

12 August 1941

NRL Report No. B-1767

NAVY DEPARTMENT

Report of Test

on

Horns, Types H-8 and H-9

FR-1767

Submitted by

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Des Plaines, Illinois

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WASHINGTON, D. C.

Number of Pages: Text - 4 Plates - 3

Authorization: BuShips ltr. S65-4 (355) of 18 July 1941.

Date of Test: August 1941.

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Distribution:
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 references (b), (c), and (d).

Reference: (a) BuShips Ltr. S65-4 (355) of 18 July 1941.
(b) Specification 17S11c of 1 May 1940.
(c) Benjamin Electric Manufacturing Company's Plans 191505 and 191506.
(d) NRL Report No. B-1651.

OBJECT OF TEST

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

ABSTRACT OF TEST

3. The sample horns were set up at this Laboratory in suitable test circuits where their 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 horns failed to meet the requirements of the specification, reference (b), in the following respects:

Type H-8 - 115 V.D.C.

- (1) Power consumption.
- (2) Endurance - Failed after 20.75 hours due to an open circuit in the armature.

Type H-9 - 115 V.A.C.

- (3) Endurance - Failed after 27 hours due to an open circuit in the armature. When the horn was examined, two of the rivets (pc. 48) securing the anvil (pc. 46) to spring strip (pc. 45) had fallen out.

(b) It will be noted that the acoustical characteristics of the sample horns differ greatly with those of the samples reported by reference (d). The total sound energy is less and the frequencies of the principal components are higher. The notes produced were of a scratchy variety.

RECOMMENDATIONS

(a) It is recommended that the subject horns be not approved for Naval use.

(b) It is further recommended that the manufacturer be invited to experiment with a formed type of diaphragm with the anvil riveted to the diaphragm. It is believed that this type of construction would result in fewer diaphragm failures and the production of a note of higher quality.

DESCRIPTION OF MATERIAL UNDER TEST

4. The sample horns, manufactured by Benjamin Electric Manufacturing Company, were submitted as Navy types H-8 (115 v.d.c.) and H-9 (115 v.a.c.) motor-operated horns. They are identical in design, except for the windings of the motors.
5. The motor is housed in a cast bronze case, having three (3) mounting lugs and a connection box cast integral with the case. The connection box is tapped for two (2) 3/4-inch (IPS) terminal tubes.
6. A terminal block of phenolic material is located in the connection box and is accessible by removing a cast bronze cover. An engraved nameplate of nickel-copper alloy is secured to the outside of the connection box by two (2) zinc plated steel drive screws.
7. The motor is equipped with sleeve bearings, each of which is lubricated by a wick type oiler which is accessible by removing the connection box cover.
8. These horns differ from those reported by reference (d), in that the anvil is not mounted on the diaphragm. The anvil is riveted to a laminated strip of spring steel, the ends of which are clamped between two rubber gaskets located between a steel ring and the case flange. A hammer button, secured to the opposite side of the strip with the same rivets, strikes the diaphragm when the anvil is struck by the ratchet on the armature.
9. The spring steel diaphragm, protected by glyptal paint over zinc chromate paint, is assembled between flat rubber gaskets and is clamped between the case and projector by eight (8) fillister-headed brass machine screws threaded into the case.
10. A hexagon head brass adjusting screw, having a steel insert in its end, is threaded into the bottom of the case and may be secured by a brass locknut. The insert presses against a steel ball, recessed in the end of the armature shaft and, when properly adjusted, the shaft is forced forward, causing the ratchet to engage the anvil. Forward movement of the armature shaft is resisted by a flat bronze spring, mounted inside the motor endbell, and pressing a bronze washer located against a shoulder on the armature shaft.
11. Further details are shown by photographs, Plates 2 and 3, and drawings, reference (c).

METHOD OF TEST

12. Following tests to determine their electrical and acoustical characteristics, at rated voltage and frequency, the sample horns were subjected to tests for inclination, endurance, and temperature rise.

