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NAVY DEPARTMENT
BUREAU OF ENGINEERING

Report of Test
on
Six-inch a.c., 60 cycle vibrating bell
submitted by
Chas. Cory Corporation

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D. C.

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AUTHORIZATION FOR TEST

1. This test was authorized by ref.(a) and other additional references pertinent to this problem are listed as refs.(b) and (c).

Reference: (a) BuEng let.S65-4/L5(1-30-Ds) of 6 Feb.1935.
(b) Navy Dept.Specifications SGS(65)-102 of 2 Jan.1935.
(c) Navy Dept.Specifications 17S11a of 1 April 1931.

OBJECT OF TEST

2. The object of this test was to determine the suitability of this type of bell, submitted by the Chas.Cory Corporation, Brooklyn, N.Y., for installation on the U.S.S. YORKTOWN and ENTERPRISE and its conformance with Navy Department specifications, refs.(b) and (c).

ABSTRACT OF TEST

3. The bell was set up at this Laboratory in a standard test circuit and closely observed for its operating characteristics while under test for endurance, over and under voltage and frequency, inclination, and shock. The usual tests for current consumption, power factor, insulation resistance, dielectric strength, audibility range, and watertight integrity then followed.

Conclusions

(a) This bell as manufactured and submitted by the Chas. Cory Corporation is identified by "Type CAL-740-2A1-115 volt, 60 cycle" and complies with the requirements of the Navy Department specifications, refs. (b) and (c) with the exception of the endurance and watertight integrity requirements. These defects and the methods of correcting them are discussed under "COMMENTS", pars. 20 and 21.

(b) The bell is exceptionally good in audibility range and would be suitable for the Naval Service if modified in accordance with "COMMENTS", pars. 20 to 25 inclusive.

Recommendations

(a) It is recommended that this bell be approved only for installation on the U.S.S. YORKTOWN and ENTERPRISE subject to modifications given under "COMMENTS" of this report.

(b) Type approval of this six inch bell is not recommended inasmuch as this size will not be accepted for the Naval Service under ref.(b).

(c) In view of the minor changes made by this Laboratory, the subject bell, by request of the Bureau, is being returned to the manufacturer for guidance.

(d) It is further recommended that the Bureau request the manufacturer to return the modified bell to this Laboratory for use on comparative tests.

DESCRIPTION OF MATERIAL UNDER TEST

4. This bell is of the vibrating type, designed for 115 volt, a.c., 60 cycle operation.

5. The magnetic circuit consists of a "U" shape laminated core and a solid armature of rectangular cross section. Two windings, having a total d.c. resistance of 32.43 ohms at 26°C., are connected in series. Each pole piece supports its respective coil which is secured by bending over the outside laminations.

6. The coils are of form wound enameled wire covered with varnish cambric and cotton tape and protected from moisture with insulating varnish, properly baked.

7. The armature is provided with two locking adjustments, one a contact which limits its stroke away from the poles and the other a spring to return the armature to its position against the contact.

8. A terminal strip of molded phenolic material is equipped with two standard Navy terminal lugs and a bracket for supporting a flat contact spring. This spring is slotted at the unsupported end to fit an insulating bushing, riveted to the armature. This bushing is so designed that the movement of the armature is greater than that of the contact spring. The contacts are shunted by two fixed resistors, having a total d.c. resistance of 1272 ohms at 26°C.

9. The armature is secured to the striker arm which enters the case cover through a watertight packing gland, made of cadmium plated steel, screwed into the case cover.

10. The entire mechanism of this bell is mounted on the cover of the watertight cast aluminum alloy case. The only external adjustment is the striker which is threaded on to its arm and may be moved in or out as desired.

11. The bell gong is 6.0" in diameter and is of cast bell material. It is supported by a cast steel bracket which is secured to a boss on the case cover by means of a tapered steel pin. The gong is secured to the bracket with a steep cap screw and lockwasher, both cadmium plated. A pin, located in the bracket, engages a hole in the gong, preventing it from turning and making it unnecessary to change the bell adjustments when removing and replacing the gong.

12. In operation the windings are energized and the core attracts the armature, causing the striker to move towards the gong. The movable contact does not break the circuit until the armature has completed the greater part of its travel.

13. All internal parts, with the exception of the laminated core, are protected against corrosion by nickel or cadmium plating.

METHOD OF TEST

14. The bell as received was first placed on a Bureau of Engineering shock stand and tested for shock integrity as given in ref.(b).

15. After having passed the shock test requirements, the bell was transferred to a compartment having an ambient temperature of 65°C. and operated one minute, every other minute for 24 hours. The temperature was then reduced to 30°C. and the bell again operated one minute, every other minute for 24 hours. During the first part of this test, the temperature rise of the windings was obtained by the resistance method.

16. Next, the bell was tested for operation at over and under voltage and frequency when inclined 30° from the vertical plane in all directions.

