

16 November 1938

NRL Report No. B- 1494

FR- 1494

NAVY DEPARTMENT
BUREAU OF ENGINEERING

Report of Test

on

Horn, Navy Type H-2

Manufactured and Submitted by
Benjamin Electric Manufacturing Company
Des Plaines, Illinois

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D.C.

Number of Pages: Text - 6 Plates - 2
Authorization: BuEng. ltr. S65-4/L5(9-28-Ds) of 7 October 1938.
Date of Test: October and November 1938.

Tested by: _____
G.K.C. Hardesty, Sr. Eng. Aide

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

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

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

Distribution:
BuEng. (5)

APPROVED FOR PUBLIC
RELEASE - DISTRIBUTION
UNLIMITED

TABLE OF CONTENTS

<u>Subject</u>	<u>Page</u>
1. Authorization for Test	1
2. Object of Test.	1
3. Abstract of Test	1
(a) Conclusions	1a
(b) Recommendations	1b
4. Description of Material.	2
5. Method of Test	2
6. Results of Test.	3
7. Conclusions	6

APPENDICES

Photograph of sample horn assembled in watertight case. . .	Plate 1
Photograph of horn unit removed from case.	Plate 2

AUTHORIZATION FOR TEST

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

Reference: (a) Bueng. ltr. S65-4/L5(9-28-Ds) of 7 October 1938.
(b) Specifications 17S11 of 15 February 1938.
(c) Benjamin Electric Plan 191641.

OBJECT OF TEST

2. The object of this test was to determine conformance of the sample horn with the specifications, reference (b), and its suitability for Naval use as a Navy type H2.

ABSTRACT OF TEST

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

Conclusions

(a) This sample horn, manufactured and submitted by Benjamin Electric Manufacturing Company, Des Plaines, Illinois, as a Navy Type H-2, complies with the specifications, reference (b). Although having completed the required 50 hour endurance test, a small fracture had occurred in the armature spring where riveted to its securing plate. A formed spring having a slight corrugation would probably correct this defect.

(b) The horn checks with the manufacturer's plan, reference (c), except that the armature bar and striker button are not identified or listed.

Recommendations

(a) It is recommended that approval of the subject horn be withheld until such time as the manufacturer submits a sample having an armature which will satisfactorily complete an endurance test.

DESCRIPTION OF MATERIAL UNDER TEST

4. The sample horn submitted as a Navy Type H-2, is designed to operate from a supply of 115 volts, a.c., 60 cycles. It is of the vibratory type, possesses no contacts, and produces a note of 120 CPS when energized with 60 cycle current.

5. The electromagnet is made up of laminated magnetic iron of "U" shape and has a form wound coil on each of the pole pieces. The armature bar is of soft iron and is riveted to a flat steel spring, which in turn is riveted to a steel supporting plate, secured to the chassis with three (3) machine screws. A steel button is riveted to the under side of the armature bar and strikes the "Inconel" diaphragm twice in each electrical cycle.

6. The electromagnet, phenolic terminal block, equipped with 9-S-1841-L terminals, is supported by a cast aluminum alloy chassis. The chassis serves as a clamping ring for the diaphragm and diaphragm gasket and is secured to the cast aluminum alloy cover with six (6) No. 10-32 round head steel machine screws.

7. The case is cast of aluminum alloy, having two (2) bosses tapped to accommodate 3/4-inch (IPS) standard Navy terminal tubes, and two (2) mounting lugs with holes to accommodate 3/8 inch bolts. A 1/4 inch square rubber gasket is located in the rim of the case to assure watertightness.

8. The cover and projector are cast as one piece which is secured to inserts in the case with six (6) No. 10-32 cadmium plated round head steel machine screws, equipped with steel lockwashers. The heads of the inserts limit the compression of the gasket. Three (3) circular grooves in the cover contact the gasket when the unit is fully assembled.

9. A nameplate, designated on the manufacturer's drawing as pc. 27, material CN, is attached to the side of the case with two (2) steel drive pins.

10. The case and cover are finished with grey paint, both inside and outside, over a priming coat of zinc chromate paint.

11. Further details in the design are given by photographs, Plates 1 and 2, and by drawing, reference (c).

METHOD OF TEST

12. The sample horn was first tested to determine its electrical characteristics, pitch of note and sound pressure output.

13. It was then subjected to an endurance test of "one minute

on" and "one minute off" for an uninterrupted period of 50 hours. The first 25 hour period was conducted at an ambient temperature of 60° C., and the second period at 0° C. During the first half of the test the temperature rise of the windings was determined by the resistance method.

14. It was next placed on a standard Bureau of Engineering shock stand and subjected to 20 blows of 250 foot pounds each as specified in paragraph F-2g.

15. Then followed a test for resistance to vibration conducted by subjecting it to 3 foot pound blows at the rate of 100, 150, 200, 250, 300, and 350 blows per minute, for 30 minutes each on a standard Bureau of Engineering vibration machine.

