17 June 1937 NRL Report No. B-1373

NAVY DEPARTMENT

BUREAU OF ENGINEERING

Report of

Test on Transformer,

Gun Firing - 200 Volt-Amperes

Submitted by

Jefferson Electric Company

Bellwood, Illinois

FR-1373

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D. C.

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Authorization: BuEng. let. S62-2/L5-(3-12-Ds) of 30 March 1937.

Date of Test: May and June 1937.

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Distribution:
BuEng. (5).

bmb

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APPENDICES

Photograph of sample transformer submitted for test, assembled in W.T. case . . . . . Plate 1

Photograph of sample transformer, disassembled. . . . . Plate 2

AUTHORIZATION.

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

Reference: (a) BuEng. ltr. S62-2/L5-(3-12-Ds) of 30 March 1937.
(b) Specifications 17 T 19b of 1 May 1935.
(c) NRL Report No. 1322 of 23 October 1936.

OBJECT OF TEST.

2. The object of this test was to determine whether or not the manufacturer had modified the subject transformer to comply with the specifications, reference (b), and make it suitable for the Naval Service as a gun firing transformer.

ABSTRACT OF TEST.

3. The subject transformer was set up at this Laboratory in standard test circuits where its performance was carefully checked to ascertain whether it was in strict accordance with the specifications. An inspection of the sample transformer, relative to approved materials, design, workmanship and shock integrity, concluded the test.

CONCLUSIONS.

(a) The subject transformer, under test for conformance with the specifications, reference (b), complied with the requirements in their entirety, except for the method of securing the nameplate. Brass rivets are now used and they penetrate the cover. The customary cadmium plated steel drive pins should be substituted and should not penetrate the cover.

(b) This modified transformer is of good workmanship and design and should prove satisfactory as a gun firing transformer.

RECOMMENDATIONS.

(a) It is recommended that the sample transformer be approved for Naval use subject to a satisfactory method of securing the nameplate to the case cover.

DESCRIPTION OF MATERIAL UNDER TEST.

4. The sample transformer was manufactured and submitted by the Jefferson Electric Company, Bellwood, Illinois, as a Type GF, ratio 115/20, 200 volt-amperes.

5. It is of the dry type, the core being made up of separately punched thin laminations, insulated from one another when assembled. The core supports a primary and secondary winding, insulated from each other and the transformer core, the secondary being wound over the primary.

6. The core rests on six bosses located in the bottom of the cast aluminum alloy watertight case, two of which contain threaded steel inserts tapped for 1/4-20 R.H. steel machine screws, which secure the transformer core to the case. Located under the heads of the securing screws is a flat piece of cold rolled steel to which the terminal block assembly is mounted. A stamped brass plate, reading, "17T.19B (INT) 3-10-36", is clamped at one end of the transformer core.

7. The terminal block is of phenolic material and is equipped with four 9-S-1841-L terminals, two marked 115 V. and two 20 V. The words "Pri." and "Sec." are stamped on the terminal block.

8. The case is provided with four mounting lugs, each drilled to accommodate a 3/8 inch bolt, an external boss, drilled and tapped for two 3/8 inch and one 3/4 inch (IPS) standard terminal tubes, and a square rubber gasket, partly recessed into the rim of the case.

9. The cast aluminum alloy case cover contains a knife edge which contacts the rubber gasket located in the rim of the case when the cover is secured by the ten fillister head steel machine screws, used as through bolts. A nameplate of phenolic material, having stamped lettering, is secured to the cover with four brass rivets, penetrating the cover.

10. Further description in the details and design of the transformer are given by Plates 1 and 2.

METHOD OF TEST.

11. The sample was first tested for voltage regulation by comparing the secondary voltage at full rated load (200 V.A.) with the no load voltage.

12. The temperature rise of the windings was obtained by the resistance method, by placing the transformer in a temperature controlled cabinet, having a temperature of 40° C (104° F) and operating it for eight hours at full load (200 V.A) at a primary voltage of 120 volts.

13. Next followed a short circuit test during which a short was placed across the secondary for a period of 15 seconds with the primary energized with 120 volts, a.c. 60 cycles.

14. The insulation resistance between the windings and the core was measured with a 1,000 volt megger, prior to, and following, the dielectric tests.

15. The ruggedness of the transformer was determined by placing it

on a standard Bureau of Engineering shock stand and subjecting it to 20 shocks of 250 foot pounds each while mounted on the face of the panel, six inches below the point of impact.

16. The test was concluded with an inspection of the transformer for conformance with the specifications in the matter of design, materials, and workmanship.

RESULTS OF TESTS.