13. Due to the failure of the sample horns under the endurance test, no further tests were conducted.

RESULTS OF TEST

14. The test results obtained were as follows:

<u>Requirements</u>	<u>Test Values</u>	
	Type H-8 (Serial No. 4998)	Type H-9 (Serial No. 4997)
Voltage: 115 volts	115 volts	115 volts
Current: Type H-8 direct; H-9 a.c. 60 cycles.	Direct	Alternating
Amperes: Not specified.	0.67 ampere	0.72 ampere
Watts: Shall not exceed 75 watts	* 77.05 watts	61.5 watts
Sound pressure output: Shall be not less than 90 decibels at 18 feet in a soundproof room.	Total noise 98 db	Total noise 96 db
Pitch of note: 100-600 CPS	Complied	Complied
Inclination: Shall operate in any position when supplied with rated voltage and frequency \pm 10 per cent.	Complied	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.	*Unsatisfactory (See Conclusions)	*Unsatisfactory (See Conclusions)
Temperature rise: Maximum temperature shall not exceed 115° C. during the endurance test. (55° C. rise at 60° C. ambient temperature.)	Complied 52.1° C. above 60° C. ambient	Complied 32.6° C. above 60° C. ambient
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 electrical data.	Complied except for electrical data.

*Denotes failure to comply with the specification.

Note: Due to the early failure of these samples, no further tests could be conducted.

CONCLUSIONS

15. The subject horns failed to meet the requirements of the specification, reference (b), in the following respects:

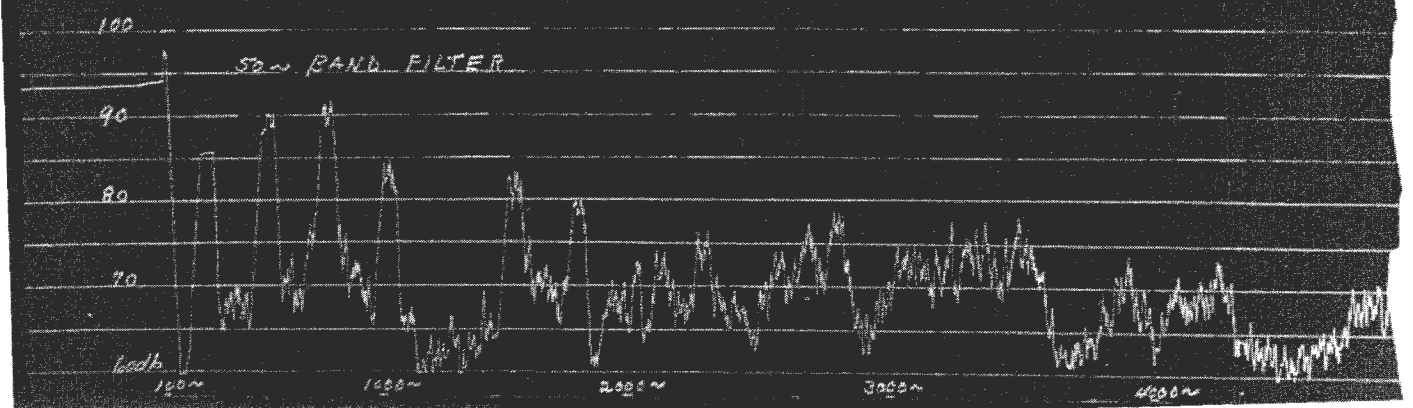
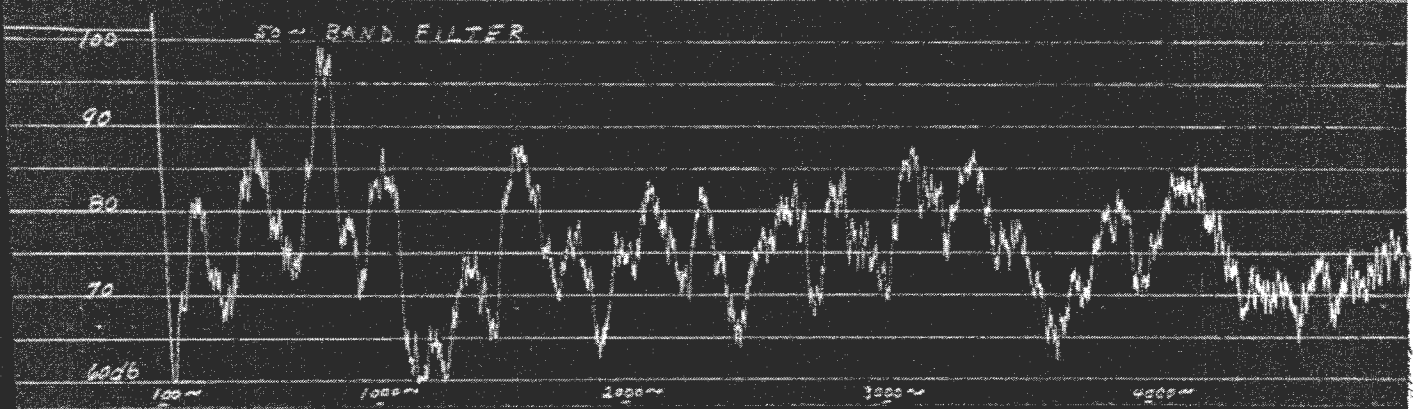
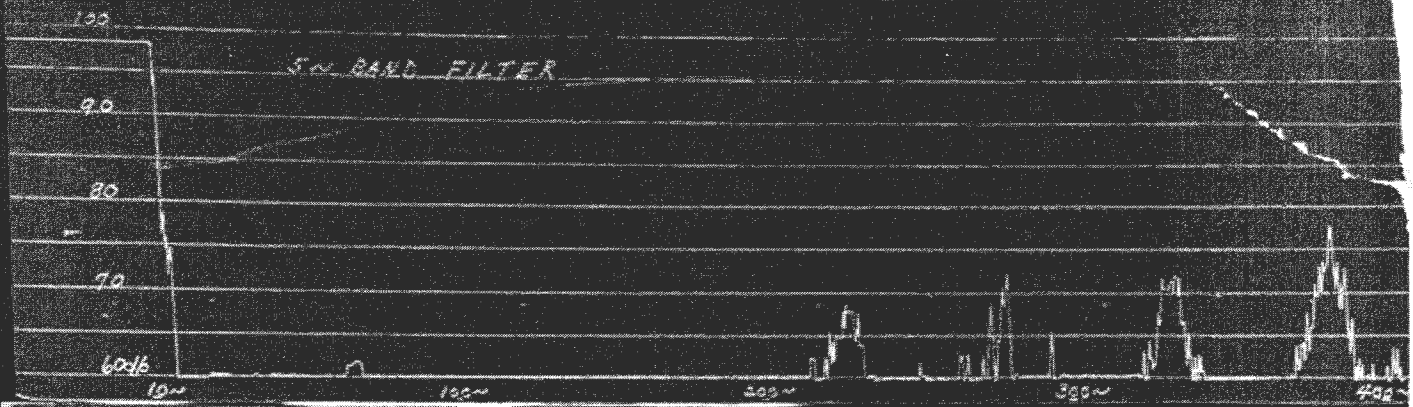
Type H-8 - 115 V.D.C.

