

24 November 1941

NRL Report No. B-1810

FR-1810

NAVY DEPARTMENT

Report of Test

on

Bell, Navy Type B-4

Submitted by

Edwards and Company, Incorporated,  
Norwalk, Connecticut

NAVAL RESEARCH LABORATORY  
ANACOSTIA STATION  
WASHINGTON, D. C.

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Authorization: BuShips ltr. S65-4(355) of 10 September 1941

Date of Test: November 1941

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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 10 September 1941.  
(b) Specification 17S11C of 1 May 1940.  
(c) Edwards and Co. Plan No. 6755.  
(d) NRL Test No. 208 of 7 October 1941

OBJECT OF TEST

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

ABSTRACT OF TEST

3. The sample bell 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 sample bell failed to comply with the requirement of the specification in the following minor particulars:

- (1). Four cc of water leaked into the case around shaft (pc.16) under the splashproof test.
- (2). A brass engraved nameplate is used in lieu of the usual copper-nickel alloy.
- (3). Brass washers (pc.73) and phosphor bronze lock-washers (pc.82) are in contact with the aluminum case (pc.1).
- (4). The protection coat of zinc chromate paint has been omitted on both the case and cover.
- (5). The laminated core is not protected against corrosion.

#### RECOMMENDATIONS

(a). It is recommended that the sample bell be approved subject to the correction of the deficiencies noted under "Conclusions" and the submission of a modified sample for a Check Test.

(b). It is further recommended that three heavily webbed or fillited mounting lugs be provided for the case in lieu of the four comparatively light ones now used.

#### DESCRIPTION OF MATERIAL UNDER TEST

4. The sample bell, submitted by Edwards and Company, Incorporated, Norwalk, Connecticut, as a Navy type B-4, is of the vibratory type, employs contacts for interrupting the current, and is designed for operation at 115 volts, a.c., 60 cycles.

5. The mechanism is housed in a cast aluminum alloy case, having two (2) bosses, one tapped for a  $3/4$  - inch (IPS) terminal tube, and four (4) mounting lugs, drilled for  $3/8$  - inch mounting screws.

6. The cast aluminum alloy cover, on which the mechanism is mounted, is secured to the case by six (6)  $1/4$  - inch fillister headed steel machine screws, used as through bolts. A  $1/4$  - inch rubber gasket, of square cross section, is recessed into the rim of the case to insure watertightness.

7. The gong is struck at the rate of approximately 60 strokes per second by means of a bell hammer, secured to a shaft extending through the case cover. A packing gland is provided for the shaft to prevent water from entering the case.

8. The acoustical analysis of the sample bell is given by photostat, Plate I. Further details in the design and construction of the bell are shown by photographs, Plates 2 and 3, and drawing reference (c).

METHOD OF TEST

(9). The sample bell, following tests to determine its electrical and acoustical characteristics at rated voltage and frequency, were subjected to further tests in the following order:

- (a). Stroke frequency
- (b). Inclination
- (c). Endurance and temperature rise
- (d). Sound pressure output following endurance
- (e). Shock
- (f). Vibration
- (g). Dielectric
- (h). Insulation resistance
- (i). Splashproof

(10). 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

(11). The test results obtained were as follows:

Requirements

Test Values

Voltage: 115 volts Tested at 115 volts, a.c., 60 cycles.

Amperes: Not specified. 0.295 ampere.

Watts: Shall not exceed 25 watts 11.2 watts

Sound pressure output: Shall be not less than 65 decibels at 18 feet in a soundproof room under the following conditions:

(a) Before the endurance test 92 d.b.

(b) Following the endurance test 84 d.b.

Stroke frequency: Shall be within 40 to 60 strokes per second. Approximately 60 per second.

Inclination: Shall operate in any position when supplied with rated voltage I 7 volts and 5 cycles. 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. Satisfactory except for the adjustment of bell hammer (pc.6) on two occasions to compensate for wear.

