

FR-1841

REPORT NO. B-1841

DATE 28 January 1942

DECLASSIFIED by NRL Contract  
Declassification Team

Date: 24 Jun 2016

SUBJECT

Reviewer's name(s) A. THOMPSON,  
P. HANNA

Declassification authority: NAVI DECLASS  
MANNA, 11 DEC 2012

Report of Test on Blown-Fuse Transformers Submitted by

R.C.A. Manufacturing Company, Camden, N. J.

DECLASSIFIED: By authority of  
5000A Dec 2008

Entered By: K. Bliss Code 2027

NAVAL RESEARCH LABORATORY

BELLEVUE, D. C.

DISTRIBUTION STATEMENT A APPLIES  
Further distribution authorized by \_\_\_\_\_  
UNLIMITED only.

DECLASSIFIED

NAVY DEPARTMENT

Report of Test

on

Blown-Fuse Transformers

Submitted by

R.G.A. Manufacturing Company, Camden, N. J.



NAVAL RESEARCH LABORATORY  
ANACOSTIA STATION  
WASHINGTON, D. C.

Number of Pages: Text - 7 Plates - 2  
Authorization: BuShips ltr. S62-2(355) of 27 December 1941

Date of Test: January 1942

Tested and  
Prepared by:

Charles H. Grogan, Senior Engineering Aide

George Pida, Engineering Aide

Reviewed by:

W. B. Roberts, Associate Electrical Engineer,  
Chief of Division

W. M. Cole, Lieutenant Commander, USN

Approved by:

H. G. Bowen, Rear Admiral, USN, Director

Distribution:  
BuShips (6)

DECLASSIFIED: By authority of  
5000A Dated: 1 Jan 1978

rb

Entered By: E. Bliss Code 2027

DECLASSIFIED

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>PAGE</u>
Authorization for Test . . . . .	1
Object of Test . . . . .	1
Abstract of Test . . . . .	1
(a) Conclusions . . . . .	1a
(b) Recommendations . . . . .	1b
Description of Material . . . . .	2
Method of Test . . . . .	2
Results of Test . . . . .	3
Conclusions. . . . .	7

APPENDICES

Photograph of Sample Transformers . . . . .	Plate 1
Sketch of Test Circuit. . . . .	Plate 2

UNCLASSIFIED



DECLASSIFIED

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).

References: (a) BuShips ltr. S62-2(355) of 27 December 1941  
(b) Specification SGS (71)-119b of 1 February 1938  
(c) BuShips ltr. S62-2(665-355) of 13 November 1941

OBJECT OF TEST

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

ABSTRACT OF TEST

3. The sample transformers were set up at this Laboratory in a suitable test circuit as shown by Plate 2, where their performance was carefully observed for compliance with the specifications, reference (b) as modified by reference (c). An inspection of the sample to determine compliance in the matter of materials, design, and workmanship, concluded the test.

## CONCLUSIONS

(a) The subject blown-fuse transformers are of good design and workmanship and they comply with the specifications, reference (b), with the following exceptions:

- (1) The terminals are not of the usual type accepted for accommodation of Navy standard wire terminals.
- (2) The case is not finished with aluminum paint for easy vision in servicing equipment.
- (3) Neither nameplate nor identification markings of any kind (reference (b), paragraph D-5) are provided.

UNCLASSIFIED

- 1a -

DECLASSIFIED

RECOMMENDATIONS

(a) It is recommended that this type of transformer for indicating blown fuses be approved for Naval use subject to satisfactory correction of waiver of the exceptions noted under "Conclusions".

## DESCRIPTION OF MATERIAL

4. Four samples of the two "primary" and one "secondary" winding type blown fuse indicator transformers were submitted, samples of which are shown by Plate 1.

5. The two "primary" windings are located on the outside legs of a laminated interleaved shell-type steel core and the "secondary", with a condenser in parallel, is wound about the middle leg. This entire assembly is contained in a sheet-steel case sealed with a moisture-proof tar compound. The three windings are connected to terminals on a phenolic cover secured by four round head brass machine screws which thread into flanges spot welded to the case. The terminals are identified by numbers, 1 - 2 corresponding to one primary, 3 - 4 to the other, and 5 - 6 to the secondary circuit.

6. The metal case is "primed" with zinc chromate and finished in black without any identification marks except for an inked stamped number. The bottom of the case is provided with a removable metal cover secured by four round head brass machine screws which thread into flanges spot welded to the case. Further details are shown by photograph, Plate 1.

## METHOD OF TEST

7. The tests conducted were made in the following order:

- (a) Voltage drop across indicator lamp with fuses in and fuses out.
- (b) Temperature rise in windings when continuously energized for a period of 8 hours at an ambient of 54.4° C. (Four hours' operation with fuses in and four hours with fuses out).
- (c) Impedances of internal circuits at 115 volts, a.c., 60 cycles at zero load.
- (d) Insulation resistance.
- (e) Dielectric strength to ground.
- (f) Insulation resistance.
- (g) Inspection of one of the sample transformers relative to design, materials, and workmanship.

8. Each transformer was connected in a test circuit (Plate 2) with one of the primary windings across the "load" side of two fuses and the other across the "line" side and in opposition to the first. The secondary winding was connected in series with a Navy standard VG-7 lamp which had a d.c. flash voltage of 74.1 V and consumed 1.91 milliamperes on 115 v.a.c. 60 cycles.

