

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>PAGE</u>
1. AUTHORIZATION FOR TEST.....	1
2. OBJECT OF TEST.....	1
3. ABSTRACT OF TEST.....	1
(a) Conclusion.....	1a
(b) Recommendation.....	1a
4. DESCRIPTION OF MATERIAL UNDER TEST.....	2
5. METHOD OF TEST.....	2
6. RESULTS OF TEST.....	3
7. COMMENTS ON RESULTS OF TEST.....	5
8. CONCLUSIONS.....	5

Appendices

Photograph of Assembled Siren.....	Plate 1
Photograph of Siren, Disassembled.....	Plate 2

AUTHORIZATION FOR TEST

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

Reference: (a) BuEng.ltr. L5/NP14 (9-7-Ds) of 10 Oct. 1935.
(b) Navy Dept.Specs. 17S11a of 1 April 1931.
(c) BuEng.ltr. CL40-8/S65 (4-5-DF) N0s-39868 of 3
May 1935.

OBJECT OF TEST

2. The object of this test was to determine how closely the motor-driven siren complied with the specifications, reference (b), and its suitability for use in the Naval Service.

ABSTRACT OF TEST

3. The siren as received from the manufacturer, was set up at this Laboratory in a standard test circuit and carefully observed while under test for the required 48 hours endurance run. Following this, the usual tests for inclination, over and under voltage, over and under frequency, shock integrity, watertight integrity, insulation resistance, and dielectric strength were made. The test was concluded with an inspection of the materials, design and workmanship.

DESCRIPTION OF MATERIAL UNDER TEST

4. This siren, known as Navy Type Q, was manufactured and submitted for test by the E. D. Bullard Company, San Francisco, California, for application on Contract NOS-39868.

5. It is driven by a General Electric motor, designed to operate from a supply of 115 volts, a.c., 60 cycles, and rated 1/8 H.P. at 8000 r.p.m. It is equipped with bronze sleeve bearings lubricated by felt wicks, spring mounted in cylindrical grease cups. The motor housing is of an aluminum alloy and laminated material is used in the field and armature cores.

6. The motor shaft has left-hand threads for securing the rotor and embodies a slot in its outboard end to accommodate a screwdriver.

7. The eight (8) aperture aluminum alloy rotor is cast in one piece and is provided with a cadmium plated steel insert, having internal left-hand threads, for securing it to the motor shaft. A cadmium plated hex. head nut and flat washer are also provided.

8. The rotor housing is also of cast aluminum alloy and has two (2) protecting rings around its periphery. The inner surface is machined to accommodate the rotor and receive the flanged part of the motor. The motor is secured with six (6) 6-32 cadmium plated fillister head steel screws, provided with lock-washers, threaded into steel inserts in the rotor housing.

9. A short projector is bolted to the rotor housing for directing the sound and to serve as an additional guard. Six (6) 8-32 cadmium plated fillister head machine screws with nuts and lock-washers secure the projector and rotor housing to the case.

10. The case is also of cast aluminum alloy and is provided with four (4) mounting lugs. A terminal block of phenolic insulating material is located in the bottom of the case. An internal boss, tapped for 3/4" Navy terminal tube, is located adjacent to the terminal block.

11. Two Vellumoid ring gaskets are used in the assembly of the siren.

12. Further details of the design and construction are shown on plates 1 and 2.

METHOD OF TEST

13. The siren was first tested for endurance by placing it in a compartment having an ambient temperature of 40°C. and operating it one minute, every alternate minute, for a period of 48 hours. The temperature rise, current consumption and power factor, were obtained during this test.

14. It was then tested for operation when inclined 30° from the vertical in all planes while supplied with 10% over voltage (126.5 volts) at 65 cycles, and 20% under voltage (92.5 volts), at 55 cycles.

15. Following this, the siren was placed on a Bureau of Engineering shock stand and given 20 blows of 250-foot pounds each to determine its shock integrity. During this test the siren was operating at rated voltage and frequency.

16. Next, the pitch of note was measured using a General Radio beat frequency oscillator, type 513-B. During this test the siren was operating from a supply of 115 volts, a.c., 60 cycles.

17. It was then tested for watertight integrity by spraying it with water from a one inch nozzle, under a head of approximately 35 feet, from a distance of 10 feet for a period of five minutes.

