3 April 1941 NRL Report No. B-1716

NAVY DEPARTMENT

FR-1716

Report of Test

on

Navy Type H-5a Horn

Submitted by

Federal Electric Company,
Chicago, Illinois.

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D. C.

Number of Pages: Text - 7 Plates - 3

Authorization: BuShips ltr. S65-4(DYs-3) of 2 April 1941

Date of Test: March 1941.

Tested and
Prepared by: _____

F. H. Dunlap, Senior Engineering Aide.

Reviewed by: _____

W. B. Roberts, Assistant Electrical Engineer,
Chief of Division.

_____

W. M. Cole, Lieutenant Commander, USN.

Approved by:

_____

H. G. Bowen, Rear Admiral, USN, Director.

Distribution:
BuShips (5)

dd

TABLE OF CONTENTS

APPENDICES

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) BuShip's Ltr. S65-4(DYs-3) of 2 April 1941
(b) Specification 17S11c of 1 May 1940
(c) Federal Electric Co. Drwg. H-5669.

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.

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

Conclusions

(a) The subject horn is of good design, of first class workmanship, and meets the requirements of specification, reference (c), as a Navy type H-5a motor boat horn (24v.d.c.) except for the minor deficiencies outlined in paragraph 11.

Recommendations

(a) It is recommended that the subject horn, Navy type H-5a manufactured by the Federal Electric Company, be considered SATISFACTORY for Naval use, and that the minor non-conformities with specification requirements be waived.

Description of Material

4. The subject horn is manufactured by Federal Electric Company and was submitted for test as a Navy type H-5a (24v.d.c.) motor boat horn.

5. It employs a single winding and has adjustable contacts shunted by a 1.0 mfd. condenser to suppress the arc. A diaphragm, of nickel-chronium alloy, is mechanically coupled to the armature.

6. The mechanism is housed in a composition BE case, having 2 bosses, one topped for a 3/4-inch (IPS) terminal tube, and two mounting lugs, drilled for 3/8-inch mounting screws.

7. Further details are shown by photographs, Plates 2 and 3, and drawing, reference (c). The acoustical analysis is given 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) Retest of sound pressure output
(d) Shock
(e) Vibration
(f) Dielectric
(g) Insulation resistance
(h) Watertight
(i) Salt spray

9. 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

10. The test results obtained were as follows:

Requirements	Test Values
Voltage: 24 volts, d.c.	24 volts, d.c.
Amperes: Not specified.	0.93 ampere

Requirements	Test Values
Watts: Shall not exceed 50 watts	22.3 watts
Sound pressure output: Shall be not less than 85 decibels at 18 feet in a soundproof room under the following conditions:	Complied.
(a) Before the endurance test	92 db
(b) Following the endurance test	96 db
Pitch of note: 100 to 600 CPS	Complied. See Plate 1
Inclination: Shall operate in any position when supplied with rated voltage ± 10 per cent.	Complied.
Endurance test: Shall operate satisfactorily for 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.
Temperature rise: Maximum temperature shall not exceed 115° C. during the endurance test. (55° C. rise at 60° C. ambient temperature.)	Complied. 44.3° C. above 60° C. ambient temperature.
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 500 volts, 60 cycles, for one minute between electrical circuits and between electrical circuits and ground.	Complied.
Insulation resistance: Shall be not less than 1 megohm at not less than 500 volts, d.c.	Complied. Greater than 100 megohms by 500 volt megger.

Requirements	Test Values
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.
Salt spray test: Shall be subjected, under ultra-violet light, to a 20 per cent salt spray at 55° C. for a period of three minutes, followed by an air blast at 55° C. for three minutes, the cycle being repeated continuously for 100 hours.	Satisfactory.
Weight: Shall not exceed 8 pounds.	* 8 pounds, 3 ounces.
Nameplate: Shall be in accordance with N. D. Specification 42N2.	Complied. Copper-nickel alloy with stamped lettering
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.
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.
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.

