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11 August 1937

NRL Report No. B-1388

NAVY DEPARTMENT
BUREAU OF ENGINEERING

Report of Test
on
Blown-Fuse Indicator Transformers

Submitted by

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WASHINGTON, D.C.

FR-1388

Number of Pages: Text - 5 Plates - 3

Authorization: BuEng. ltr. S62-2(E)-(7-8-Ds) of 20 July 1937

Date of Test: July and August 1937

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Distribution:
BuEng. (5)

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Photograph of one of the sample transformers	Plate 1
Photograph of one of the sample transformers removed from case	Plate 2
Sketch of transformer connections.	Plate 3

AUTHORIZATION FOR TEST

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

- Reference:
- (a) BuEng. ltr. S62-2(E)-(7-8-Ds) of 20 July 1937.
 - (b) Specifications SGS(71)-119a, dated 15 July 1936.
 - (c) Arma Drwg. 20980 - Transformer Case and Bottom Plate Details.
 - (d) Arma Drwg. 20984 - Standard Blown Fuse Indicator-Type 2V2.
 - (e) Arma Drwg. 20963 - Standard Laminations.

OBJECT OF TEST

2. The object of this test was to determine conformance of the subject transformers with the specifications, reference (b), and their suitability for Naval use as blown-fuse indicator transformers.

ABSTRACT OF TEST

3. Each transformer was connected in a circuit, as shown by Plate 3, where its performance was carefully checked for compliance with the specifications, reference (b). The usual inspection of one of the subject transformers, shown by Plate 2, relative to approved materials, design and workmanship, concluded the test.

Conclusions

(a) These blown fuse indicator transformers are of good design and workmanship and they comply with the specifications in their entirety.

Recommendations

(a) It is recommended that this type of transformer be approved for Naval use.

DESCRIPTION OF MATERIAL UNDER TEST

4. Four sample transformers of the blown-fuse type were submitted of which one is shown by Plates 1 and 2.

5. This type of transformer has two (2) "primary" windings and a "secondary" winding located on a laminated core of the interleaved shell-type. The center leg supports the secondary and each of the other legs supports a primary. One of the primary windings is connected across the line side of two fuses. The other is connected across the load side and is in opposition to the first primary. If either, or both, of the fuses blow, the second primary is deenergized and the opposing flux is removed, thereby causing a type VG2-N lamp, connected across the secondary, to glow.

6. The transformer is provided with an aluminum case and a molded phenolic cover. The case and cover are identical with those used on this manufacturer's "Synchro" overload transformers, previously tested and reported under NRL Report No. B-1368, dated 24 May 1937. Further details in the design and construction of the transformer are given by drawings, references (c) to (e) inclusive.

METHOD OF TEST

7. Each transformer was first set up in a circuit where the primaries were connected to the "line" and "load" sides of two fuses and a type VG2-N lamp, consuming approximately 1.8 milliamperes at 115 volts, 60 cycle a.c. was connected to the secondary. The potential across the lamp was measured with the fuses intact to determine the amount of unbalance in the transformer.

8. Next, the fuses were removed and the voltage across the lamp was again measured. A vacuum tube voltmeter was used for measuring the voltages at the trouble indicator lamp.

9. The temperature rise of the transformers was determined by the resistance method by placing them in a temperature controlled cabinet having a temperature of 54° C. The transformers were connected in the same circuits which were supplied with rated voltage and frequency.

10. The usual dielectric and insulation tests, followed by an inspection of the transformers, relative to design, workmanship and materials, concluded the test.

RESULTS OF TEST

11. The results of the tests, obtained when conducted in the order required by the specifications, were as follows:

Indicator Lamp Voltages

25° C. Room Temperature

VG2-N Lamp - 1.8 ma. at 115 V.A.C., 60 cycles.

Trans- former	Line Volts	55 cycles		60 cycles		65 cycles	
		Lamp Volts	Lamp Volts	Lamp Volts	Lamp Volts	Lamp Volts	Lamp Volts
		Fuses In	Fuses Out	Fuses In	Fuses Out	Fuses In	Fuses Out
No. 1	92	2.0	89	2.00	89	2.00	84
	115	2.25	121	2.25	118	2.20	109
	126.5	2.50	137.5	2.75	134.5	2.50	124.5
No. 2	92	1.50	89	2.00	86	1.75	81
	115	2.25	121	2.20	115	2.00	107
	126.5	2.75	136.5	2.50	133.5	2.50	122.5
No. 3	92	2.0	89	2.50	87	2.25	81
	115	2.25	121	2.75	117	2.50	107
	126.5	2.50	137.5	3.00	134.5	2.75	121.5

Note: These voltages vary greatly when using lamps selected at random from stock due to the variation in current consumption.

Temperature Rises - Resistance Method

Ambient Temperature 54°C. for 8 hours

Fuses Intact

Transformer No. 1

L - L1 - 5.0° C.
T - TT1 - 6.0° C.
T3- TT3 - 6.0° C.

Transformer No. 2

7.0° C.
6.0° C.
6.0° C.

Transformer No. 3

5.0° C.
6.0° C.
4.0° C.

30° C. rise allowed

Fuses Removed

Transformer No. 1

L - L1 - 3.0° C.
T - TT1 - 5.0° C.
T3- TT3 - 4.5° C.

Transformer No. 2

6.0° C.
5.0° C.
6.0° C.

Transformer No. 3

4.0° C.
4.0° C.
3.5° C.

40° C. rise allowed

Requirements

Dielectric strength to ground, 1500 volts, A.C. 60 cycles, for 1 second.

