

B-1713

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26 March 1941

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NAVY DEPARTMENT

Report of Test

on

Resonated Horn - Navy Type H-3

Submitted by

Bendix Aviation Corporation
Marine Division
Brooklyn, New York

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D. C.

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Authorization: BuShips Ltr. S65-4 (DYS-3) of 12 March 1941.

Date of Test: March 1941.

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BuShips (5)

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AUTHORIZATION FOR TEST

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

Reference: (a) BuShips Ltr. S65-4(DYs-3) of 12 March 1941.
(b) Specification 17S11c of 1 May 1940.
(c) Bendix Drwg. CAL-5680.
(d) Bendix Ltr. of 28 January 1941 to BuShips.

OBJECT OF TEST

2. The object of this test was to determine conformance of the sample horn with specification, reference (b), and its suitability for Naval use.

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 specification. An inspection of the sample to determine compliance in the matter of materials, design, and workmanship, concluded the test.

Conclusions

(a) The sample horn tested is of good design and workmanship and complied with all of the requirements of the specification except as listed in paragraph 9. The only important departure is in the diaphragm material, where steel is used instead of the specified nickel-chromium alloy. The diaphragm, however, is protected by zinc chromate varnish and red glyptal varnish, and it was not affected by the salt spray test.

Recommendations

(a) It is recommended that the subject horn be approved for Naval use subject to the correction of the deficiencies listed in paragraph 9, or the Bureau's waiver of these deficiencies in view of the generally excellent test performance.

(b) It is further recommended that the horn be provided with a suitable drain cock or drain screw for draining off water collecting in the diaphragm chamber.

DESCRIPTION OF MATERIAL

4. The subject horn was submitted by Bendix Aviation Corporation, Marine Division, as a Navy Type H-3 resonated horn. It is designed to operate from a supply of 115 volts, direct potential.

5. The sample is shown by photographs, Plates 2 and 3, and drawing, reference (c). The acoustical analysis is given by Plate 1.

METHOD OF TEST

6. The sample horn, following tests to determine its electrical and acoustical characteristics at rated voltage, was subjected to further tests in the following order:

- (a) Inclination
- (b) Endurance and temperature rise
- (c) Retest of sound pressure output
- (d) Shock
- (e) Vibration
- (f) Dielectric
- (g) Insulation resistance
- (h) Splashproof
- (i) Salt spray

7. The tests were concluded with a careful examination of the sample to determine compliance with the specification, pertaining to design, quality of workmanship and materials, and any defects resulting from the tests.

RESULTS OF TEST

8. The test results obtained were as follows:

<u>Requirements</u>	<u>Test Values</u>
Voltage: 115 volts d.c.	115 volts d.c.
Amperes: Not specified.	0.275 amperes.
Watts: Shall not exceed 40 watts	31.6 watts.
Sound pressure output: Shall be not less than 75 decibels at 18 feet in a soundproof room under the following conditions:	Complied.
(a) Before the endurance test	101 db.
(b) Following the endurance test	96 db.
Pitch of note: Resonated.	Complied. See Plate 1.

Requirements

Inclination: Shall operate in any position when supplied with rated voltage \pm 10 per cent.

Endurance test: Shall operate satisfactorily for 1500 cycles of "one minute on" and "one minute off", the first 750 cycles at 60°C. and the second at 0°C, ambient temperatures.

Temperature rise: Maximum temperature shall not exceed 115°C. during the endurance test. (55°C. rise at 60°C. ambient temperature.)

Shock test: Shall withstand 20 shocks of 250 foot pounds each as specified in paragraph F-2g.

Vibration test: Shall be mounted on a standard Navy 3 foot pound vibration machine and subjected to six tests of 30 minutes each at frequencies of 100, 150, 200, 250, 300 and 350 shocks per minute.

Dielectric test: Shall withstand twice the rated voltage plus 1250 volts, 60 cycles, for one minute between electrical circuits and between electrical circuits and ground.

Insulation resistance: Shall be not less than 5 megohms at not less than 500 volts, d.c.

Splashproof integrity: Shall be subjected to a 1-inch stream of water, under a pressure head of 35 feet, played from a hose at a distance of 5 feet, for 5 minutes, without the entry of water into the case.

