decibels, measured 18 feet from the buzzer and on the axis thereof in a soundproof room, using General Radio Noise Meter, Type 559.
Pitch of note: 60 to 500 CPS.	120 CPS at 60 cycle input.

REQUIREMENTS

TEST VALUES

Inclination: Shall operate in any plane 45° from vertical at 10% over and 10% under rated voltage.

Complied with.

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

Complied with.

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

Complied with.

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

Complied with.

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

Complied with.

Dielectric: Shall withstand 1500 v.a.c., 60 cycles, applied between any electrical point and ground for a period of one minute, and 500 v.a.c., 60 cycles, following the immersion test.

\*Broke down at 1500 V.A.C., 60 cycles between coil and ground.

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 test, zero resistance by 1000 V. megger.

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

\*Test omitted as case was unfinished.

Total weight: Shall not exceed 5 pounds.

3 pounds.

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

\*Terminal block not equipped with 9-S-1841-L terminals.

Nameplate: Specified under para. E-11.

\*None furnished.

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

Threaded steel inserts provided in case cover for chassis mounting screws.

REQUIREMENTS

Diaphragm material: Not specified.

Dimensions: Not specified.

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

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

\*Denotes failure to comply with the specifications.

TEST VALUES

Blue steel, 0.032 x 4.375.

Max. diameter .. 5.625

Max. depth ..... 3.625

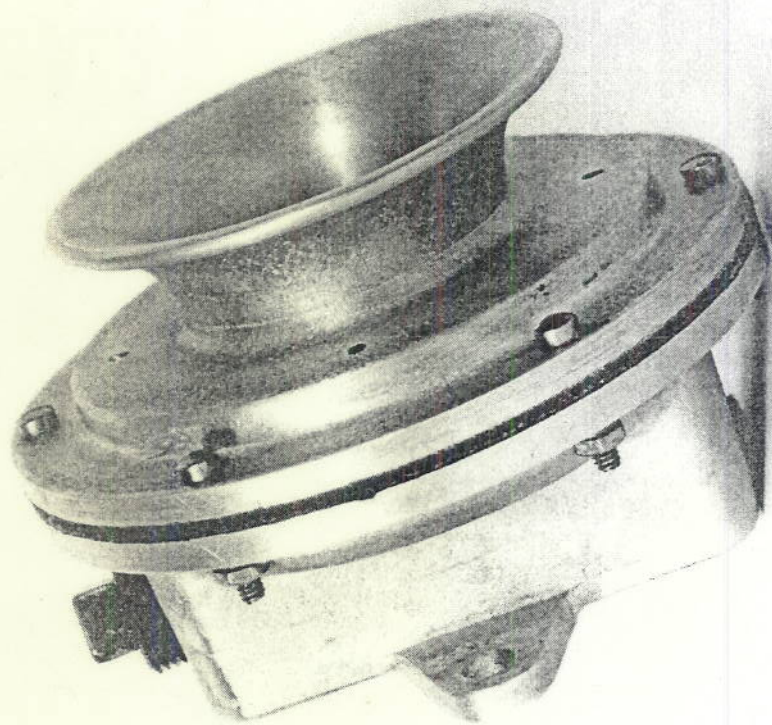
Silk covered enamel wire.

\*Not painted.

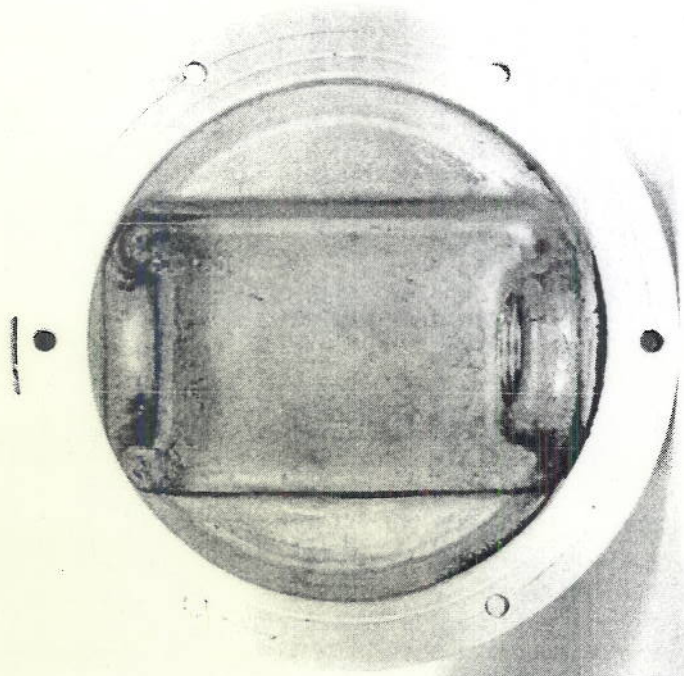
## CONCLUSIONS.

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1815



1816