Temperature rise: Maximum temperature shall not exceed 115° C. during the endurance test. (55° C. rise at 60° C. ambient temperature.) Complied. 14.7° C. above 60° C. ambient temperature

Shock test: Shall withstand 20 shocks of 250 foot pounds each as specified in paragraph F-2g. No change in operation or derangement of parts due to this test.

Requirements

Test Values

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
Insulation resistance: Shall be not less than 5 megohms at not less than 500 volts, d.c.	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.	*Leaked approximately 4 cc of water at packing gland.
Weight: Shall not exceed 8 pounds.	Complied. 7 pounds.
Nameplate: Shall be in accordance with N. D. Specification 42N2.	*Sheet brass with engraved 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.	*Brass nameplate, (pc 38) brass washers, (pc 73) and phospher bronze lockwashers (pc,82) are in contact with aluminum.

Requirements

Test Values

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. \*Zinc chromate paint omitted.

Protection of exterior surfaces: Exterior surfaces of all equipment, except nameplates, gongs, and strikers, 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.

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.

Requirements

Test Values

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

\*Laminated core is not protected against corrosion.

Terminal block: Shall be of an 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.

Complied

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

Complied

Requirements

Test Values

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.

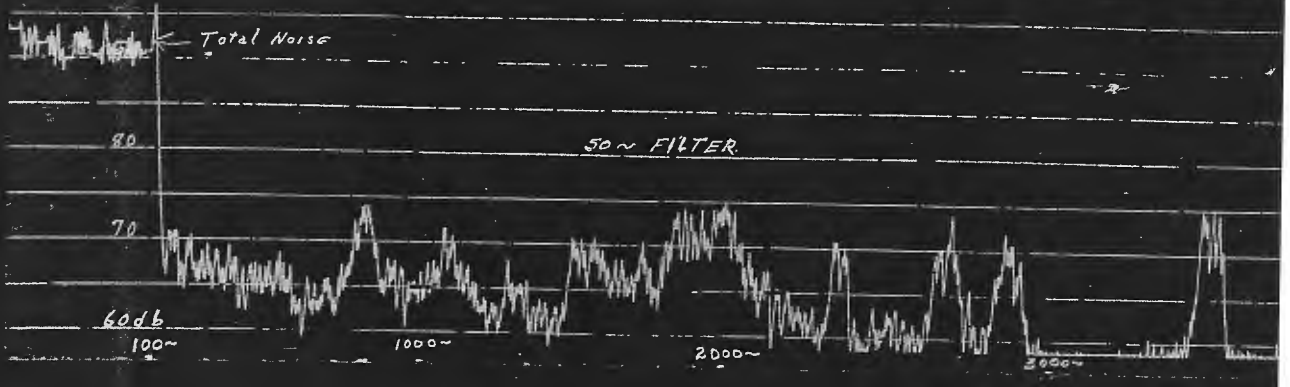
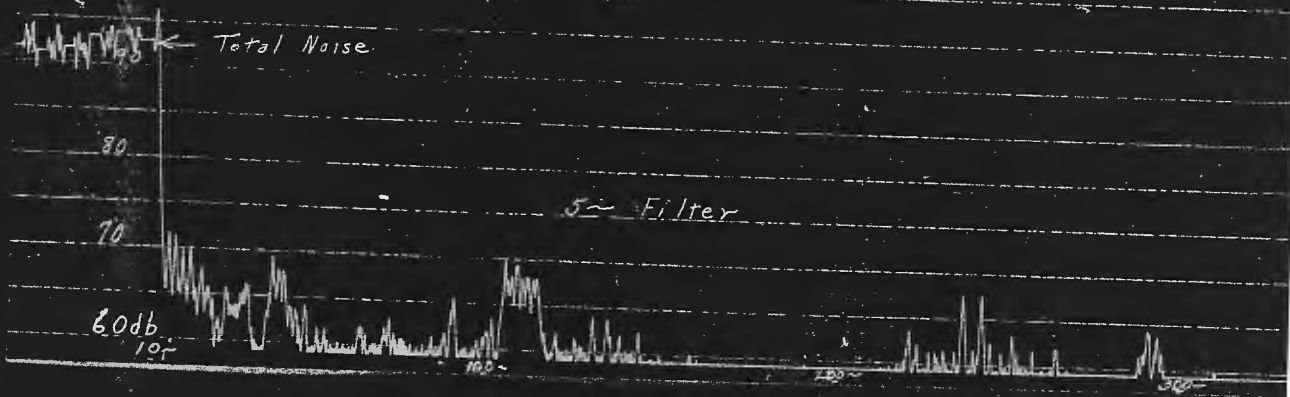
Complied