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.

Test Values

Complied.

Complied.

Complied. 17.6°C. rise above 60°C. ambient temperature.

Complied.

Complied.

Complied.

Complied. 200 megohms by 1000 volt megger.

Complied.

Satisfactory

Requirements

Weight: Shall not exceed 10 pounds.

Nameplate: Shall be in accordance with N. D. Specification 42N2.

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.

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.

Protection of exterior surfaces: Exterior surfaces of the equipment, except nameplates and diaphragms, shall be finished with two coats of gray paint specifically approved by the bureau concerned.

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.

Wiring: All wiring shall be in accordance with the requirements of N. D. Specification 15C1, unless otherwise approved.

Coil windings: May be either single or double silk or cotton covered enameled copper wire.

Test Values

Complied. 6 pounds, 6 ounces.

* Material satisfactory but relief etching is used instead of etching as specified.

Complied.

Complied - gray paint over zinc chromate.

Complied.

* Insufficient clearance (1/16") between condenser pc. 52 and terminal screws pc. 76.

Complied.

Complied. Single silk enameled copper wire.

Requirements

Protective covering for coils:
Shall be nonhygroscopic, not glued or cemented to the coils, but shall be overlapped and cemented in the lap.

Diaphragm: Shall, unless otherwise specifically approved by the Bureau, be of nickel-chromium alloy.

Magnetic circuits: Shall be of laminated punchings of the best available grade for the purpose and shall be protected against corrosion.

Terminal block: Shall be of approved material and type, and readily accessible.

Terminal lugs: Shall be in accordance with Bureau of Engineering drawing 9-S-1841-L, unless otherwise specified by the bureau concerned.

Supply leads: Shall enter through the casing attached to the mounting bulkhead and not through any removable part.

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.

Springs: All springs which form a part of the electrical circuit shall be of beryllium copper, phosphor bronze, or their approved equivalent.

Contacts: All contacts for making and breaking an electrical circuit shall be of tungsten.

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.

* Denotes failure to comply with the specifications.

Test Values

Complied. Cotton tape impregnated with clear lacquer.

* Steel protected by zinc chromate varnish and red glyptal varnish.

Complied.

Complied.

Complied.

Complied.

Complied.

* Contact spring, piece 28, is of steel, unprotected.

Complied.

* Case design, weight, and electrical data are not in agreement with drawing, reference (c).

COMMENTS ON RESULTS OF TEST

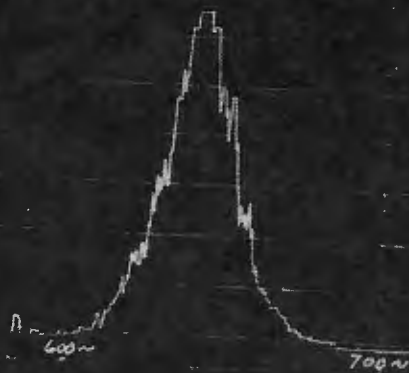
9. The subject horn failed to meet the specification in the following respects:

- (a) Paragraph D-13a Nameplate: Relief etching is used instead of etching as specified.
- (b) Paragraph E-4c (3) Diaphragm: Steel is used instead of nickel-chromium alloy as specified.
- (c) Paragraph D-11d Contact spring: Steel is used instead of beryllium-copper or phosphor-bronze as specified.
- (d) Paragraph H-3b Agreement with test plans: Bell case, weight, and electrical data are not in agreement with drawing, reference (c).
- (e) Paragraph D-5 Clearance to ground: There is less than the required 1/8 inch clearance between condenser pc. 52 and terminal screws pc. 76.

CONCLUSIONS

10. The sample horn tested is of good design and workmanship and complied with all of the requirements of the specification except as listed in paragraph 9. The only important departure is in the diaphragm material, where steel is used instead of the specified nickel-chromium alloy. The diaphragm, however, is protected by zinc chromate varnish and red glyptal varnish, and it was not affected by the salt spray test.

HORN



800 ~

900 ~

1000 ~



8000 ~

PLATE I
9800 ~ 3-7-41

