[redacted] NRL Report No.B-1678

NAVY DEPARTMENT

Report of Test

on

Horn, Navy Type H-4

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(SS) of 23 July 1940.

Date of Test: December 1940

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Reviewed by:

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

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Approved by:

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

Distribution:
BuShips (5)

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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) BuShips Ltr. S65-4(SS) of 23 July 1940
(b) Specification 17Ellc of 1 May 1940.
(c) Federal Drwg. No. H-5632.

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-4, complied with the specifications, reference (b), except in the following respects:

(1) Steel inserts are not provided in housing cover (pc. 2) for machine screws (pc. 69) securing the chassis to the cover.

(2) One screw (pc. 7) is not accessible, due to its location under projector (pc. 3). Drawing, reference (c), shows two screws so located but, as submitted, the position of projector was as shown by Plate 2.

(3) Contact spring (pc. 43) is of blued steel.

(4) Brass spacers (pc. 57) under the terminal block are in contact with aluminum.

(5) Terminal tube bosses are not correctly located. The specifications require that one be located at the top and one at the bottom.

Recommendations

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

(b) It is also recommended that the use of blued steel for contact spring (pc. 43) be permitted due to the excellent performance of the horn throughout the test.

(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-4, is designed to operate from a supply of 115 volts alternating potential. A 0.5 mfd. condenser rated at 800 volts, a.c. is connected across the contacts.

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

6. A terminal box, provided with two (2) bosses tapped for 3/8-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.

METHOD OF TEST

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

(a) Insulation
(b) Resonance and temperature rise
(c) Shock
(d) Vibration
(e) Dielectric
(f) Insulation resistance
(g) Splashproof
(h) Salt spray.

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.	115 volts.
Amperes: Not specified	0.238
Watts: Shall not exceed 40 watts.	23.8
Power factor: Not specified.	87%
Sound pressure output: Shall be not less than 75 decibels at 18 feet in a soundproof room.	Complied. 95 db Total noise.
Pitch of note: Resonated	Complied. See Plate 1.
Inclination: Shall operate in any position when supplied with rated voltage and frequency ± 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 temperatures.	Complied. No adjustments were necessary.
Temperature rise: Maximum temperature shall not exceed 115° C. during the endurance test. (55° C. rise at 60° C. ambient temperature.)	Complied. 48.1° 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 vp;ts. 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.	Complied
Weight: Shall not exceed 10 pounds.	Complied. 7 pounds, 3 ounces.
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, diaphragms, gongs, and strikers, 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.
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 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, except that both bosses are in the sides of the terminal box at the bottom of the case.

Requirements	Test Values
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, except for location of projector. See "Conclusions".

* Denotes failure to comply with the specifications.

[redacted]

11. The subject horn, manufactured by Federal Electric Company, Chicago, Illinois, as Navy type H-4, complied with the specifications, reference (b), except in the following respects:

(1) Steel inserts are not provided in housing cover (pc. 2) for machine screws (pc. 69) securing the chassis to the cover.