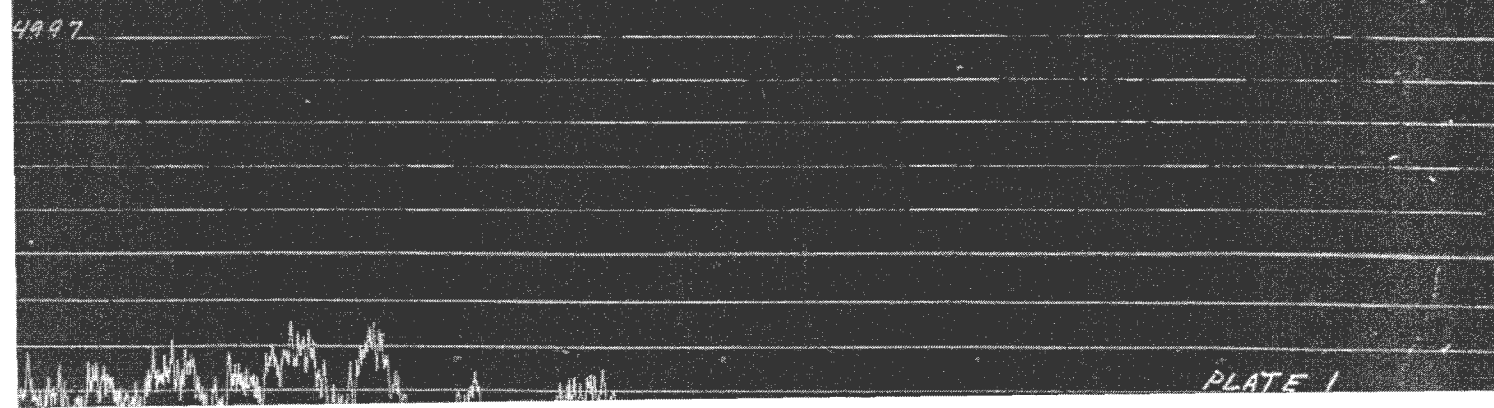
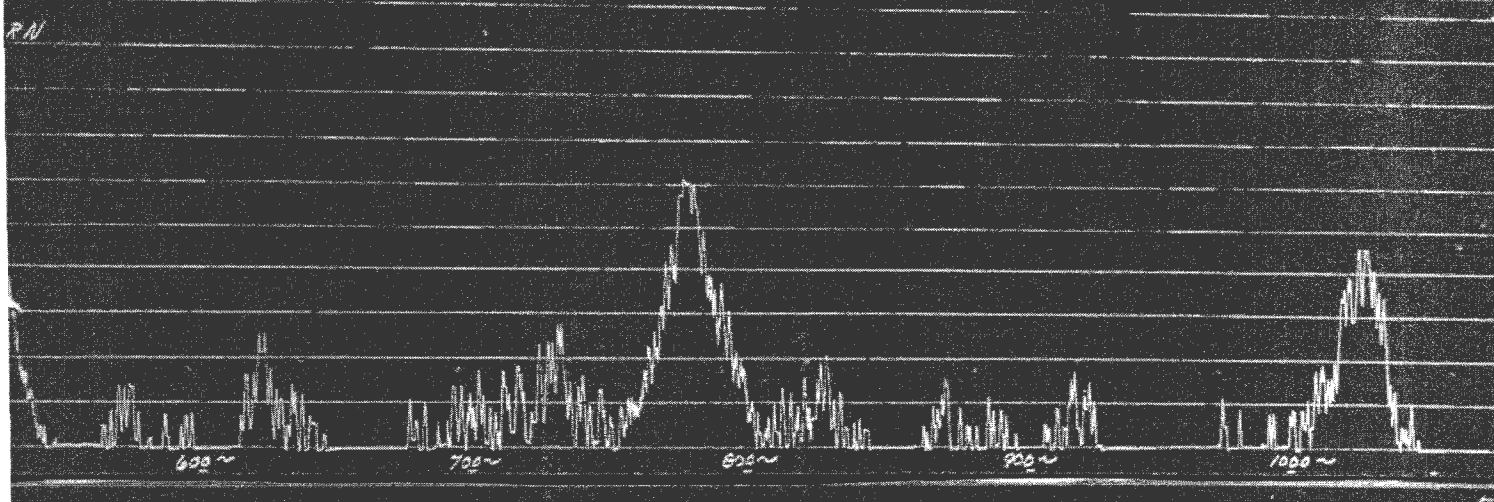
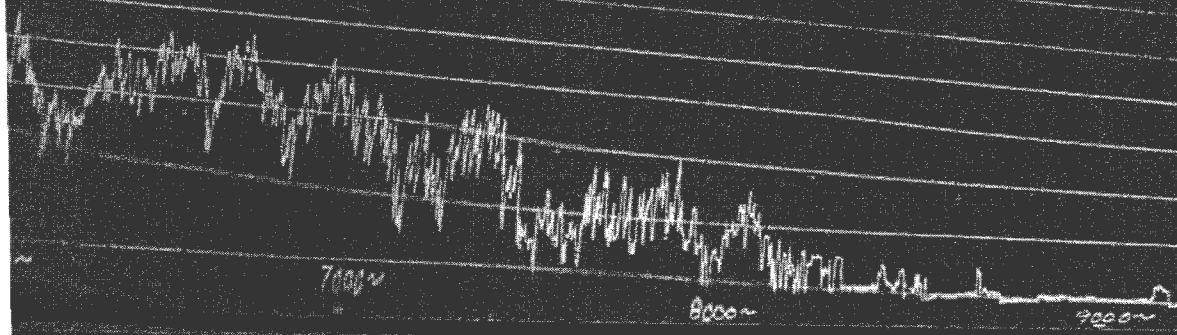