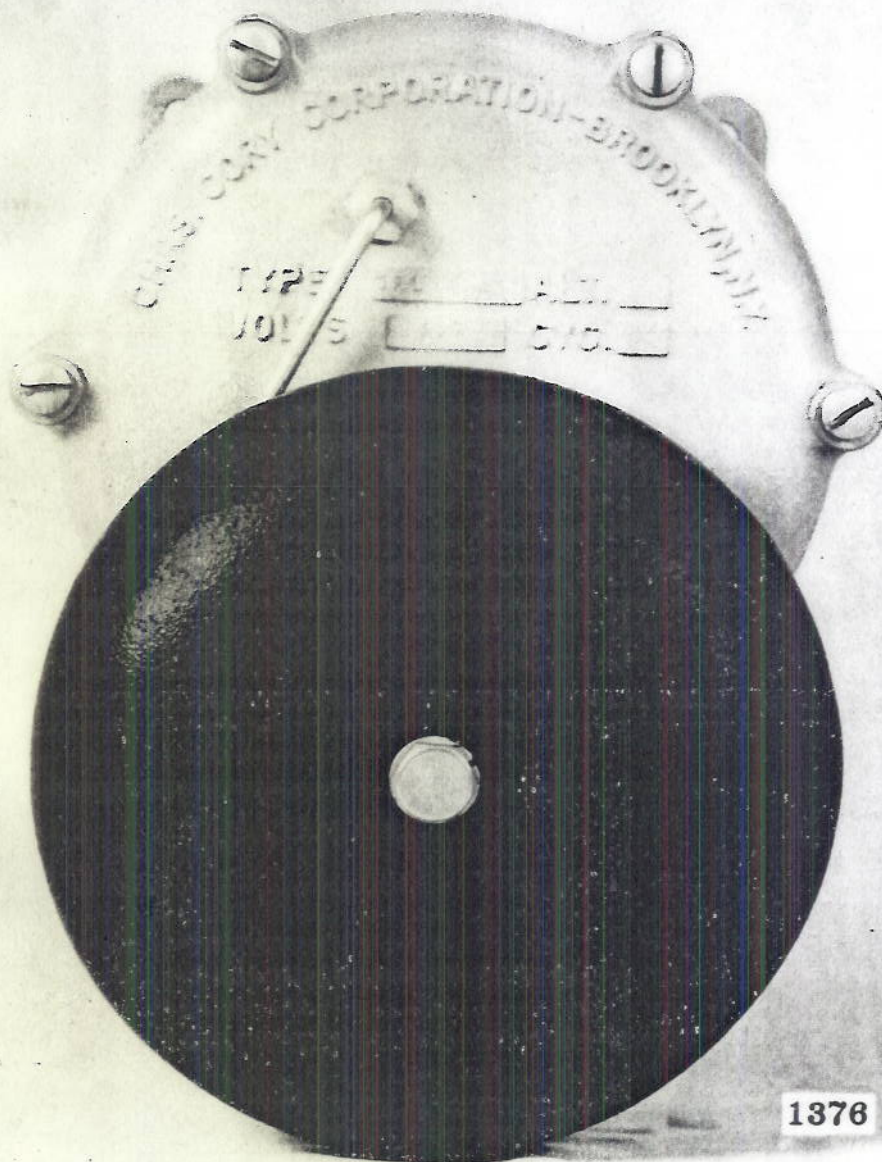
17. It was then tested for current consumption, power factor, insulation resistance, dielectric strength, watertight integrity, and audibility range.

18. The test was concluded with a general examination of the design and materials.

RESULTS OF TEST

19.	<u>Specifications</u>	<u>Requirements</u>	<u>Test Values</u>
	Voltage	115 volts	115 volts
	Current	Alternating	Alternating
	Frequency	60 cycles	60 cycles
	Amperes	-	0.272 amps.
	Watts	Not over 50 watts.	13.60 watts
	Power Factor	Not less than 30%.	43.48%
	Impedance	Not specified.	422.5 ohms at 60 cycles, while operating.
	Endurance	Shall operate one min., every other minute for 24 hours at ambient temp. of 65°C. and one min. every other minute for 24 hours at ambient temp. of 30°C.	Contacts failed. See "COMMENTS", par.20.
	Temperature rise of windings	Shall not exceed 30°C. at ambient of 40°C.	10.18°C rise.

