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NAVY DEPARTMENT

Report of Test

on

Annunciator - 25 Drop

Submitted by

Bendix Aviation Corporation
Marine Division
Brooklyn, New York

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1942.

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Prepared by: F. H. Dunlap
F. H. Dunlap, Chief Engineering Aide.

Reviewed by: G. K. C. Hardesty
G. K. C. Hardesty, Associate Electrical
Engineer
Asst. Supt., I. C. Division.

W. B. Roberts
W. B. Roberts, Electrical Engineer
Superintendent, I. C. Division.

C. L. Ashley
C. L. Ashley, Lieutenant Commander, USNR

Approved by: A. H. Van Keuren
A. H. Van Keuren, Rear Admiral, USN, Director

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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) and (c).

Reference: (a) BuShips Ltr. S65-4(350) of 9 November 1942.
(b) Specification 17A8 of 1 March 1941 and Amendments of 2 and 15 March 1942.
(c) Bendix Drwg. No. 1000-5-25E.

OBJECT OF TEST

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

ABSTRACT OF TEST

3. The sample annunciator 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.

CONCLUSIONS

(a) The subject annunciator is of good design and first class workmanship. However, it failed to comply with the specification in the following respects:

- (1) Shock test.
- (2) Dielectric test.
- (3) Watertight integrity.
- (4) Painting.
- (5) Furnishing of cards.
- (6) Nameplate material.
- (7) Agreement with test plans.

(b) It is believed that the watertight integrity of the sample annunciator was impaired by the use of 1/32-inch rubber gasket material and the failure could be corrected by the use of heavier material to compensate for any unevenness in the mounting. This was demonstrated by the substitution of 1/16-inch material at the Laboratory.

RECOMMENDATIONS

(a) In view of the generally satisfactory operation of the subject annunciator, it is recommended that it be approved for Naval use subject to the desires of the Bureau relative to the correction of the deficiencies noted under "Conclusions".

DESCRIPTION OF MATERIAL

4. The subject annunciator, submitted by Bendix Aviation Corporation, Marine Division, Brooklyn, New York, is designed to operate from a supply of 115 volts, a. c., 60 cycles. It is of the mechanical reset type and contains 25 drops and one alarm relay. The relay operates in conjunction with any drop.

5. Each drop contains a 1-inch square target holder which is released when the drop magnet is energized, and falls into view by the combined force of gravity and a coiled spring.

6. The drops are mounted on a 1/8-inch sheet brass plate, hinged at one side of the case. Mounted in the bottom of the case is a cam-operated mechanical reset device actuated by a thumb lever secured to a shaft extending through a packing gland in the side of the case. A large gear on the lever shaft drives a smaller gear on the cam shaft so that the reset may be accomplished without turning the handle through a large angle.

7. The relay and 5 resistors are mounted on two 3/16"x 1/2" x 7" steel pads welded to the inside of the case. One resistor is connected across the relay coil. Provision is made for 4 relays on the front of the drop panel.

8. Four phenolic terminal blocks are mounted on two 3/16" x 5/8" x 5-1/2" steel pads welded to the inside of the case and tapped for No. 8-32 machine screws.

9. The mechanism is mounted in a rectangular fabricated steel case, provided with four mounting lugs drilled for 5/8" mounting screws.

10. The case cover is of fabricated sheet steel and is provided with a plate glass window and a black steel masking plate with 25 openings of such dimensions that only the drops are visible. A 1/32" rubber gasket is provided around the edge and both sides of the glass window to obtain watertightness when the window is clamped between the cover and four 1/16" x 1/2" flat steel strips by sixteen No. 4-40 round headed brass machine screws threaded into the reinforcing strips of the cover.

11. A 1/4" square rubber gasket, retained in a channel inside of the case cover, is provided to obtain watertightness when the cover contacts the edge of the case and is secured by ten 1/4-20 fillister-headed steel machine screws passing through lugs welded to the sides of the case and cover.

12. The case and cover are finished with gray paint applied over zinc chromate paint. Further details in the design and construction of the sample annunciator are shown by photographs, Plates 1, 2, and 3, and drawing, reference (c).

