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NAVY DEPARTMENT  
BUREAU OF ENGINEERING

FR-1453

Report of Test

on

Samples of Types B-7 and B-8  
Single Stroke Chimes

Benjamin Electric Manufacturing Company,  
Des Plaines, Illinois, Exhibitor

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 additional references pertinent to this problem are listed as references (b) and (c).

Reference: (a) Bueng. ltr. S65-(5-16-Ds) of 7 June 1938.  
(b) Specifications 17S11(INT) of 15 February 1938.  
(c) Manufacturer's Drwg.191-383 (Assembly).

### OBJECT OF TEST

2. The object of this test was to determine how closely the samples of chimes comply with the specifications, reference (b), and their suitability for Naval use.

### ABSTRACT OF TEST

3. The two samples were set up at this Laboratory in test circuits and their performance carefully observed for compliance with the specifications. The usual inspection of the chimes, to ascertain whether the materials used were in strict accordance with the requirements, concluded the test.

## Conclusions

(a) The subject bar chimes, manufactured and submitted by Benjamin Electric Manufacturing Company, Des Plaines, Illinois, complied with the electrical and sound pressure output requirements of the specifications. As noted under "Results of Test", all discrepancies pertained to case design and the use of unapproved insulating materials.

(b) A sketch of a suggested form of watertight case is given as Plate 1.

Recommendations

(a) Due to the present form of case construction, these chimes are not recommended for Naval use.

(b) It is further recommended that the manufacturer be invited to construct a marine model, similar in design to sketch given as Plate 1, and submit samples for test.

## DESCRIPTION OF MATERIAL UNDER TEST

4. Two samples were submitted, one designed for 115 Volts, direct current, and submitted as a type B-7, and one for 115 Volts, 60 cycle alternating current, and submitted as a type B-8.

5. In design, the chimes are alike except for the solenoid windings. The type B-7 coil has a d.c. resistance of 751 ohms and the type B-8 a resistance of 218 ohms.

6. The solenoid is enclosed in a cast iron case designed for commercial installation on a concealed outlet box. A terminal block of fibre material is located on the inside of the case. A nameplate of aluminum is on the outside.

7. The note is produced by the solenoid plunger striking against a bar chime suspended loosely between felt washers on two wood screws which thread into a wood block. This block also supports a resonator.

8. The plunger, or armature, is of soft iron, copper plated, and has a piece of phenolic material inserted at one end for striking the chime. A piece of felt projects from the bottom of the plunger to prevent a noise when the plunger returns and strikes the adjustment screw. This adjustment screw is provided to regulate the stroke of the plunger.

9. Further details in the design are given by photographs, Plates 2 and 3.

## METHOD OF TEST

10. The chimes, following measurements for power consumption, pitch of note and sound pressure output, were placed on a standard Bureau of Engineering shock stand, 12 inches below the anvil, and subjected to 2 shocks of 250 foot pounds each while deenergized and energized and mounted in each of the following positions:

- (a) Normal vertical position.
- (b) Parallel to anvil, inclined 45 degrees back from vertical.
- (c) Parallel to anvil, inclined 45 degrees forward from vertical.
- (d) Edgewise to anvil, inclined 45 degrees from vertical.
- (e) Edgewise to anvil, inclined 45 degrees back from vertical.

11. They were next placed on a 3-foot pound vibrating machine and subjected to six periods of 30 minutes each at 100, 150, 200, 250, 300 and 350 blows per minute. During this test, the chimes were operating at the rate of 10 cycles per minute.

12. Next followed tests for endurance by operating them 10 times per minute (equal time on and off), every alternate minute, for 12 hours. This test was conducted in two halves, the first half at an ambient temperature of 60° C., the second half at 0° C. The temperature rise of each solenoid winding was obtained during the first half of the test, using the resistance method.

13. Upon completion of the endurance test, the acoustical output of the chimes was again measured to determine the effect of the endurance test.

14. They were next tested for operation when inclined 45° to the vertical in all planes and energized at 10% over and 10% under rated voltage. The type B-8 was checked for operation at ± 5 cycles in frequency.

