

B-2016

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NRL Report No. B-2016

NAVY DEPARTMENT

Report of Test

on

Bell, Type B-3

Submitted by

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Adrian, Mich.

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D. C.

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Authorization: BuShips Ltr. S65-2(350) of 14 January
1943.

Date of Test: February - March 1943

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Distribution:
BuShips (6)

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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. S65-2(350) of 14 January 1943.
(b) Specification 17S11(INT) of 1 October 1941.
and Amendment 2 of 1 March 1942.
(c) Specification 17E13(INT) of 1 March 1942.
(d) Schwarze Electric Co. Drwg. EM 3249.

OBJECT OF TEST

2. The object of this test was to determine conformance of the sample bell with 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 to determine compliance in the matter of materials, design, and workmanship, concluded the test. The HI shock test specified in reference (c) was not conducted due to the failure of the bell during the endurance test.

CONCLUSIONS

(a) The sample bell failed to comply with specification, reference (b), in the following respects:

- (1) The stroke frequency is 28.7 in lieu of 40 to 60 strokes per second.
- (2) During the endurance test, at 60° C., the plunger stuck in the plunger tube, due to insufficient clearance.
- (3) The bell is not adequately protected against corrosion as demonstrated by the salt spray test. The edge of the gong and hammer spring (pc. 15) were badly corroded.
- (4) There is insufficient clearance between the contact assembly and coil supporting bracket. The fiber insulation used is not approved for this use.
- (5) Sleeving is used over bare copper wire in the wiring of the mechanism.
- (6) Enameled copper wire with no other insulation is used in the coil windings.
- (7) Cloth tape cemented to the coil is used for the coil covering.
- (8) The coil is unimpregnated.
- (9) Solid steel is used for the magnetic circuit which includes a solid steel plunger.
- (10) No terminal lugs were furnished.
- (11) No terminal tube bosses were provided.
- (12) The bell is designed for 4-point in lieu of 3-point bulkhead mounting.

RECOMMENDATIONS

(a) That the subject bell be considered NOT satisfactory for Naval use in view of the deficiencies noted under "Conclusions".

DESCRIPTION OF MATERIAL

4. The sample, submitted by Schwarze Electric Company as a Navy Type B-3 bell, is designed to operate from a supply of 115 volts, direct potential.

5. The mechanism, consisting of a coil wound on a brass plunger tube, a steel plunger, contacts for interrupting the circuit, and a terminal block, is mounted on a "U"-shaped steel base plate. The coil is supported by two steel brackets secured to the base plate by two No. 6-32 round-headed steel machine screws threaded into the supporting brackets. The base plate is secured to the steel housing by inserting one end into a slotted steel mounting foot welded to the back of the case and by securing the other end by means of a No. 8-32 round-headed steel machine screw which passes through an extending bracket and threads into a steel mounting pad, welded to the case.

6. A bronze hammer passes through a neoprene impregnated cambric diaphragm and is enclosed in a phenolic housing secured to the case by five No. 4-36 round-headed steel machine screws threaded into a 1/8-inch steel ring welded to the case.

7. A formed steel base, spot-welded to the back of the case, is drilled for four 3/8-inch mounting screws. A steel gong post bracket is secured to the base by two 1/4 - 28 round-headed steel machine screws used as through bolts. The steel gong post is "U"-shaped and fits into two slots in the gong post bracket. The steel gong is secured to the gong post by means of a 3/8 -16 hexagonal headed steel screw extending through the gong, gong post, gong post bracket, and threading into a square nut welded to the gong post bracket.

8. A rubber gasket of 1/4-inch cross section is recessed in a channel in the steel case cover and contacts the rim of the case when the cover is secured by four 1/4-inch round-headed steel machine screws passing through the cover and four steel brackets welded to the case.

9. The gong is finished with black enamel. The case and case cover are finished with gray paint, applied over zinc chromate paint.