Requirements	Test Values
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.
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.
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.
Springs: All springs which form a part of the electrical circuit shall be of beryllium copper, phosphor bronze, or their approved equivalent.	* Contact spring (pc. 29) of blued steel.

Requirements	Test Values
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.	* Weight and electrical data are not in agreement with the sample tested.

* Denotes failure to comply with the specifications.

Comments on Results of Test

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

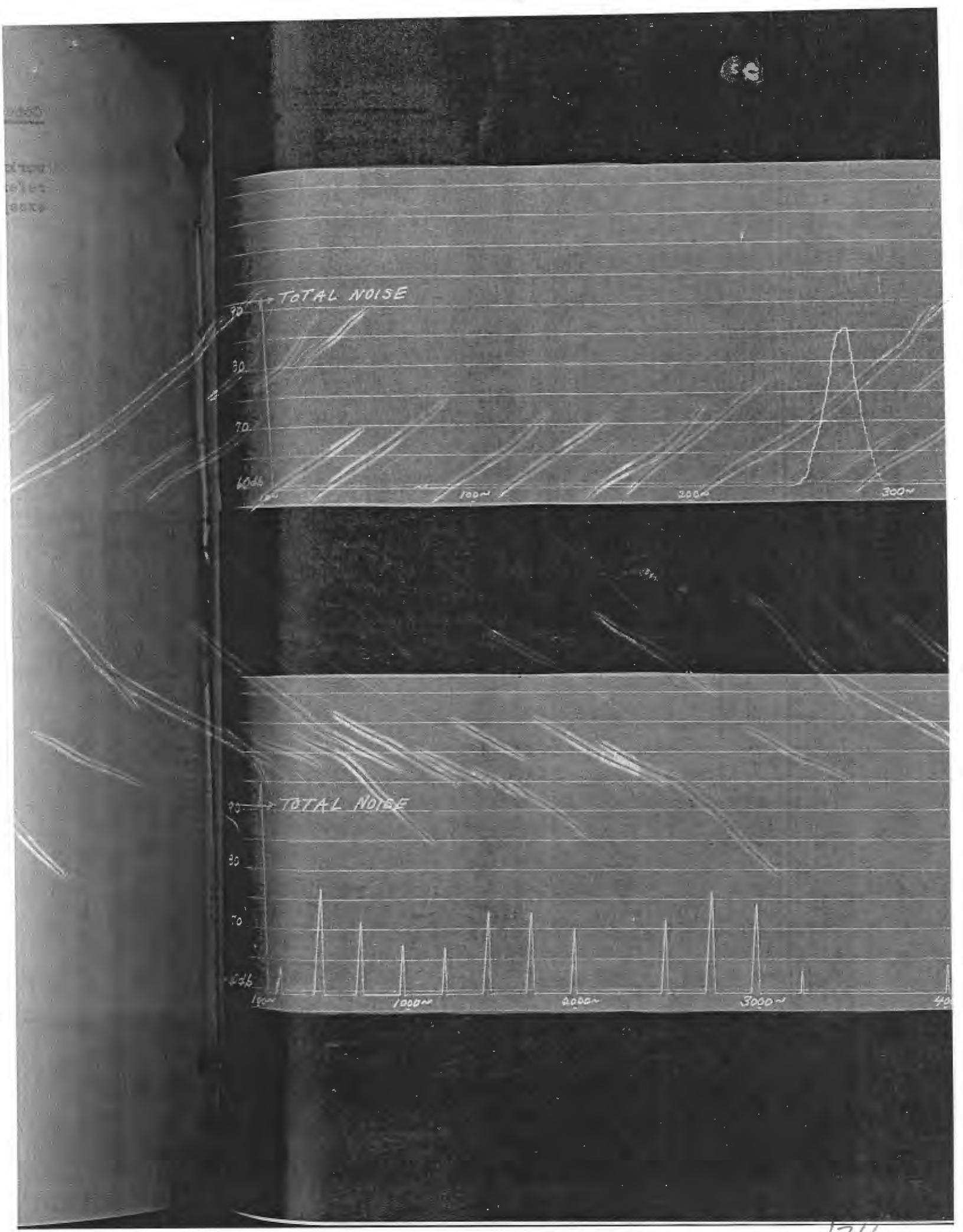
(a) Paragraph E-1, Weight: The weight is exceeded by 3 ounces.