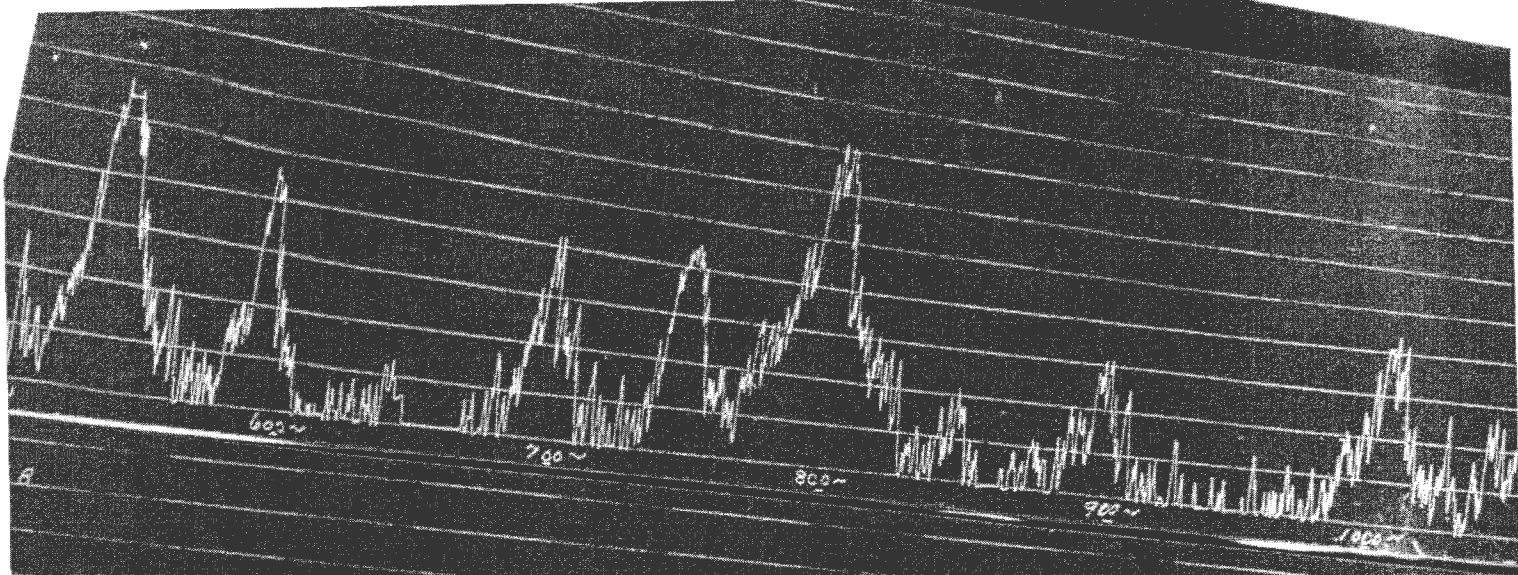
- (1) Power consumption.
- (2) Endurance - Failed after 20.75 hours due to an open circuit in the armature.