METHOD OF TEST

13. The sample annunciator was first tested to determine its current consumption at rated voltage and frequency. This was followed by tests for operation when inclined at an angle 30° to vertical in any direction with the supply varied plus or minus 7 volts and 5 cycles.

14. The annunciator was next subjected to an endurance test of 36 hours at 10 operating cycles per minute, at rated voltage and frequency, the first 18 hours at 130° F. and the second at 0° F. This was followed by operating it at the same rate for 12 hours at room temperature, the first 6 hours at plus 7 volts and 5 cycles and the second at minus 7 volts and 5 cycles. During the first part of the endurance test, the temperature rise of the windings was determined by the resistance method.

15. After determining its shock and vibration integrity, dielectric strength and insulation resistance, the sample was subjected to the water-tight test by submerging it under 3 feet of water for 1 hour.

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

RESULTS OF TEST

17. The results obtained were as follows:

<u>Requirements</u>	<u>Test Values</u>
Voltage: 115 volts, a.c., 60 cycles.	Tested at 115 volts, a.c., 60 cycles.
Operating current: Para. F-2c(2).	Complied. Varied with individual drops - 0.135 ampere - maximum for current through 1 drop and relay winding.
Inclination: Para. F-2c(4).	Complied.
Endurance test: Para. F-2c(1), amended.	Complied.
Temperature rise: Para. F-2c(3).	Complied. The maximum temperature rise of the drop windings was 4.6° F. and of the relay winding 9.5° F.
Shock Test: Para. F-2d(1).	*Complied except that one drop moved from the non- indicating to the indicat- ing position on the 20th blow.

RESULTS OF TEST (Cont'd)

Requirements

Test Values

Vibration Test: Para. F-2d(2).

Complied.

Dielectric Test: Para. F-2e(3).

*No. 14 drop broke down under the test. The location was not discovered as the ground disappeared upon reassembly of the drop following its removal for examination.

Insulation: Para. F-2e(4).

Greater than 100 megohms after reassembly of No. 14 drop.

Watertight test: Para. F-2e(2).

*Leaked 715 cc at corners of glass window.

Painting: Para. C-6.

*Both interior and exterior finished with gray paint applied over zinc chromate paint. Interior should be white.

Design: Para. E-3b.

Tapped bosses not provided.

Glass windows: Para. E-3c(2).

Complied.

Shape of cases and arrangement of drops: Para. E-3d.

Complied.

Drop construction: Para. E-4a and b.

Complied.

Cards: Para. E-4c(1).

*None furnished.

Clearance Dimensions: Para. E-4d.

Complied.

Relays: Para. E-5a.

Complied.

Wiring: Para. E-6a.

Complied.

Terminal block: Para. E-6b.

Complied.

Electrical clearance: Para. E-6c.

Complied.

Fiber: Para. E-6d.

Complied.

Protective covering: Para. E-6f.

Complied.

RESULTS OF TEST (Cont'd)

<u>Requirements</u>	<u>Test Values</u>
Magnet cores: Para. E-6g.	Complied.
Springs: Para. E-6h.	Complied.
Terminal lugs: Para. E-6i.	Complied.
Nameplate: Para. E-8a amended by Para. E-8c.	*Copper-nickel alloy nameplate furnished should be plastic.

*The test plans are not in agreement with the sample submitted
in the following respects:

- (a) Design of case and cover at securing bolts -
shows extending flanges - lugs used on sample.
- (b) Number of alarm relays - given as 5 - 1 in sample.
- (c) Painting of interior surfaces - note gives white enamel.
- (d) Nameplate material - listed as Lamicoid - metal furnished.
- (e) Window material - listed as Plexiglas -furnished as glass.

*Denotes failure to comply with the specification.

CONCLUSIONS

18. The subject annunciator is of good design and first class workmanship. However, it failed to comply with the specification in the following respects:

- (1) Shock test.
- (2) Dielectric test.
- (3) Watertight integrity.
- (4) Painting.
- (5) Furnishing of cards.
- (6) Nameplate material.
- (7) Agreement with test plans.