16. The sound pressure output and pitch of note were again checked to determine compliance with paragraph F-2n.

17. Next followed tests for dielectric strength, insulation resistance and watertightness.

18. The test was concluded with the salt spray test, under which the sample horn was subjected, under ultra-violet light, to a 20% salt spray at 55° C. for 3 minutes, followed by an air blast at 55° C. for 3 minutes, the cycle being repeated for an uninterrupted period of 100 hours. A careful examination of the sample to determine compliance with the specifications as to design, quality of workmanship and materials, concluded the test.

RESULTS OF TEST

19. The test results obtained were as follows:

<u>Requirements</u>	<u>Test Values</u>
Voltage: 115 volts.	115 volts.
Current: Alternating, 60 cycles.	Alternating, 60 cycles.
Amperes: Not specified.	0.182 amps
Watts: Not over 25.	13 watts
Power factor: Not less than 40%.	62.1%
Weight: Not over 6 pounds.	3 lbs. 4 oz.
Pitch of note: Not less than 100 CPS or more than 600 CPS.	120 CPS
Sound pressure output: Shall be not less than 75 decibels, at 18 feet in a sound proof room.	88 db

RequirementsTest Values

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

Complied

Vibration Tests: 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 blows per minute.

Complied

Endurance: Shall be operated "one minute on" and "one minute off" for a period of 1500 cycles, the first half at an ambient temperature of 60° C. and the second half at 0° C.

See note under "Conclusions."

Temperature rise: Shall not exceed 45° C. at any time during the endurance test.

32° C.

Retest of acoustical output as specified in paragraph F-2n.

Complied

Dielectric Test: Shall withstand a dielectric test of twice the rated voltage plus 1250 volts, at 60 cycles, for a period of one minute.

Complied

Insulation resistance: Shall be not less than 5 megohms, with a 500 volt megger, after the dielectric test.

100 megohms

Wire: Type SICP shall be used.

Complied.

Inclination: Shall operate in any position when supplied with ±10% rated voltage and frequency.

Complied

Watertight integrity: Shall be submerged under 3 feet of standard sea water for 3 hours without water entering the case.

Complied

Salt spray test: Shall be subjected under ultra-violet light, to a 20% salt spray at 55° C. for

Complied

Requirements

Test Values

a period of 3 minutes, followed by an air blast at 55° C. for 3 minutes, the cycle being repeated for a period of 100 hours. Shall show no serious corrosion and shall operate satisfactorily at the end of the test.

Nameplates: Shall be in accordance with N.D. specification 42N2.

Complied

Case Material: Shall be of cast aluminum alloy as specified in paragraph D-3.

Complied

Terminal block: Shall be of approved material, equipped with terminal lugs in accordance with BuEng. Drwg. 9-S-1841-L.

Complied

Diaphragm: Shall be of nickel-chromium alloy.

Complied

Magnet cores: Shall be protected against corrosion.

Complied, coated with insulating varnish. The chassis is also coated with varnish.

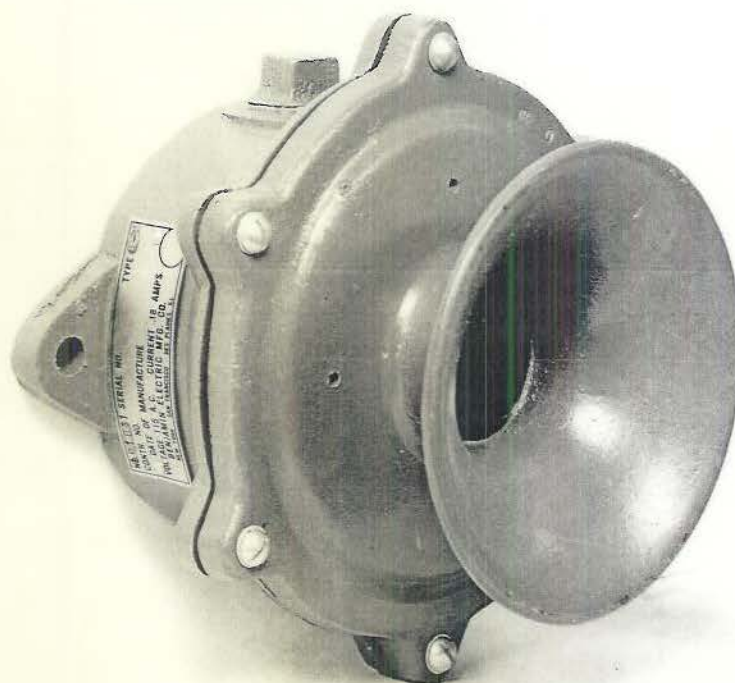
Protective covering for coils: Shall be non-hygroscopic and not glued or cemented to the coils.

Complied, spun thread used as a covering.

CONCLUSIONS

20. The sample horn, manufactured and submitted by Benjamin Electric Manufacturing Company, Des Plaines, Illinois, as a Navy Type H-2, complies with the specifications, reference (b). Although having completed the required 50 hour endurance test, a small fracture had occurred in the armature spring where riveted to its securing plate. A formed spring having a slight corrugation would probably correct this defect.

21. The horn checks with the manufacturer's plan, reference (c), except that the armature bar and striker button are not identified or listed.



TYPE 100
MANUFACTURED BY
ELECTRIC MFG. CO.
NEW YORK, N.Y.
SERIAL NO. 100-10000