18. Following this, the siren was tested for audibility range, insulation resistance and dielectric strength.

19. The test was concluded with an inspection of the siren to note any defects resulting from the tests and conformance with the specifications relative to materials, design and workmanship.

RESULTS OF TEST

20. The results given below were obtained when the siren was tested for conformance with Specifications 17S11a of 1 April 1931.

<u>Requirements</u>	<u>Test Values</u>
Voltage: 115 volts	115 volts.
Current: Alternating	Alternating
Frequency: 60 cycles	60 cycles
Amperes:	1.83 amperes
Watts: not over 200 watts	195 watts
Power factor: not less than 30%	92.6%
Endurance: Operated one minute, every alternate minute, for a period of 48 hours, while energized at rated voltage and frequency.	Satisfactory operation throughout the test.
Inclination: Satisfactory operation when inclined 30° from the vertical in all planes, while supplied with 10% over voltage at 65 cycles and 20% under voltage at 55 cycles.	Satisfactory operation under all conditions.
Pitch of note: 1000 to 2000 CPS.	1375 CPS at a potential of 115 volts, a.c., 60 cycles.

Requirements

Decibel output: (Not specified)
Measured at 18 feet in soundproof room, using
General Radio noise meter, type 559-A.

Temperature rise: Shall not exceed 30°C. at
ambient of 40°C. over period of 48 hours endurance
test.

Insulation resistance: Not less than 5 megohms by
1000 volt megger.

Dielectric Test: Shall withstand 1240 volts, a.c.
60 cycles, applied between all current carrying
parts and case, for a period of one minute, without
breakdowns.

Watertightness: No leaks shall occur when splashed
with a 1" stream of water, 35 foot head, from a
distance of 10 feet, for a period of 5 minutes.

Shock integrity: Shall withstand 20 blows of 50
foot pounds without change of tone or damage
to siren.

Audibility range: Shall be heard in open still
air, 450 yards.

Case material: Shall be made of aluminum alloy.

Inside finish of case: Two coats of an approved
aluminum paint followed by one coat of
insulating varnish.

Terminal lugs: Shall be in accordance with
Bureau plan 9-S-1841-L, latest alteration.

Mounting lugs: Four lugs, spaced not more than
4 inches.

Weight: Not specified.

Dimensions: Not specified.

Motor type: Not specified.

Assembly screws: Steel screws, cadmium plated,
provided with cadmium plated lock-washers.

Test Values

91 decibels.

25°C rise by
thermometer method.

200 megohms by 1000
volt megger.

Satisfactory, no
breakdowns occurring.

Leaked 10 c.c. of water.
*See Comments, par. 21.

Siren withstood 20 blows
of 250-foot pounds
without change of tone or
damage.
Could be heard at a
distance of approximately
1800 yards.

Aluminum alloy.

Does not appear to have
any paint or varnish.*
See "Comments", par. 22.

Unsatisfactory.* See
"Comments" par. 23,

Four lugs, spaced
approximately 4.75" on
centers.

7 lbs. 12 oz.

Height 7"00
Maximum diameter 7"50

Bi-polar, series wound.

Steel screws, cadmium
plated, provided with
cadmium plated lock-
washers.

*Denotes failure to comply with the specifications.

COMMENTS ON RESULTS OF TEST

21. The siren, under test for watertight integrity, leaked 10 c.c. of water. This defect can be corrected by using a thicker "Vellumoid" gasket between the case and rotor housing.

22. The manufacturer has not complied with the requirements noted under reference (c), paragraph 1(c), relative to the painting of the equipment.

23. The present terminal lugs do not comply with specification D-15 of reference (b).

24. Tapped holes for securing the nameplate should not extend through the case. Steel screws, cadmium plated, should be substituted for the brass screws.

25. All faying surfaces between aluminum parts should be treated with a bituminous paint prior to assembly.

26. The Bureau's attention is invited to the fact that the case does not embody a connection box. To make line connections it is necessary to remove the motor from the case.