\*Denotes failure to comply with the specifications.

## Conclusions

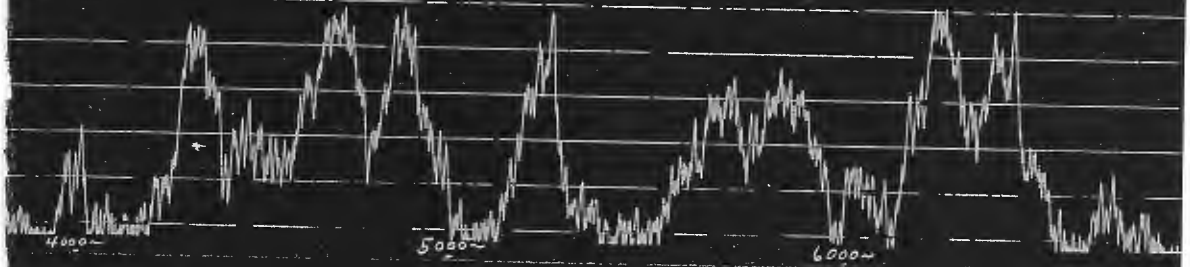
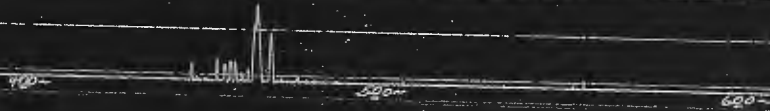
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EDWARDS and CO.

TYPE B4 BELL



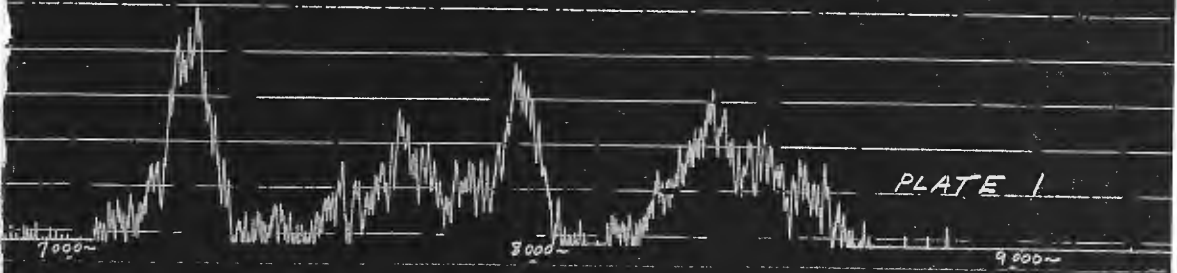
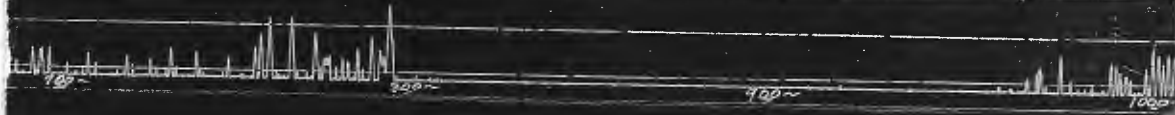




PLATE 2



PLATE 3