(b) D-11d, Springs: Steel is used for contact spring (pc.29) instead of beryllium copper or phosphor bronze as specified.

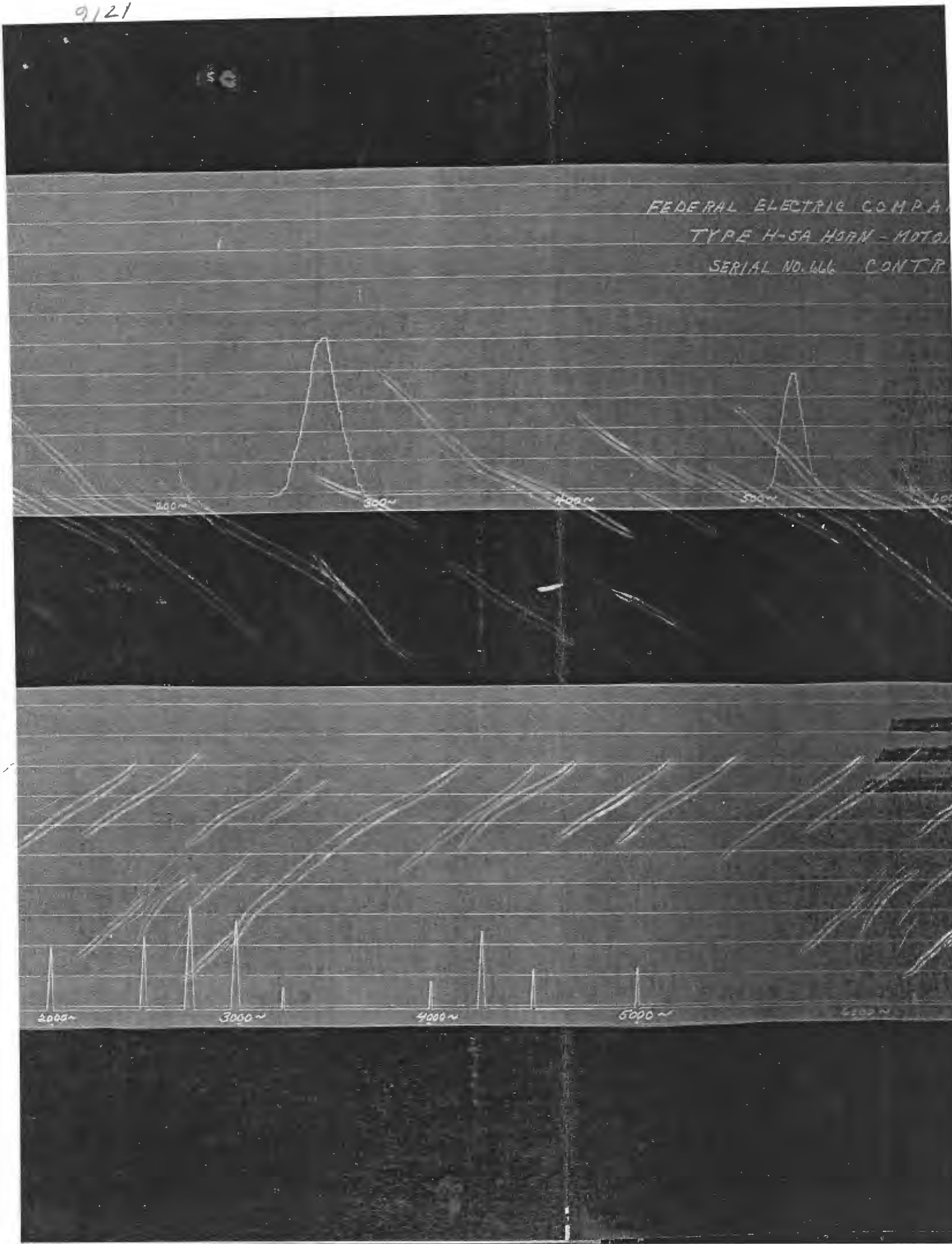
(c) H-3b, Agreement with test plans: Weight and electrical data are not in agreement with drawing, reference (c).