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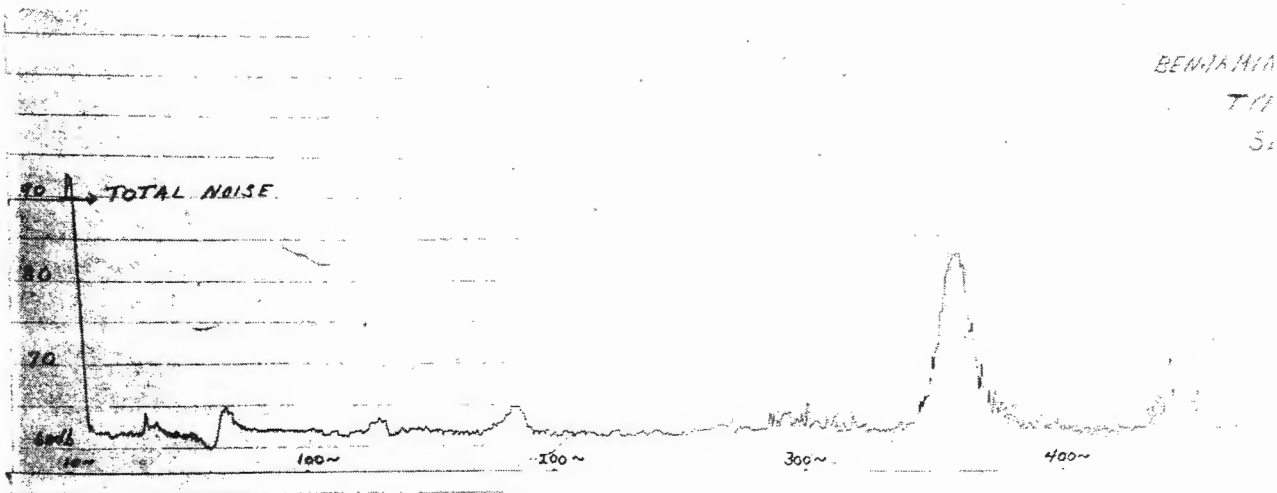
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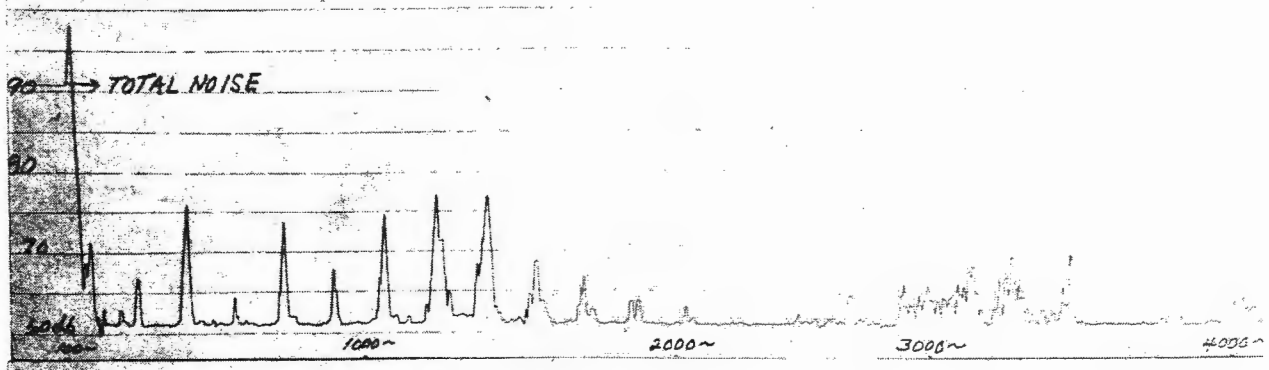
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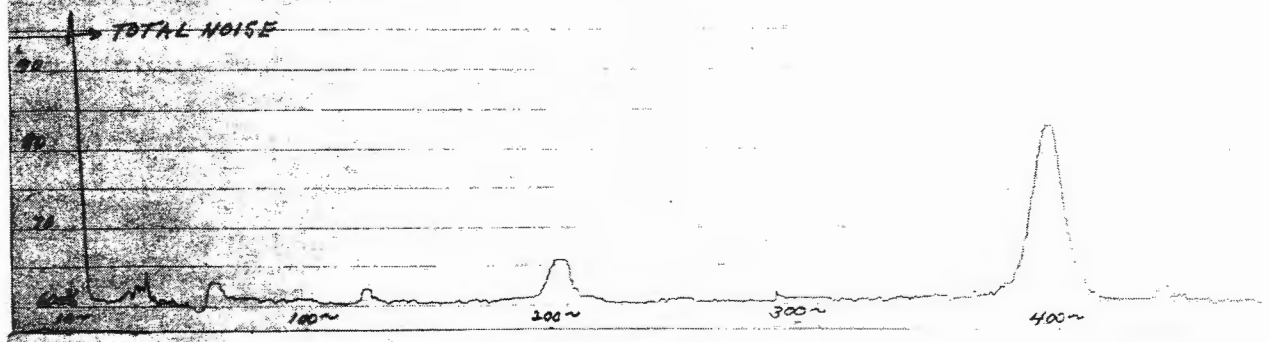
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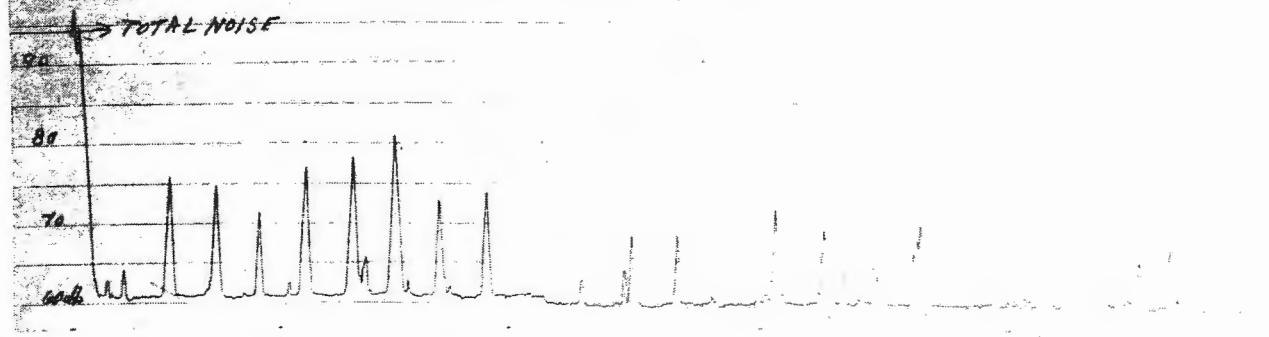
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CTRIC MFG. CO

