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NRL Report No. B-1674

NAVY DEPARTMENT

Report of Test

on

Motor Boat Horns, Type H5

Submitted by

Benjamin Electric Manufacturing Company

Des Plaines, Illinois.

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D. C.

FR-1674

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TABLE OF CONTENTS

<u>SUBJECT</u>	<u>PAGE</u>
Authorization for Test	1
Object of Test	1
Abstract of Test	1
(a) Conclusions	1 a
(b) Recommendations	1 b
Description of material	2
Method of Test	2
Results of Test	2
Conclusions	7

APPENDICES

Photostat of Acoustical Analysis of sample horns	Plate	1
Photograph of sample horns		2

AUTHORIZATION FOR TEST

1. This test was made in accordance with a provision in contract, reference (a), and other references pertinent to this problem are listed as references (b), (c), (d), and (e).

Reference: (a) Contract NOc-76157 of 26 July 1940.
(b) Specification 17811c of 1 May 1940
(c) Benjamin Electric Mfg. Co. Drwg. 191500
(d) NRL Report No. B - 1668 of 23 November 1940.
(e) NRL Ltr. S63-4/15/EN24-9/NOc-76157 of 13
December 1940 to INM, Chicago, copy to
BuShips (covering tests for contract suitability)

OBJECT OF TEST

2. The object of this test was to determine qualification of the sample horns under specification, reference (b), and their suitability for Naval use. Tests for contract suitability were reported by reference (e).

ABSTRACT OF TEST

3. The sample horns were set up at this Laboratory in suitable test circuits where their performance was carefully observed for compliance with the specification. An inspection of the sample to determine compliance in the matter of materials, design, and workmanship, concluded the test.

Conclusions.

(a) The subject horns, manufactured by Benjamin Electric Manufacturing Company, Des Plaines, Illinois, as Navy type H-9, fully comply with the specification, reference (b).

Recommendations

(a) It is recommended that the subject horns be approved for Naval use.

DESCRIPTION OF MATERIAL UNDER TEST

4. The two sample horns, submitted by Benjamin Electric Manufacturing Company, are identical in design and operate from a supply of 6 volts direct potential. Contacts are employed for interrupting the circuit.

5. The mechanism is enclosed in a watertight cast bronze case having a boss tapped for a 3/4 inch (IPS) terminal tube and two (2) mounting lugs cast integral with the case.

6. Further details are shown by drawing, reference (c), and photograph, Plate 2.

METHOD OF TEST

7. The sample horns, following tests to determine their electrical and acoustical characteristics at rated voltage, were subjected to further tests in the following order:

- (a) Inclination
- (b) Endurance and temperature rise
- (c) Shock
- (d) Vibration
- (e) Dielectric
- (f) Insulation resistance
- (g) Watertightness.

8. The tests were concluded with a careful examination of the samples to determine compliance with the specifications pertaining to design and quality of workmanship and materials and any defects resulting from the tests.

RESULTS OF TEST

9. The test results obtained were as follows:

<u>Requirements</u>	<u>Test Values</u>	
	<u>No. 1</u>	<u>No. 2</u>
Voltage: 6 volts, direct potential.	6 volts	6 volts
Amperes: Not specified	1.9 amperes	1.45 amperes
Watts: Shall not exceed 50 watts	10.4 watts	8.7 watts
Sound pressure output: Shall be not less than 85 decibels at 18 feet in a soundproof room.	Complied. 91 db total noise	Complied. 94 db total noise.

RequirementsTest Values

	<u>No. 1</u>	<u>No. 2</u>
Pitch of note: 100 to 600 C.P.S.	Complied See Plate 1	Complied. See Plate 1.
Inclination: Shall operate in any position when supplied with rated voltage \pm 10 per cent.	Complied	Complied
Endurance test: Shall operate 9000 cycles of "one second on" and "one second off," the first 4500 cycles at 60° C. and the second at 0° C. ambient temperatures.	Complied	Complied.
Temperature rise: Maximum temperature shall not exceed 115° C. during the endurance test. (55° C. rise at 60° C. ambient temperature.)	Complied 29.4° C above 60° C. ambient.	Complied 17.6° C above 60° C. ambient
Shock test: Shall withstand 20 shocks of 250 foot pounds each as specified in paragraph F-2g.	Complied	Complied
Vibration test: Shall be mounted on a standard Navy 3 foot pound vibration machine and subjected to six tests of 30 minutes each at 100, 150, 200, 250, 300 and 350 shocks per minute	Complied	Complied
Dielectric test: Shall withstand 500 volts, 60 cycles, for one minute between electrical circuits and between electrical circuits and ground.	Complied	Complied
Insulation resistance: Shall be not less than 1 megohm at not less than 500 volts, d.c.	Complied 100 megohms by 500 volt megger	Complied 100 megohms by 500 volt megger
Watertight integrity: Shall be submerged under 3 feet of standard sea water for a period of 3 hours without the entry of water into the case.	Complied	Complied.