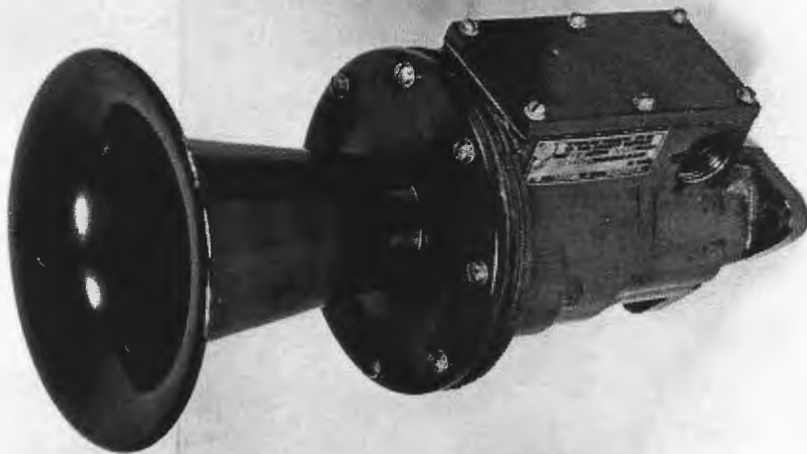
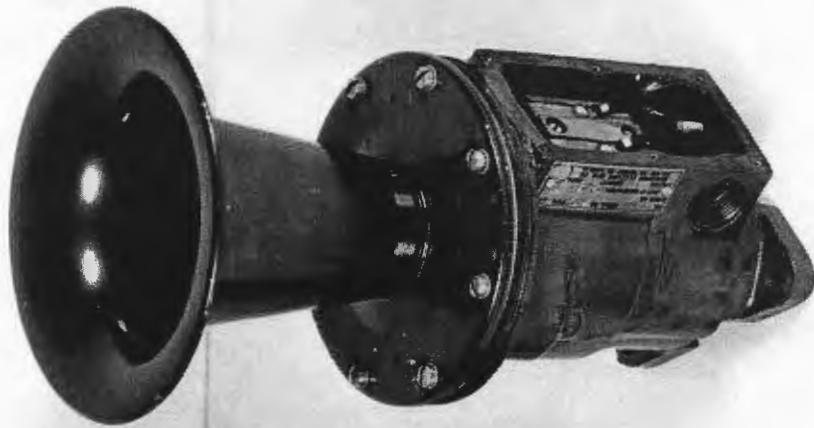
Type H-9 - 115 V.A.C.