S. HORN

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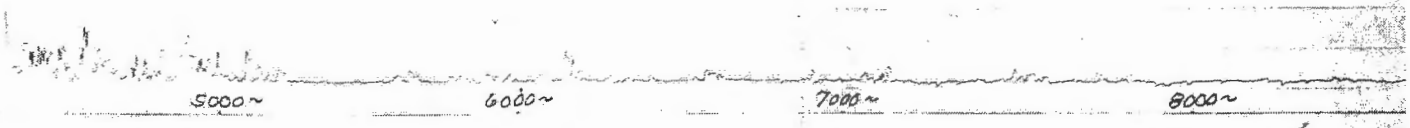

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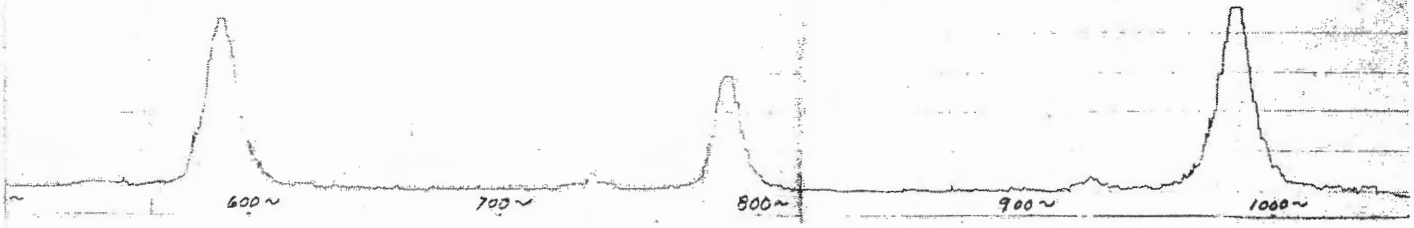