10. The acoustical analysis of the sample bell is given by Plate 1. Further details in its design and construction are shown by photographs, Plates 2, 3, and 4, and by drawing, reference (d).

METHOD OF TEST

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

- (a) Inclination
- (b) Endurance and temperature rise
- (c) Dielectric
- (d) Insulation resistance
- (e) Splashproof
- (f) Salt spray

12. The tests were concluded with a careful examination of the sample to determine compliance with the specifications pertaining to design, quality of workmanship and materials, and any defects resulting from the tests.

RESULTS OF TEST

13. The test results obtained were as follows:

<u>Requirements</u>	<u>Test Values</u>
Voltage: 115 volts, direct potential.	Tested at 115 volts, direct potential.
Amperes: Not specified.	0.074 ampere.
Watts: Para. E-1.	Complied. 8.5 (VA).
Sound pressure output: Para. E-1.	Complied. 87 db.
Stroke frequency: Para. E-2c(2).	*28.7 strokes per second.
Inclination: Para. D-1lh.	Complied.
Endurance: Para. F-2m(1).	*Did not comply. At 60° C. the plunger stuck in the plunger tube causing the contacts to remain closed.
Temperature rise: Para. F-2m(4).	Complied. 38° C. above 60° C. ambient temperature.
Shock and vibration: Paragraphs F-2g and F-2h.	Not conducted due to the failure of the bell during the endurance test.
Dielectric: Para. D-4a.	Complied.
Insulation resistance: Para. D-4b.	Complied. 60 megohms with 1000 volt megger.
Splashproof integrity: Para. D-12d.	Complied.
Salt spray test: Para. F-2p.	*Unsatisfactory. Edge of gong corroded, particularly where hammer strikes gong. Hammer spring (pc. 15) corroded.
Weight: Para. E-1.	Complied. 6 pounds, 3 ounces.
Nameplate: Para. D-13c.	Complied. Plastic material.

RESULTS OF TEST (Cont'd)

Requirements

Test Values

Protection of exterior surfaces: Para. C-5d.	*Gong is finished with black enamel. (Case and cover are finished with gray paint applied over zinc chromate paint).
Clearances: Para. D-5.	*Insufficient clearance between the contact assembly and coil supporting bracket. Fiber insulation used is not an approved material for this use.
Wiring: Para. D-6a.	*Sleeving used over bare copper wire.
Coil winding: Para. D-6b.	*Enameled copper wire used.
Protective covering for coils: Para. D-9a.	*Cloth tape cemented to coil
Waterproofing of coils: Para. D-9e.	*Unimpregnated.
Magnetic circuit: Para. D-9c.	*Solid steel magnetic circuit including a steel plunger is used.
Terminal block: Para. D-10a.	Complied.
Terminal lugs: Para. D-10b.	*None furnished.
Supply leads: Para. D-10c.	Complied.
Terminal wiring: Para. D-10d.	*No bosses provided.
Springs: Para. D-11d.	Complied. Phosphor bronze.
Contacts: Para. D-11e.	Complied.
Mounting: Para. D-11i.	*Designed for 4-point in lieu of 3-point bulkhead mounting.
Agreement with test plans: Para. H-3b.	Complied.

*Denotes failure to comply with the specification.

CONCLUSIONS

14. The sample bell failed to comply with specification, reference (b), in the following respects:

- (1) The stroke frequency is 28.7 in lieu of 40 to 60 strokes per second.
- (2) During the endurance test, at 60° C., the plunger stuck in the plunger tube, due to insufficient clearance.
- (3) The bell is not adequately protected against corrosion as demonstrated by the salt spray test. The edge of the gong and hammer spring (pc. 15) were badly corroded.
- (4) There is insufficient clearance between the contact assembly and coil supporting bracket. The fiber insulation used is not approved for this use.
- (5) Sleeving is used over bare copper wire in the wiring of the mechanism.
- (6) Enameled copper wire with no other insulation is used in the coil windings.
- (7) Cloth tape cemented to the coil is used for the coil covering.
- (8) The coil is unimpregnated.
- (9) Solid steel is used for the magnetic circuit which includes a solid steel plunger.
- (10) No terminal lugs were furnished.
- (11) No terminal tube bosses were provided.
- (12) The bell is designed for 4-point in lieu of 3-point bulkhead mounting.