- (3) Endurance - Failed after 27 hours due to an open circuit in the armature. When the horn was examined, two of the rivets (pc. 48) securing the anvil (pc. 46) to spring strip (pc. 45) had fallen out.

16. It will be noted that the acoustical characteristics of the sample horns differ greatly with those of the samples reported by reference (d). The total sound energy is less and the frequencies of the principal components are higher. The notes produced were of a scratchy variety.







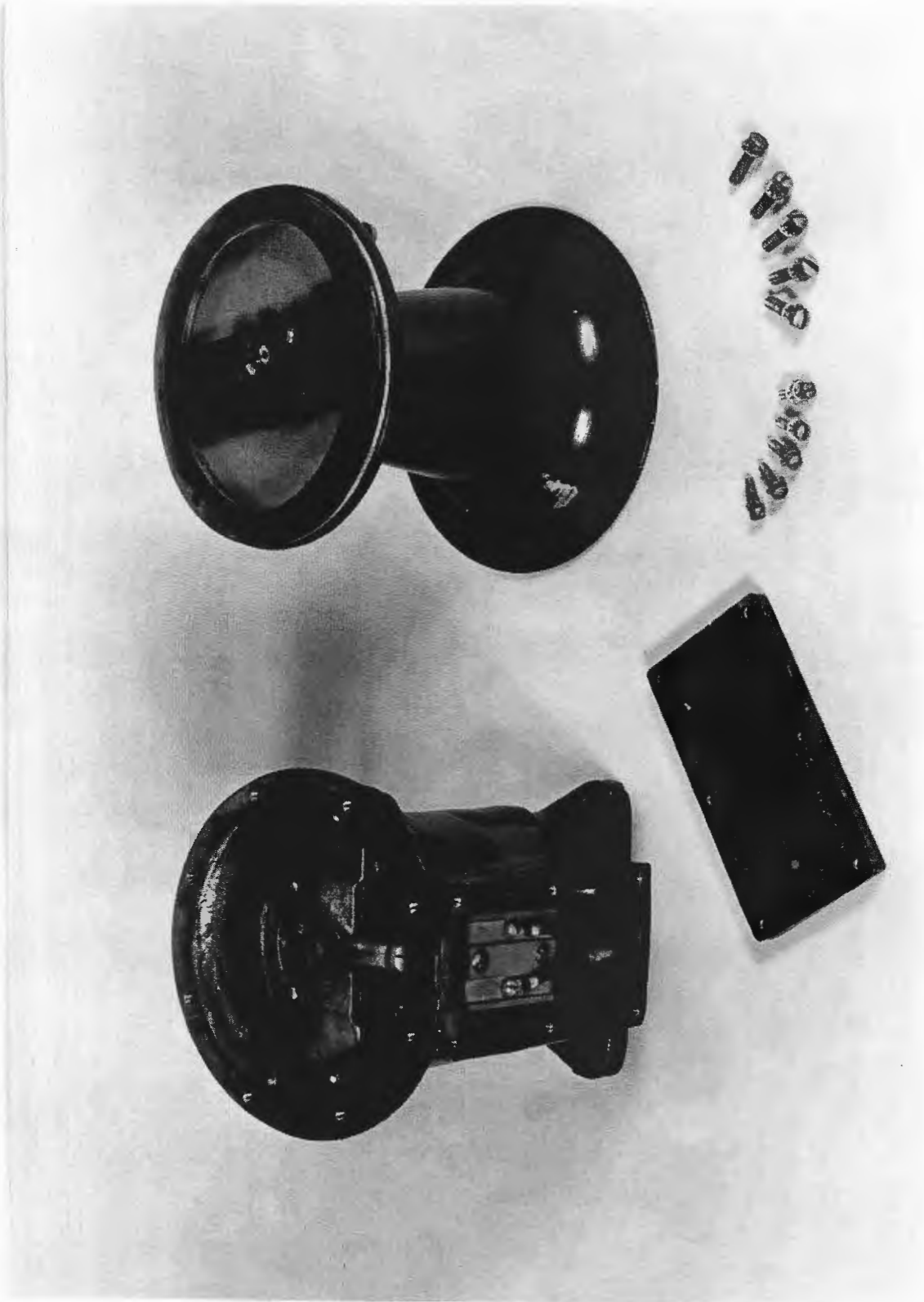


PLATE 3