<u>Specifications</u>	<u>Requirements</u>	<u>Test Values</u>
Shock test	Shall be subjected to 5-250 foot pound blows when energized and when de-energized in normal position and when inclined 30° in all directions.	Satisfactory under all conditions.
Inclination	Shall operate when inclined 30° from the vertical plane in all directions at over and under voltage and frequency.	Satisfactory operation under the following conditions: 10% above line voltage -- 126.5 volts at 55 cycles. 20% under voltage-- 92 volts at 65 cycles.
Dielectric	Before immersion 1240 volts a.c., 60 cycle. After immersion, 500 volts a.c. 60 cycles applied for 1 minute between all current carrying parts and ground.	Satisfactory under both conditions.
Insulation Resistance	Before immersion, 5 megohms minimum. After immersion, 1 megohm minimum.	Before -- 200 megohms. After -- 100 megohms (1000 V. megger)
Watertight Integrity	Shall not leak when immersed in salt water to a depth of 3 ft. for a period of 12 hours.	Leaked 45 cc. See COMMENTS, par.21.
Audibility Range	Shall be audible at 100 yards.	175 yards.
Case material	Aluminum alloy	Aluminum alloy, die cast.
Gong material	Cast bell metal.	Cast bell metal.
Assembly screws and bolts.	Steel, cadmium plated.	Steel, cadmium plated.
Contacts	Tungsten	Tungsten 0.125" dia.
Weight	Not specified.	Total 7.0 lbs.
Dimensions	Not specified.	Height - 8.875" Width - 6.875" Depth - 5.50"



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Plate 1

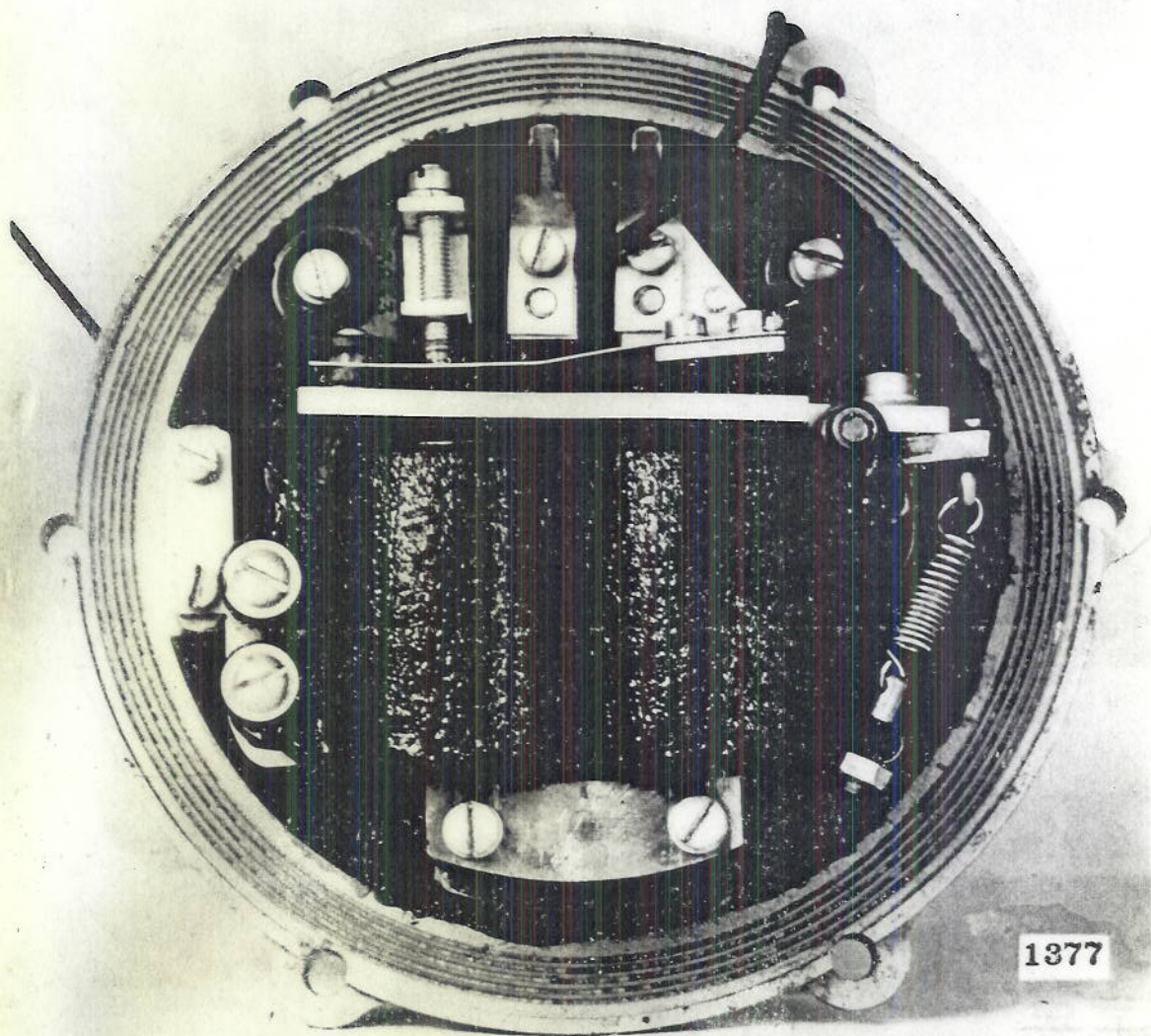


Plate 2