ELECTRIC COMPANY

NO. B-2016

B-3 BELL

600~

700~

800~

900~

2

PLATE 1

6000~

7000~

8000~

9000~

SCHWARZE ELECTRIC
REPORT NO. B-2014
TYPE B-3 BELL

200~

300~

400~

500~

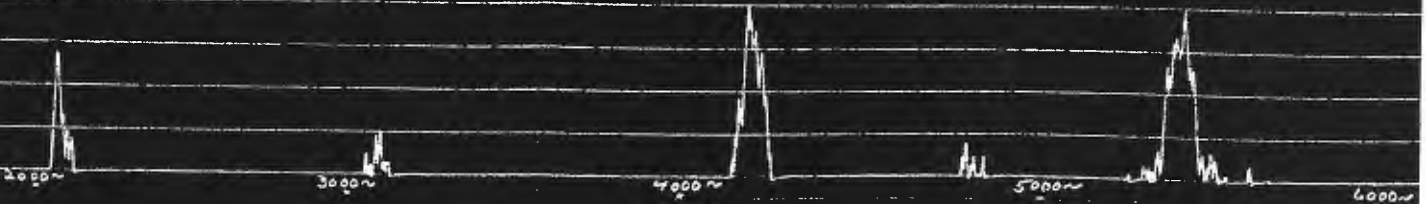
2000~

3000~

4000~

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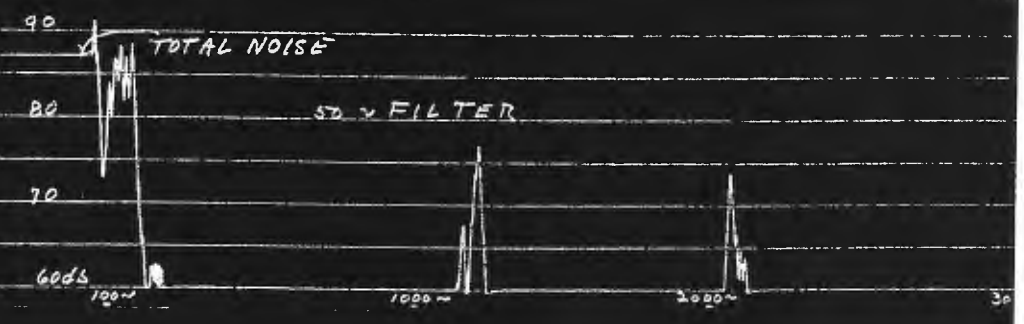
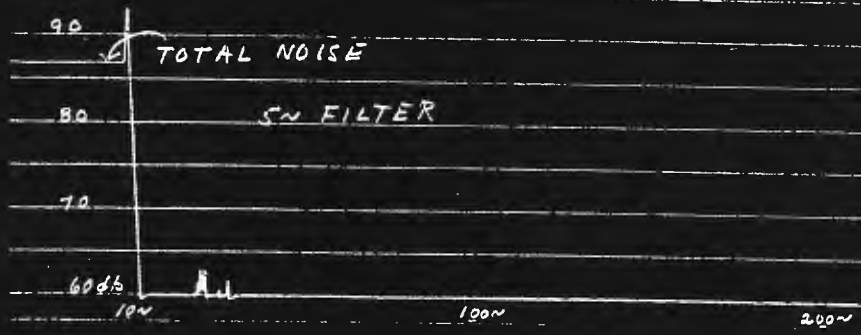




