

Report No. B-1682
at on Horn, Navy Type H-3, Submitted by Federal Electric Co.

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SUBJECT

Test on Horn, Navy Type H-3, Submitted by

Federal Electric Co., Chicago, Ill.



BY

NAVAL RESEARCH LABORATORY

BELLEVUE, D. C.

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Report of Test

on

Horn, Navy Type H-3

Submitted by

Federal Electric Company,
Chicago, Illinois.

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D. C.

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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 references (b) and (c).

Reference: (a) BuShips Ltrs. S65-4(SS) of 23 July 1940, and S65-4(DYs-3) of 14 Jan. 1941.
(b) Specification 17S11c of 1 May 1940.
(c) Federal Drwg. No. H-5639.
(d) NRL Report B-1678 of 27 December 1940.

OBJECT OF TEST

2. The object of this test was to determine conformance of the sample horn with the 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 subject horn, manufactured by Federal Electric Company, Chicago, Illinois, as Navy type H-3, complied with the specification, reference (b), except in the following respects:
- (1) During the endurance test the pitch of note frequently changed. When this occurred, the current increased from 0.318 to 0.55 ampere.
 - (2) The temperature rise of the winding was 65.7° C. The allowable rise is 55° C.
 - (3) Brass spacers, (pc. 57) located under the terminal block, are in contact with aluminum.
 - (4) The terminal tube bosses are not correctly located. The specification requires that one be located at the top and one at the bottom of the case.
 - (5) Contact spring (pc. 43) is of blued steel.

RECOMMENDATIONS

(a) It is recommended that the sample horn be approved for Naval use subject to correction of the deficiencies noted under "Conclusions" and a satisfactory check test.

(b) It is also recommended that the use of steel for contact spring (pc. 43) be permitted providing that future tests on this type of horn are satisfactory.

(c) It is further recommended that the position of housing (pc. 1), relative to cover (pc. 2) be so changed on drawing, reference (c), that the terminal box will be located on one side of the unit. This will permit entry of a cable from either above or below which is believed to be the intent of the specification.

DESCRIPTION OF MATERIAL UNDER TEST

4. The sample horn, manufactured by Federal Electric Company, Chicago, Illinois, as Navy type H-3, is designed to operate from a supply of 115 volts direct potential. A 0.1 mfd. condenser rated at 400 volts, d.c. is connected across the contacts to suppress the arc.

5. The mechanism is mounted on a removable cover which is secured to the case with six (6) steel machine screws. Both case and cover are of cast aluminum alloy. A formed brass re-sonated projector of the coiled type is provided.

6. A terminal box, provided with two (2) bosses tapped for 3/4-inch (IPS) terminal tubes, and three (3) mounting lugs, equipped with "Lord" rubber mountings, are cast integral with the case.

7. Further details are shown by drawing, reference (c), and photographs, Plates 2 and 3. The acoustical characteristics are shown by Plate 1.

METHOD OF TEST

8. 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) Shock
- (d) Vibration
- (e) Dielectric
- (f) Insulation resistance
- (g) Splashproof

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

RESULTS OF TEST

10. The test results obtained were as follows:

Requirements

Test Values

Voltage: 115 volts, direct potential.	115
Amperes: Not specified	0.318
Watts: Shall not exceed 40	36.5
Sound pressure output: Shall be not less than 75 decibels at 18 feet in a soundproof room.	Complied. 97 db total noise.
Pitch of Note: Resonated	Complied. See Plate 1
Inclination: Shall operate in any position when supplied with rated voltage \pm 10 per cent.	Complied.
Endurance test: Shall operate 1500 cycles of "one minute on" and "one minute off," the first 750 cycles at 60° C. and the second at 0° C. ambient.	*Unsatisfactory. See "Conclusions."
Temperature rise: Maximum temperature shall not exceed 115° C. during the endurance test. (55° C. rise at 60° C. ambient temperature.)	* 65.7° C. above 60° C. ambient.
Shock test: Shall withstand 20 shocks of 250 foot pounds each as specified in paragraph F-2g.	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 frequencies of 100, 150, 200, 250, 300 and 350 shocks per minute.	Complied.
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.	Complied.

Requirements

Test Values

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

Complied.
Greater than 200 megohms by 1000 volt megger.

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.

Complied.

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, and shall show no corrosive or other damage due to the salt spray.

Not conducted due to previous satisfactory test on similar case reported by reference (d).

Weight: Shall not exceed 10 pounds

Complied. 7 pounds.

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

Complied. Etched and stamped 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.

*Brass spacers (pc. 57) in contact with aluminum.

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.

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

Complied.

Requirements

Test Values

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.

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

Complied.

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

Complied. Single silk covered 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. Covered with fabric tape.