15. Each sample was then given a test for dielectric strength by applying 1500 V. a.c., 60 cycles, between all current carrying parts and ground for a period of one minute. Immediately following this they were tested for insulation resistance, using a 500 volt megger.

16. Following an inspection of the samples to determine conformance with the specifications in the matter of materials, design and workmanship, one was placed in a salt spray machine, and while under constant ultra-violet light, subjected to a 20 percent hot (55° C.) salt spray for a period of 3 minutes, followed by a hot (55° C.) air blast for a period of 3 minutes. This cycle was repeated for 100 continuous hours.

17. The test was concluded with an examination of the sample subjected to the salt spray for signs of corrosion.

#### RESULTS OF TEST

18. The test results obtained were as follows:

<u>Requirements</u>	<u>Test Values</u>	
	<u>Type B-7</u>	<u>Type B-8</u>
Volts: 115	115	115
Current:	Direct	Alternating, 60 cycles.

<u>Requirements</u>	<u>Test Values</u>	
	<u>Type B-7</u>	<u>Type B-8</u>
Amperes: Not specified.	0.173	0.215
Shock and inclination: Shall withstand 20 shocks of 250 foot pounds each under the conditions specified in paragraph F-2g.	Complied	Complied
Vibration test: Shall withstand 3 foot pound shocks under the conditions specified in paragraph F-2h.	Complied	Complied
Endurance: Shall operate satisfactorily for 12 hours at the rate of 10 cycles per minute, every alternate minute. First 6 hours at ambient of 60° C., the second 6 hours at 0° C.	Complied	Complied
Temperature rise: Shall not exceed 45° C. during first 6 hours of endurance test at ambient of 60° C.	36.2° C.	32.4° C.
Sound pressure output: Shall be not less than 45 decibels, measured as specified in paragraph D-13h.	62 db Note: Chimes operating at maximum rate when measurements were made.	61 db
Pitch of Note: Not specified.	384 CPS	384 CPS
Power Factor: Not less than 50%.	- - - -	64.7%
Inclination: Shall operate satisfactorily at variations of ±10 percent in voltage and ±5 cycles in frequency, when inclined 45° to the vertical in all planes.	Complied	Complied



RequirementsTest ValuesType B-7Type B-8

Dielectric: Shall withstand 1500 V. a.c., 60 cycles, applied for 1 minute between all current carrying parts and ground.

Complied

Complied

Insulation resistance: Not less than 5 megohms between any electrical point and ground.

100 megohms  
(500 V. megger)

100 megohms  
(500 V. megger)

Watertightness: Shall operate following immersion in sea water for a period of 1 hour after natural drainage.

Not conducted  
due to case  
construction.

Not conducted  
due to case  
construction.

Salt spray test: Shall be operative and show no corrosive or other damage to parts as a result of the salt spray test, paragraph F-2p.

\*All cast iron and steel parts showed corrosion after 24 hours of exposure. The bar chime showed corrosion at edges.

Not tested because of identical construction.

Weight: Shall not exceed 3 pounds.

2 lbs. 10 oz.

2 lbs.10 oz.

Terminal block: Molded phenolic material equipped with 9-S-1841-L terminals.

\*Fibre block with commercial terminals.

\* Fibre block with commercial terminals

Nameplate: Non-corrosive - Specification 42N2.

\*Aluminum, etched lettering.

\* Aluminum, etched lettering.

Windings: Double silk or double cotton covered enamel copper wire.

\*Plain enamel copper wire on fibre form.

\* Plain enamel copper wire on fibre form.

Case Material: Cast aluminum alloy or valve bronze.

\*Cast iron with wooden support for resonator

\* Cast iron with wooden support for resonator.

Dimensions: Not specified.