PLATE 2

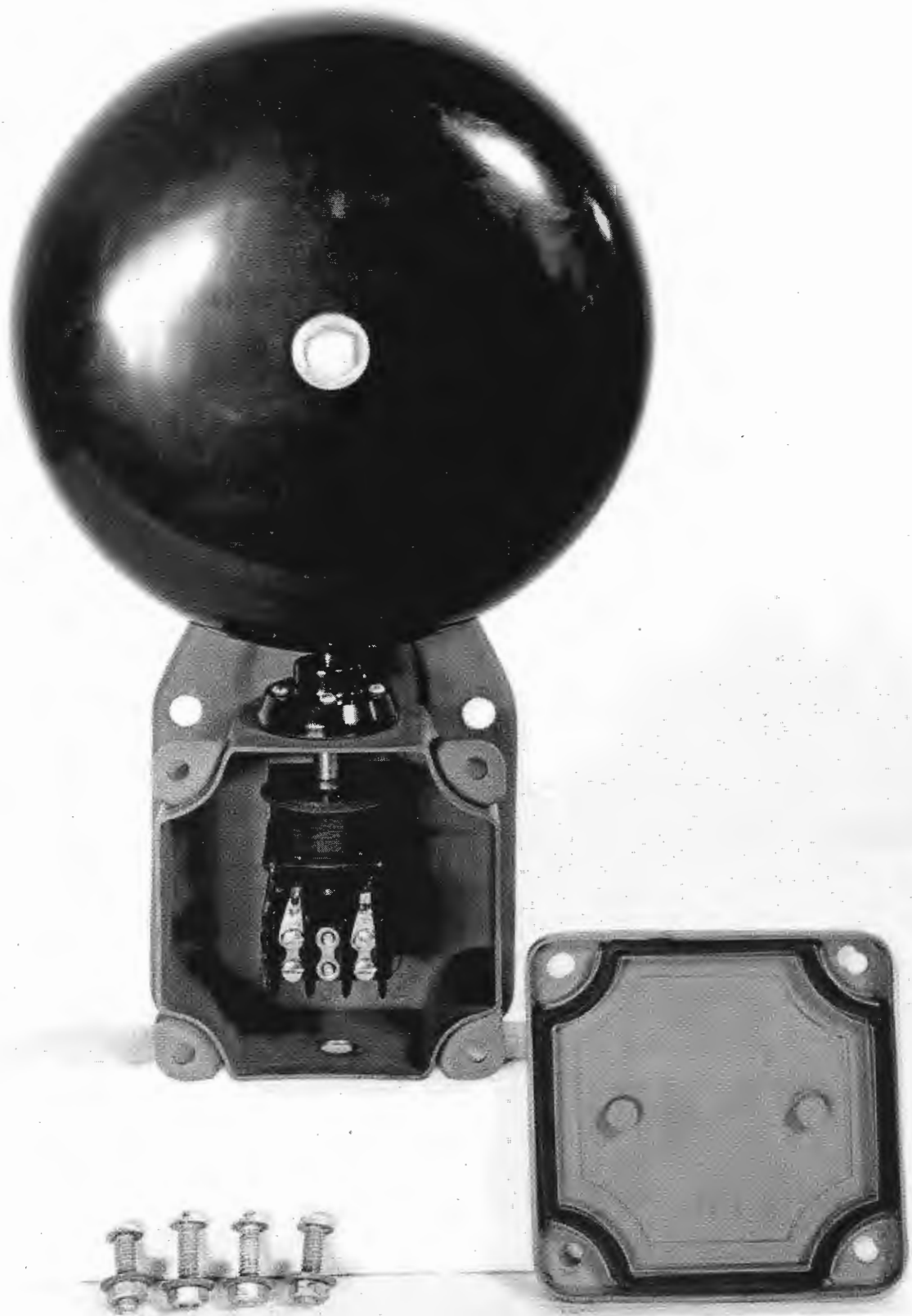


PLATE 3