Waterproofing of coils: All coils shall be impregnated with an approved synthetic resinous material or other suitable and approved waterproofing and insulating compound.

Complied.

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

Complied.

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

Complied.

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

Complied.

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

Complied.

Requirements

Test Values

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, except that both bosses are in the sides of the terminal box at the bottom of the case.

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

*Blued steel used for contact spring (pc. 43).

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

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.

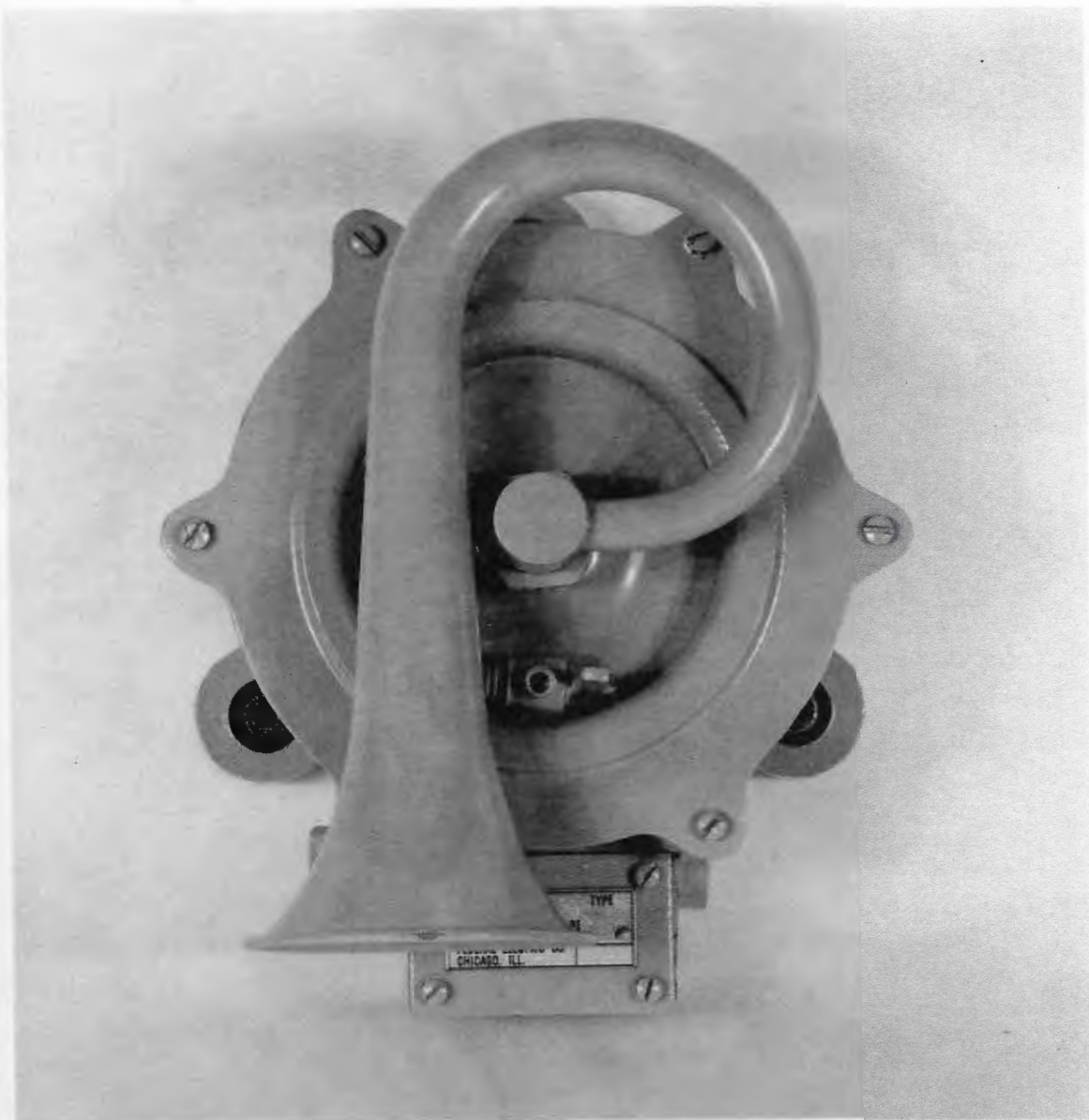
Complied.

*Denotes failure to comply with the specifications.

CONCLUSIONS

11. The subject horn, manufactured by Federal Electric Company, Chicago, Illinois, as Navy type H-3, complied with the specification, reference (b), except in the following respects:

- (1) During the endurance test the pitch of note frequently changed. When this occurred, the current increased from 0.318 to 0.55 ampere.
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Navy Type H-3 Resonated Horn
Federal Electric Co., exhibitor