17. The test results obtained were as follows:

Requirements	Test Values
Primary voltage: 115 volts	115 volts.
Secondary voltage: Not over 20 volts with 115 volts primary.	19.95 volts.
Frequency and phase: 60 cycles, S.P.	60 cycles, S.P.
Voltage regulation: The secondary voltage shall be 18 volts at rated load, 100% P.F. with 115 volt primary.	18.4 volts.
Efficiency: Shall be not less than 85% at rated load (200 V.A.)	85.3%
Temperature rise: Shall not exceed 50° C at ambient temperature of 40° C at rated load.	Pri. 43.38° C rise Sec. 41.05° C rise
Rating: Shall be capable of operating continuously at input of 120 volts, full load, without exceeding 50° C temperature rise.	Temperature rises as given after 8 hours of operation.
Short circuit test: Transformer shall withstand a short circuit on the secondary for 15 seconds with a 120 volt primary.	Satisfactory, no apparent damage to the transformer.
Insulation resistance: Not specified.	Following short circuit test - 200 megohms by 1,000 V. megger. Following dielectric test - 200 megohms by 1,000 V. megger.
Dielectric strength: Shall withstand 2500 V. A.C. 60 cycles for 1 minute, applied between primary and core with secondary grounded to core, and 1250 V. A.C. 60 cycles for 1 minute, between secondary and core with primary grounded.	Complied.

Requirements	Test Values
Watertightness: No leaks shall occur in the case when sprayed with a stream of water from a 1" nozzle, under head of 35 feet from a distance of 10 feet, for a period of 5 minutes.	Complied.
Shock integrity: Not specified	Transformer withstood 20 blows of 250 foot pounds each while mounted on BuEng shock stand.
Transformer mounting: Bosses provided on inside of case.	Bosses, provided with steel inserts, tapped and provided with round head steel machine screws.
Terminal block: Phenolic material equipped with terminals for both primary and secondary leads and line connections.	Complied.
Bosses for terminal tubes: Shall be drilled and tapped for two size "A" and one size "E" terminal tubes.	Complied.
Dimensions: Shall not exceed 6" x 12" x 6"	6".0 x 6".0 x 8".5
Case construction: Aluminum alloy, case provided with four mounting lugs and a square rubber gasket, recessed into the rim, and a cover provided with a knife-edge and secured with through bolts.	Complied.
Total weight: Shall not exceed 15 lbs.	14 lbs. 3 oz.
Painting: Priming coat of zinc chromate followed with 2 coats of aluminum paint and 2 coats of varnish on the inside of case and two coats of gray over the same base coats on the outside.	Complied.

CONCLUSIONS.

18. The subject transformer, under test for conformance with the specifications, reference (b), complied with the requirements in their entirety, except for the method of securing the nameplate. Brass rivets are now used and they penetrate the cover. The customary cadmium plated steel drive pins should be substituted and should not penetrate the cover.

19. This modified transformer is of good workmanship and design and should prove satisfactory as a gun firing transformer.

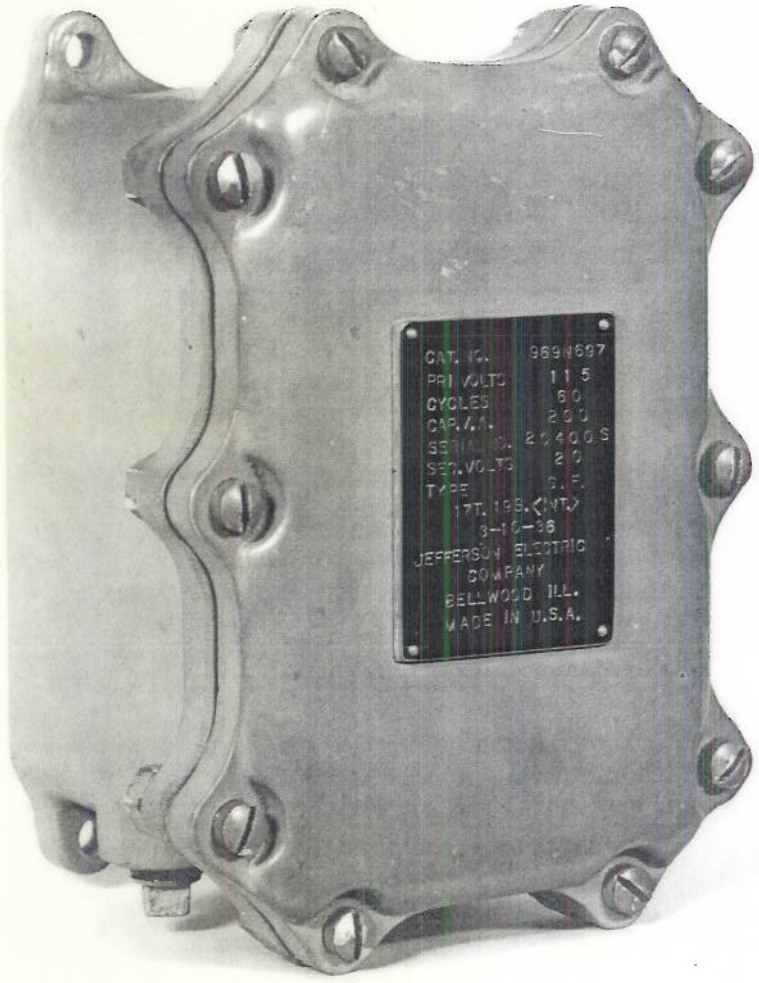
CAT. NO. 969N697
PRI. VOLTS 115
CYCLES 60
CAP. V.A. 200
SEC. VOLTS 20
TYPE C.F.
17T. 18S. (INT.)
3-10-36
JEFFERSON ELECTRIC
COMPANY
BELLWOOD ILL.
MADE IN U.S.A.