Test Values

All samples withstood the test.

Requirements

Insulation resistance: Shall be not less than 1 megohm at 500 volts.

Melting point of compound: Shall remain moisture proof at 210° F.

Finish of case: Shall be covered with aluminum paint.

Weight: Shall not exceed 34 oz.

Dimensions: Maximum

Width 2.5 inches

Depth 2.5 inches

Length 4.5 inches

Test Values

The minimum resistance for any sample was 100 megohms by 500 volt megger.

Compound used would not run from case at 210° F.

Samples finished in black.

22 oz.

2.25 inches

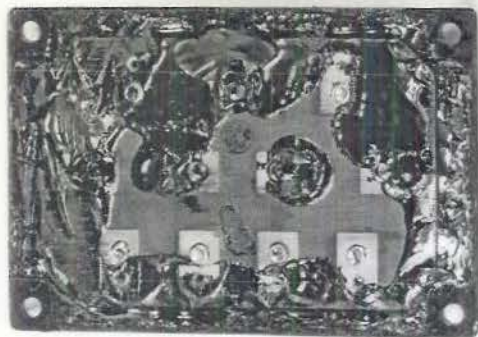
2.00 inches

4.0 inches

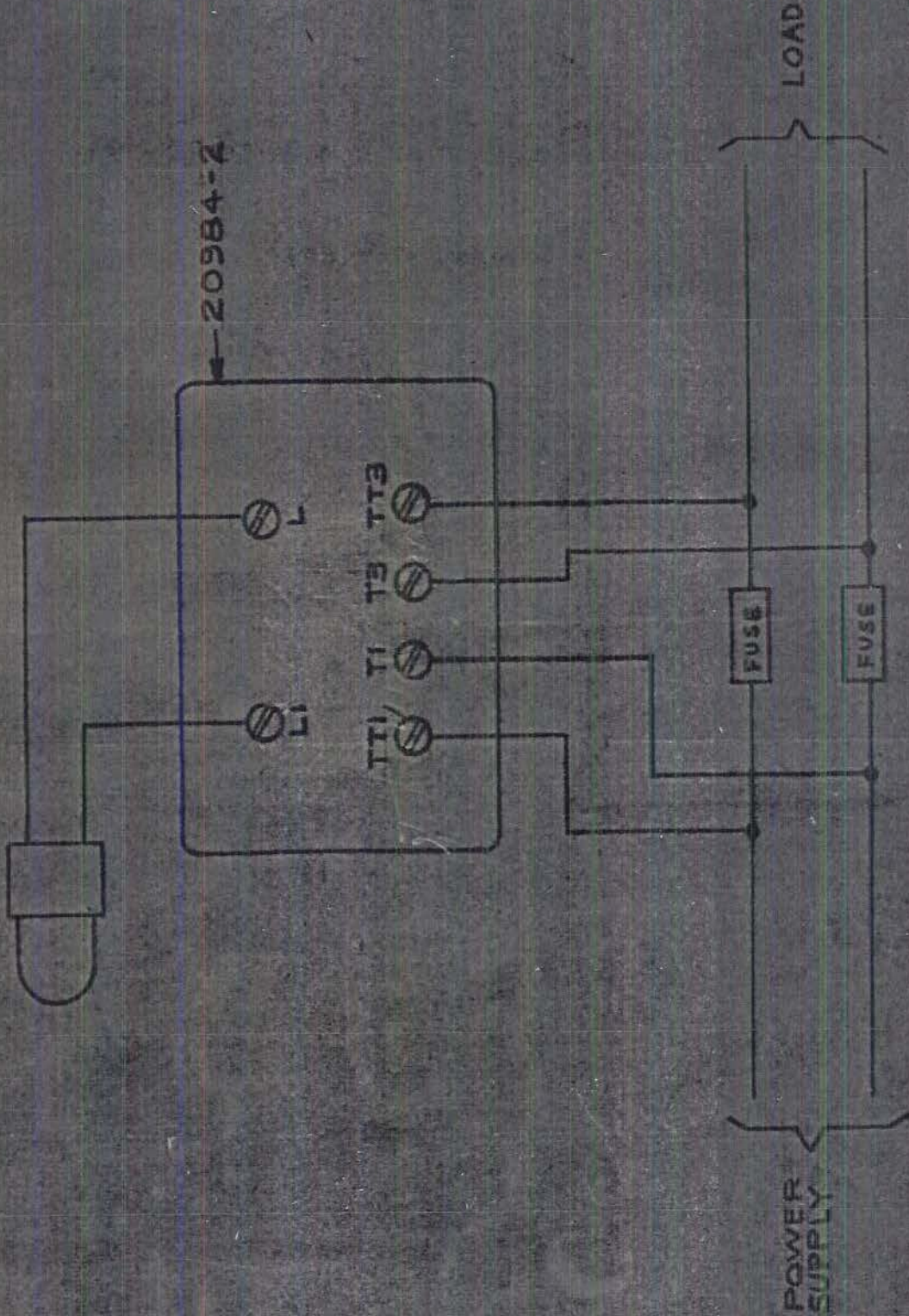
CONCLUSIONS

12. These blown fuse indicator transformers are of good design and workmanship and they comply with the specifications in their entirety.





NEON LAMP



← 20984-Z

POWER SUPPLY

LOAD

SKETCH NO 1025
BLOWN FUSE INDICATOR
TYPE 2V2
ARMA ENGINEERING Co.
BROOKLYN, N.Y.

DRAWN BY W.M.H.
INSPECTED BY G.J.S.
DEV. DEPT. 1/15/51