9!0x6!25x2!25

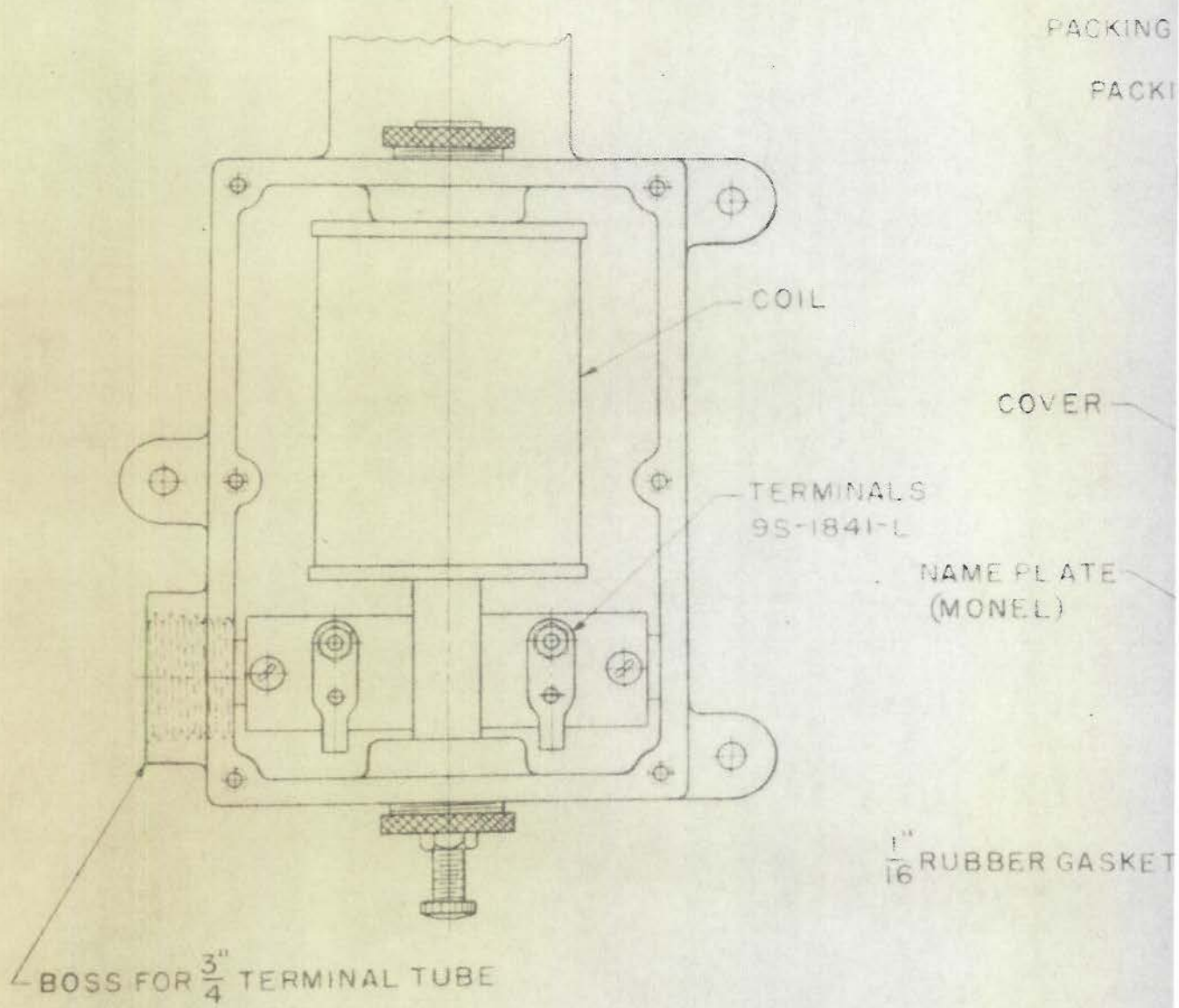
9!0x6!25x2!25

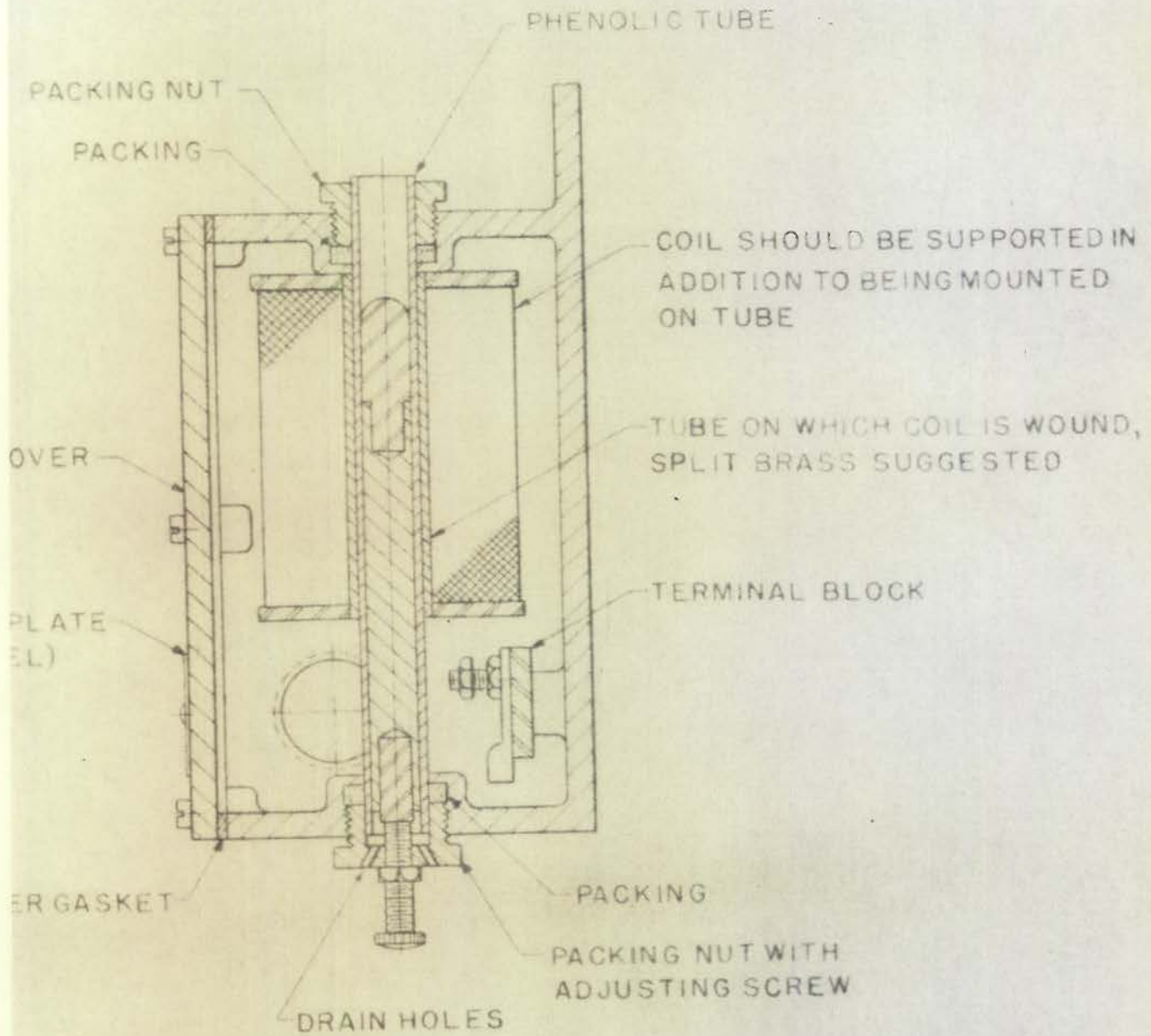
\*Denotes failure to comply with the specifications.

## CONCLUSIONS

19. The **subject** bar chimes, manufactured and submitted by Benjamin Electric Manufacturing Company, Des Plaines, Illinois, complied with the electrical and sound pressure output requirements of the specifications. As noted under "Results of Test", all discrepancies pertained to case design and the use of unapproved insulating materials.