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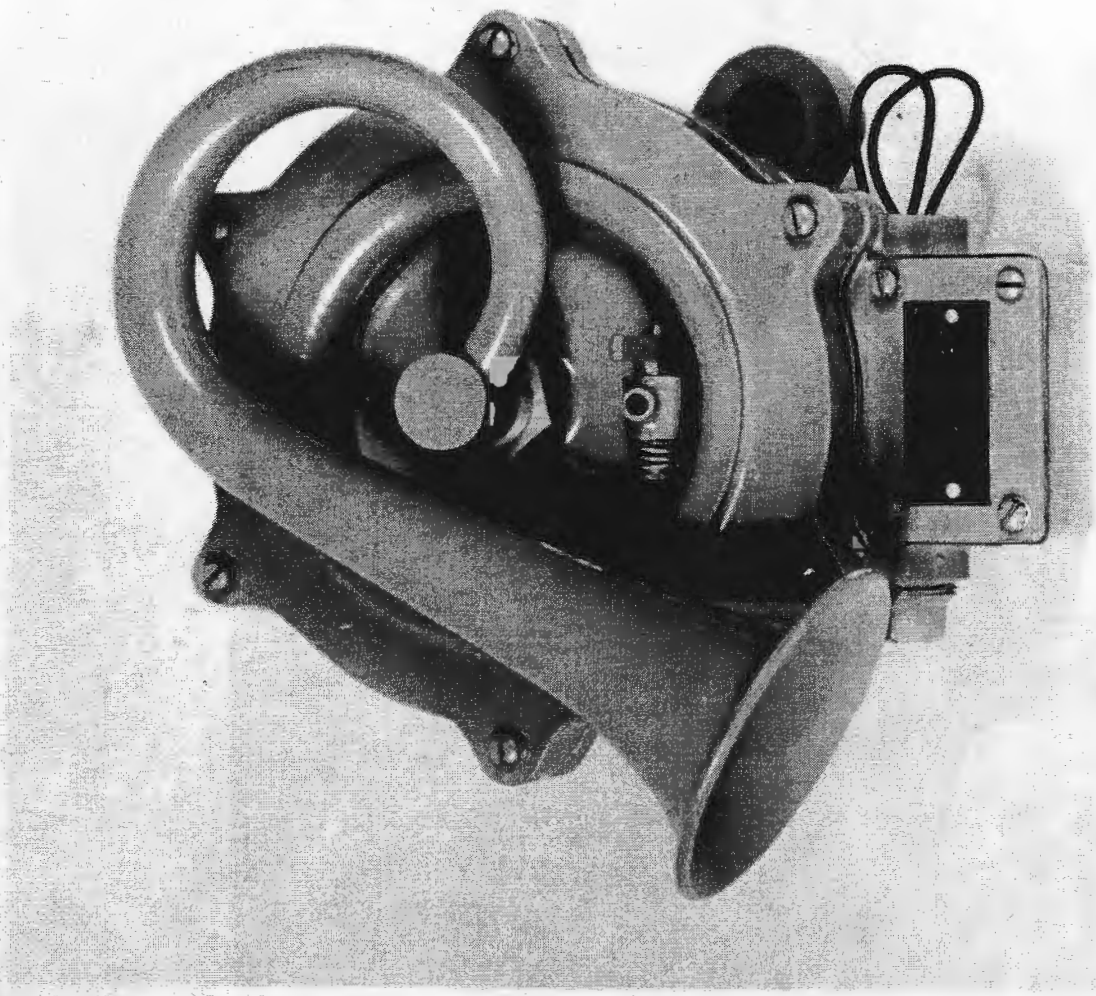
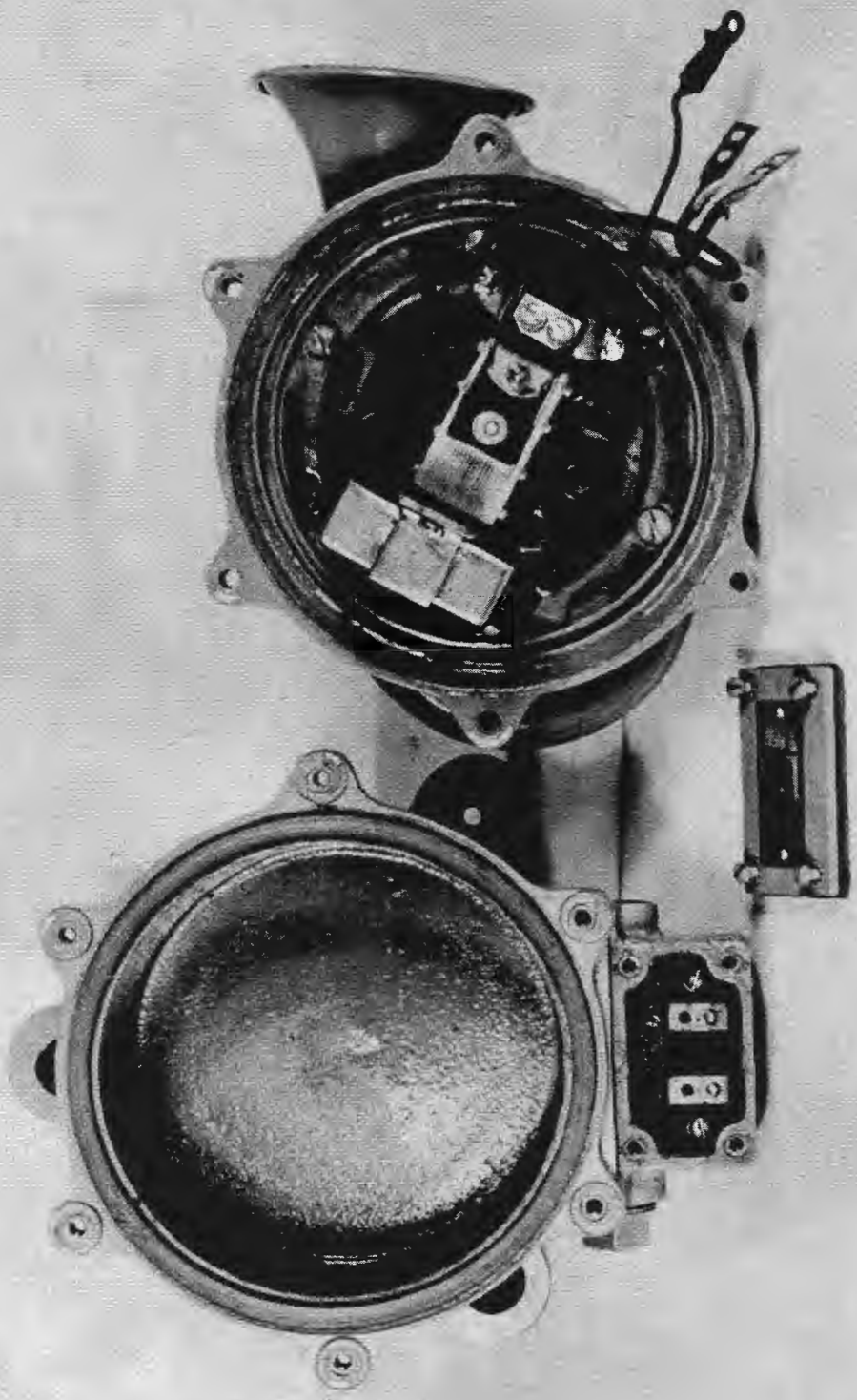
PLATE I



Federal Electric Type H-4 Horn

Plate 2



Federal Electric Type H-4 Horn

Plate 3