19. It is believed that the watertight integrity of the sample annunciator was impaired by the use of 1/32-inch rubber gasket material and the failure could be corrected by the use of heavier material to compensate for any unevenness in the mounting. This was demonstrated by the substitution of 1/16-inch material at the Laboratory.

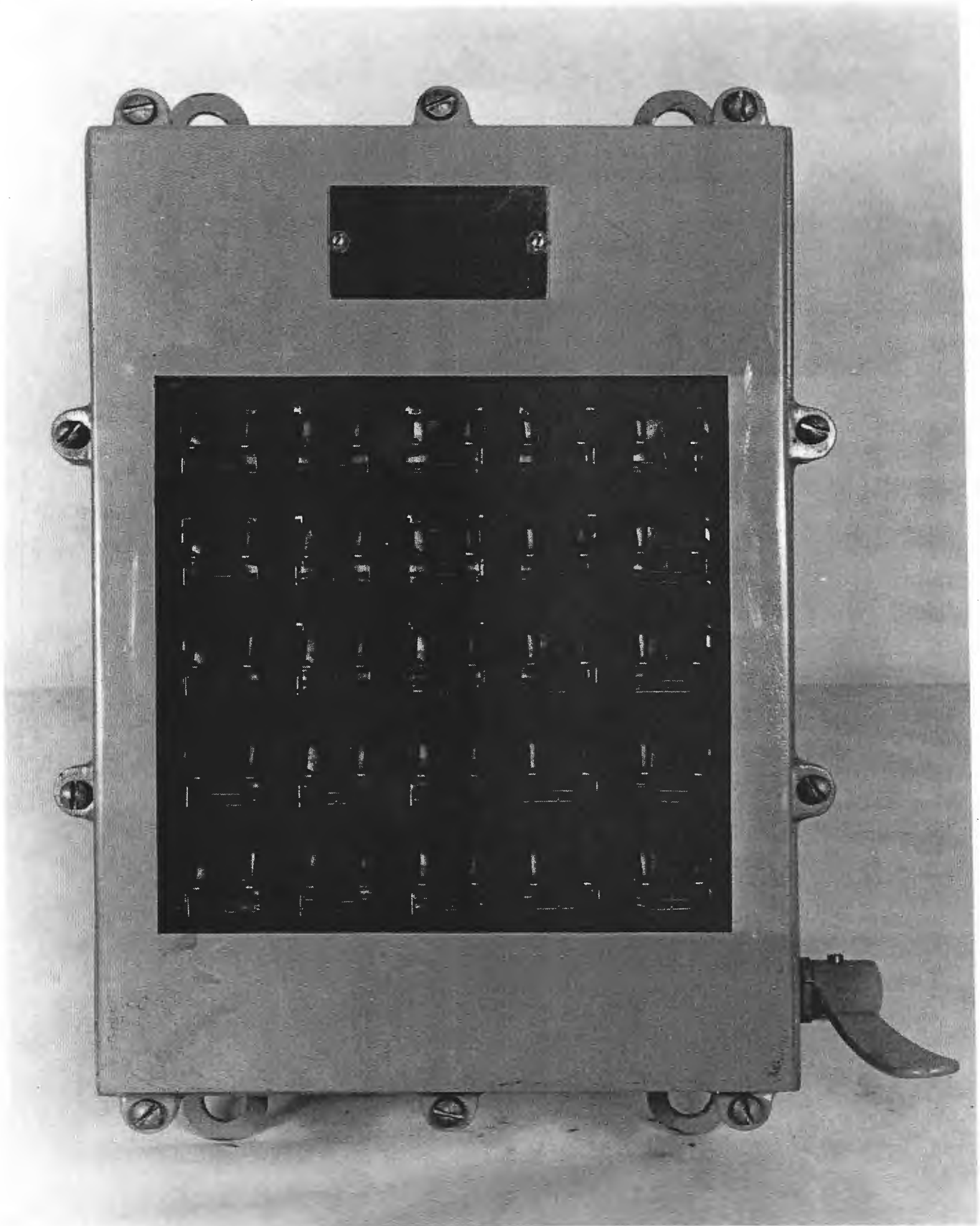


PLATE I