27. The workmanship employed in this siren is first class in every respect.

28. The steel cadmium plated bushing to which the rotor is mounted is a force fit. Under reference (c), paragraph 1(1), the manufacturer was requested to thread the bushing into the rotor. This is not considered necessary in view of the fact that once the left-hand nut on the armature shaft is tightened, the rotor is firmly clamped between the steel flat washer and the flange on the steel insert.

29. Brass parts of the motor grease cups are in contact with aluminum; steel, cadmium plated, should be substituted.

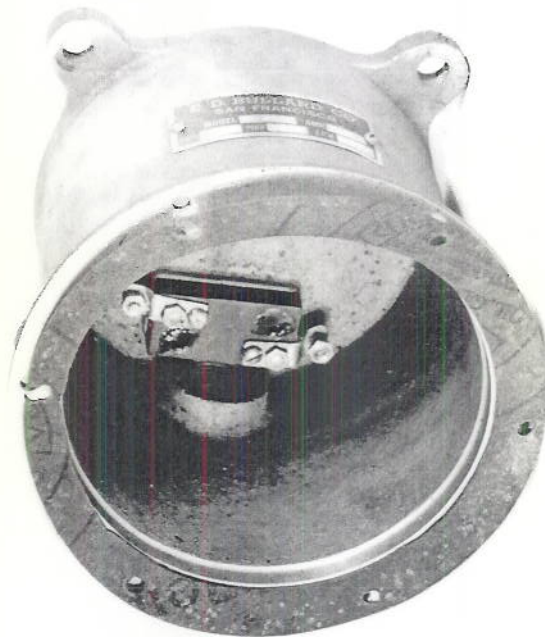
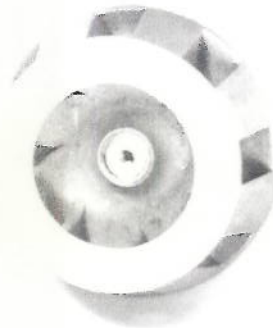
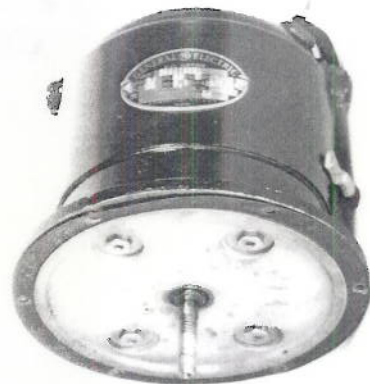
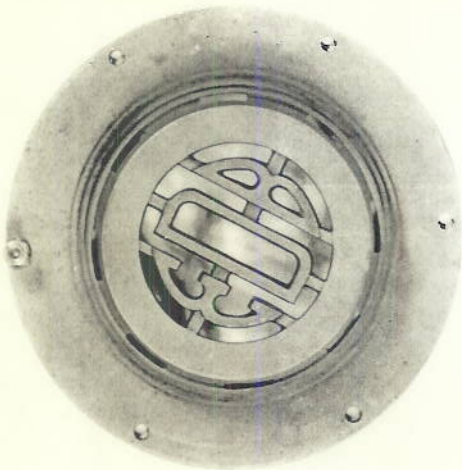
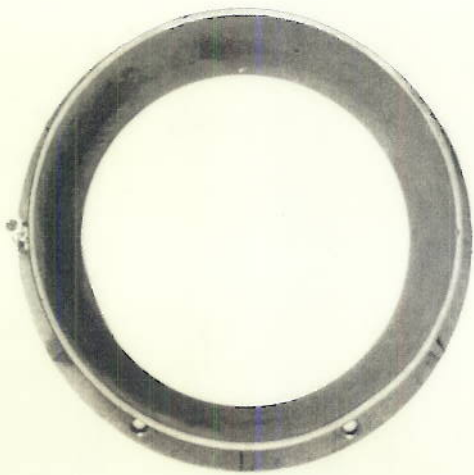
30. Steel liners, cadmium plated, force fit, should be inserted in the aluminum motor end bells to prevent contact between them and the bronze bearings. This should reduce the electrolytic action between the dissimilar metals.

CONCLUSION

31. The subject siren is of first class workmanship and complied with the specifications, reference (b), with the exception of a few minor requirements. If corrected, as noted under "Comments", paragraphs 21 to 30 inclusive, it should prove satisfactory for use on this contract.



1499



1500
NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D. C.