Conclusions

12. The subject horn is of good design, of first class workmanship, and meets the requirements of specification, reference (c), as a Navy type H-5a motor boat horn (24v.d.c.) except for the minor deficiencies outlined in paragraph 11.


TOTAL NOISE
90
80
70
60db
100~
200~
300~
TOTAL NOISE
90
80
70
60db
1000~
2000~
3000~

9121


FEDERAL ELECTRIC COMPA
TYPE H-5A HORN - MOTO
SERIAL NO. 666 CONTR
200~
300~
400~
500~
2000~
3000~
4000~
5000~

3/5/41

C.

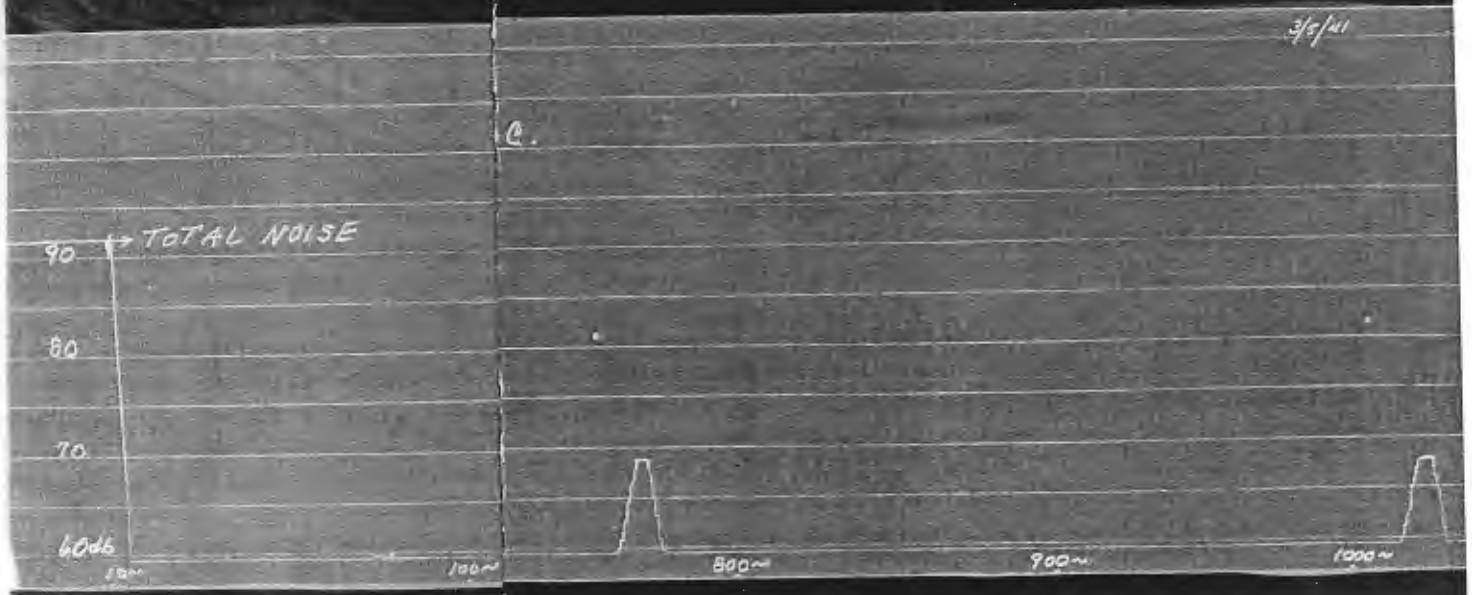


PLATE I

PLATE 2

PLATE 3