Plate 1

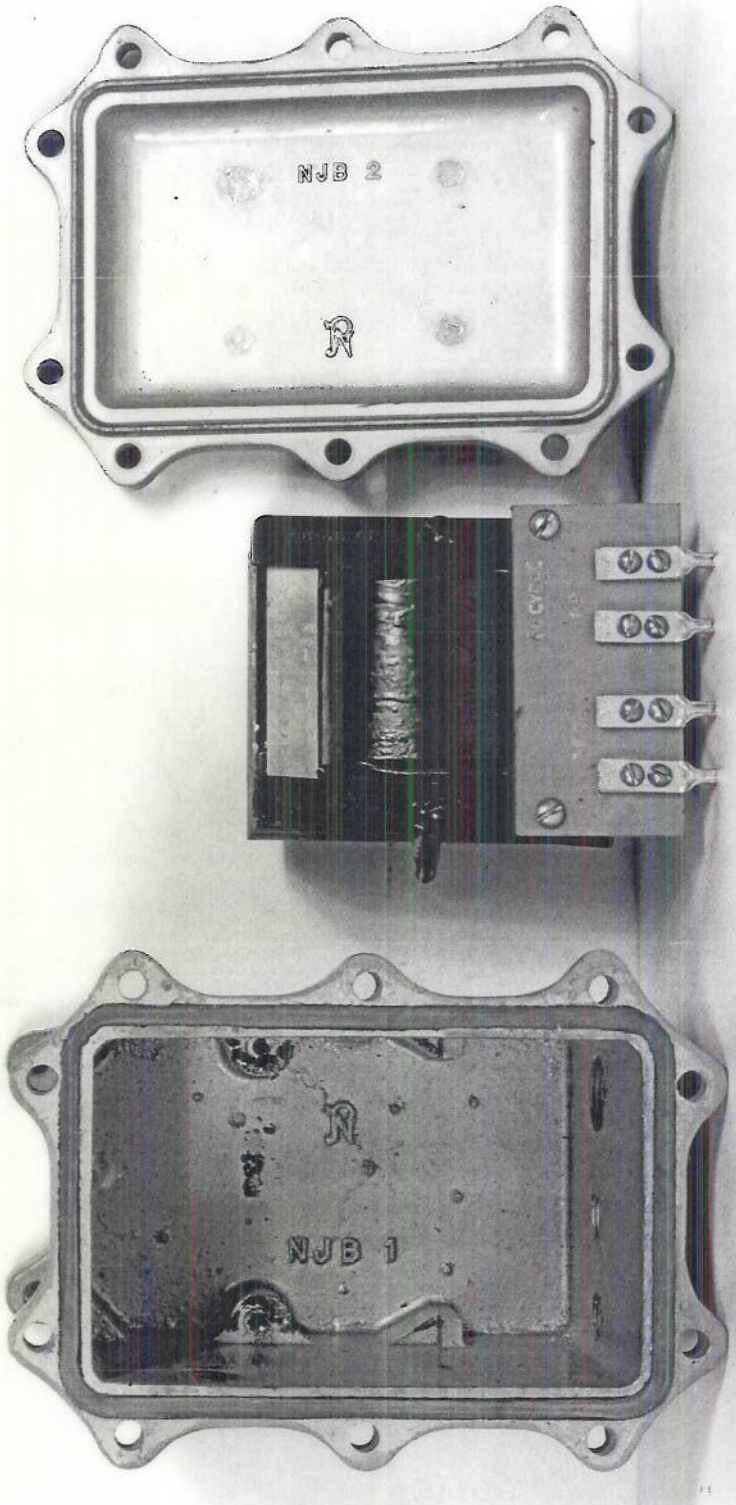

Plate 2