20. A sketch of a suggested form of watertight case is given as Plate 1.





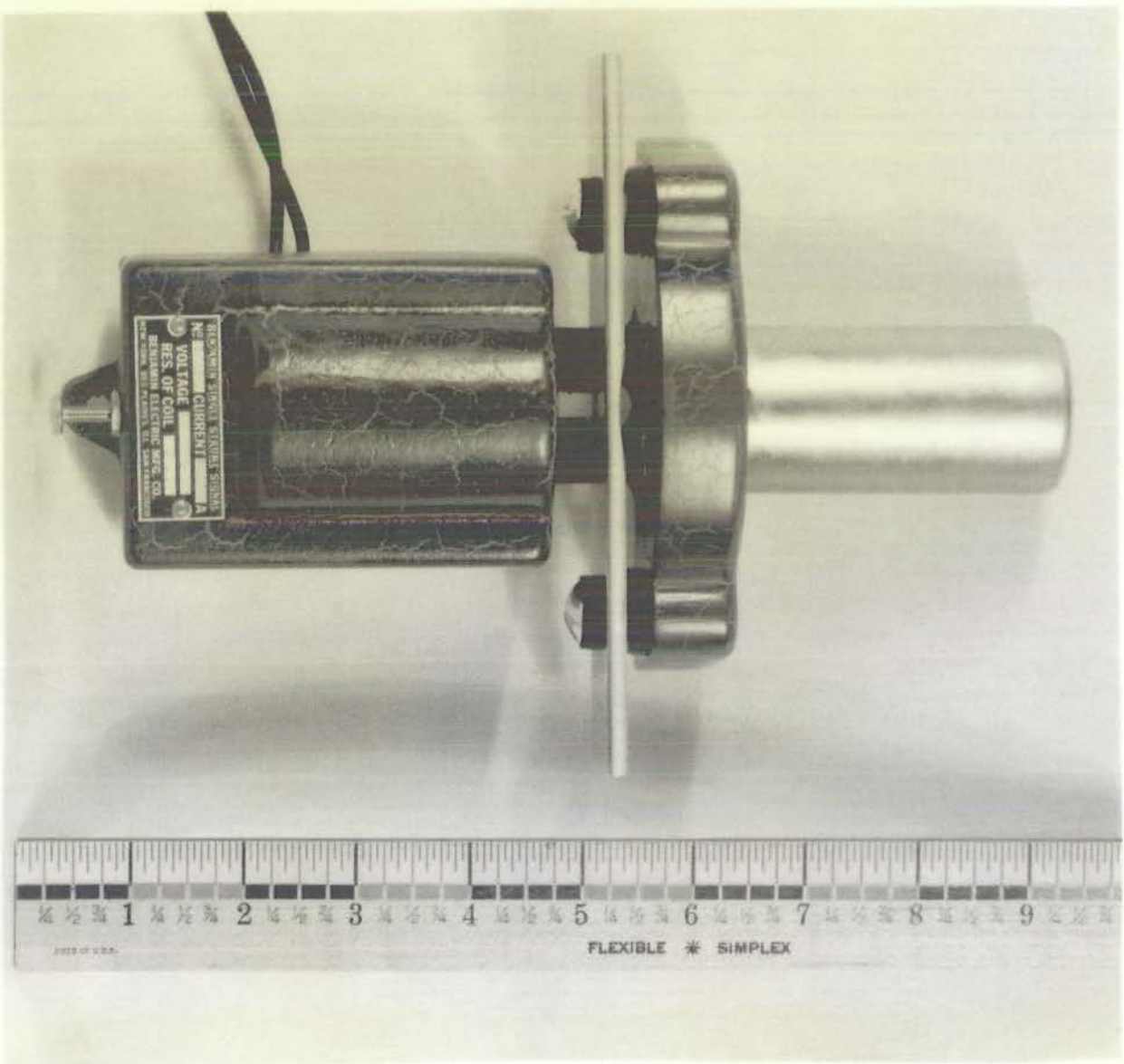


Plate 2