Requirements

Test Values

	<u>No. 1</u>	<u>No. 2</u>
Salt spray test: Shall be subjected, under ultra-violet light, to a 20 per cent salt spray at 55° C. for a period of 3 minutes, followed by an air blast at 55° C. for 3 minutes, the cycle being repeated continuously for 100 hours.		Not conducted due to previous satisfactory test on samples having identical cases and finish, reported by reference (d).
Weight: Shall not exceed 8 pounds.	Complied. 6 pounds 13 ounces.	Complied. 6 pounds 13 ounces.
Nameplate: Shall be in accordance with N. D. Specification 42N2.	Complied. Engraved copper-nickel alloy	Complied. Engraved Copper-nickel alloy
Dissimilar metals: Contact of dissimilar metals, except steel, with aluminum alloys shall be avoided as much as practicable in the assembly of parts. Where contact cannot be avoided, an approved spar varnish or other approved material shall be used between the faying surfaces.	Complied	Complied.
Protection against corrosion: All aluminum surfaces shall be protected with one coat of zinc chromate paint, or an approved anodic treatment, over which finishing coats of approved gray paint shall be applied.	Complied	Complied
Protection of exterior surfaces: Exterior surfaces of all equipment, except nameplates, diaphragms, gongs, and strikers, shall be finished with two coats of gray paint specifically approved by the bureau concerned.	Complied	Complied.
Clearances: Clearances between any two electrical circuits or between any electrical circuit and ground, where not separated by at least 1/16-inch of approved insulating material, shall be not less than 1/8-inch, unless otherwise approved.	Complied.	Complied
Wiring: All wiring shall be in accordance with the requirements of N.D. Specification 15C1, unless otherwise approved.	Complied	Complied

<u>Requirements</u>	<u>Test Value</u>	
	<u>No. 1</u>	<u>No. 2</u>
Coil windings: May be either single or double silk or cotton covered enameled copper wire.	Complied. Single silk enameled copper wire	Complied. Single silk enameled copper wire.
Protective covering for coils: Shall be nonhygroscopic, not glued or cemented to the coils, but shall be overlapped and cemented in the lap.	Complied	Complied.
Waterproofing of coils: All coils shall be impregnated with an approved synthetic resinous material or other suitable and approved waterproofing and insulating compound.	Complied	Complied.
Magnetic circuits: Shall be of laminated punchings of the best available grade for the purpose and shall be protected against corrosion.	Complied.	Complied.
Terminal block: Shall be of approved material and type, and readily accessible.	Complied	Complied.
Terminal lugs: Shall be in accordance with Bureau of Engineering drawing 9-S-1841-L, unless otherwise specified by the bureau concerned.	Complied.	Complied.
Supply leads: Shall enter through the casing attached to the mounting bulkhead and not through any removable part.	Complied	Complied.
Terminal wiring: Shall be lead in through a boss drilled and tapped for a Navy standard terminal tube. The case shall be provided with two bosses, one located at the top and the other at the bottom of the case, unless otherwise approved by the bureau concerned.	Complied. Use of one boss approved by the Bureau.	Complied. Use of one boss approved by the Bureau.

Requirements

Test Values

	<u>No. 1</u>	<u>No. 2</u>
Springs: All springs which form a part of the electrical circuit shall be of beryllium copper, phosphor bronze, or their approved equivalent.	Complied. Spring (pc. 15) Beryllium-copper Spring (pc. 35) bronze.	Complied. Spring (pc. 15) beryllium-copper Spring (pc. 35) bronze.
Contacts: All contacts for making and breaking an electrical circuit shall be of tungsten.	Complied	Complied.
Agreement with test plans: Blueprint plans of sufficient detail to show all essential components of the equipment to be tested shall be furnished and shall check with the equipment.	Complied	Complied.

CONCLUSIONS

10. The subject horns, manufactured by Benjamin Electric Manufacturing Company, Des Plaines, Illinois, as Navy type H-5, fully comply with the specification, reference (b).

BENJAMIN ELECTRIC MFG. CO.

TYPE H-5 HORN

SERIAL 2001

500~

1000~

1500~

2000~

2500~

3000~

SERIAL 2001

4000~

5000~

6000~

7000~

8000~

SERIAL 2002

500~

1000~

1500~

2000~

2500~

3000~

SERIAL 2002

PLATE 1

NOISE



SERIAL 2001

NOISE



SERIAL 2002

NOISE



SERIAL 2002

NOISE





Motor-Boat Horn, Type H-5
Benjamin Elec. Mfg. Co.