- 2 -  
DECLASSIFIED

9. The potential across the VG-7 lamp was measured under specified conditions of frequency and voltage and under loads varying from 0 to 100 watts with fuses intact in order to determine the amount of unbalance in the transformer windings.

10. Under the same conditions outlined in paragraph 9, the voltage drop across the indicator lamp was measured with fuses out.

11. Measurements of voltage drops were made using a Ballantine electronic voltmeter consuming nearly zero power.

12. The temperature rise of the transformer windings was determined by the resistance method under conditions of rated voltage and frequency in a thermostatically controlled oven at an ambient of 54.4° C. for a period of 8 hours. This test consisted of 2 parts; namely, four hours of operation with fuses intact and four hours of operation with fuses out.

13. The impedances of the three circuits were determined by ammeter-voltmeter method at 115 volts a.c. 60 cycles.

14. The test was concluded with determination of insulation resistance; dielectric strength, and examination of one sample transformer relative to material, construction, and workmanship.

#### RESULTS OF TEST

15. The results of tests, conducted in the order outlined in paragraph 7, are as follows:

#### Drop Across Indicator Lamp 25° C. Room Temperature

VG-7 Lamp - 1.91 ma on 115 v.a.c. 60 cycle - Flash Voltage 74.1 d.c.

Transformer in Number	Load Watts	54 Cycles 97.75 V.		60 Cycles 115 V.		66 Cycles 126.5V.	
		Fuses In Volts	Fuses Out Volts	Fuses In Volts	Fuses Out Volts	Fuses In Volts	Fuses Out Volts
1	0	.110	77.5	.155	94.1	.160	106.0
	.1	.110	68.5	.155	78.0	.160	83.4
	1.0	.110	83.0	.153	94.6	.159	103.4
	10	.109	98.0	.150	115.1	.158	126.4
	100	.105	100.9	.142	118.5	.154	130.0
	Short	--	100.9	--	118.5	--	130.0
2	0	.074	74.8	.105	90.0	.118	102.4
	.1	.074	67.5	.105	75.7	.118	80.5
	1.0	.074	82.5	.105	94.6	.118	103.0
	10	.072	98.0	.103	115.0	.117	126.3
	100	.069	100.9	.098	118.0	.112	130.0
	Short	--	100.9	--	118.0	--	130.2

VG-7 Lamp - 1.91 ma on 115 v.a.c. 60 cycle - Flash Voltage 74.1 d.c.

Transformer in Number	Load Watts	54 Cycles 97.75 V.		60 Cycles 115 V.		66 Cycles 126.5 V	
		Fuses In Volts	Fuses Out Volts	Fuses In Volts	Fuses Out Volts	Fuses In Volts	Fuses Out Volts
3	0	.105	77.5	.130	94.3	.134	106.5
	.1	.105	68.5	.130	76.4	.134	81.4
	1.0	.105	83.5	.130	95.3	.134	103.7
	10	.103	98.0	.128	115.0	.133	126.3
	100	.098	100.9	.125	118.5	.127	131.0
	Short	--	100.9	--	118.5	--	131.0
4	0	.315	78.5	.400	96.0	.410	109.0
	.1	.315	70.0	.400	78.5	.410	84.4
	1.0	.315	83.4	.400	95.0	.410	103.4
	10	.313	98.0	.400	115.0	.407	126.3
	100	.300	101.0	.397	118.5	.392	130.5
	Short	--	101.0	.380	118.5	--	131.0

Temperature Rises in °C. - Resistance Method

Transformer Number	Winding	54.4° C. Ambient for 8 Hours	
		Fuses Intact 22° C. Allowed	Fuses Out 33° C. Allowed
1	1-2	4.3	4.1
	3-4	4.2	4.1
	5-6	4.5	4.4
2	1-2	4.0	3.7
	3-4	4.3	4.0
	5-6	4.3	4.0
3	1-2	4.0	3.7
	3-4	4.0	4.0
	5-6	4.2	4.0
4	1-2	4.2	3.9
	3-4	4.1	4.0
	5-6	4.2	4.1

DECLASSIFIED

Internal Circuit Impedances

at 25° C. Room Temperature

<u>Transmitter Number</u>	<u>Circuit</u>	<u>MA</u>	<u>Ohms</u>
1	1-2	3.75	30,600
	3-4	4.00	28,700
	5-6	1.135	101,300
2	1-2	3.70	31,100
	3-4	3.75	30,600
	5-6	1.141	100,600
3	1-2	3.60	31,900
	3-4	3.75	30,600
	5-6	1.157	99,400
4	1-2	4.10	28,000
	3-4	4.41	26,000
	5-6	1.148	100,100

Requirements

Insulation Resistance: Shall be not less than 5 megohms at 500 volts between electrical point and ground.

Dielectric Strength to ground: Shall withstand 1500 volts rms. 60 cycle a.c. for 1 second.

Insulation Resistance: Insulation resistance following dielectric shall be not less than 5 megohms at 500 volts.

Filling Compound: Shall be tar or pitch or other approved material remaining moisture proof and air tight over the range 32° F. to 210° F.

Case finish: Shall be covered with aluminum paint.

Weight: Shall not exceed 34 oz.

Test Values

All samples had a resistance greater than 100 megohms by a 500 volt megger.

All samples complied.

All samples had a resistance greater than 100 megohms by a 500 volt megger.

Tar compound used; showed slow creep at 210° F.

\* Finished in black.

19 oz.

DECLASSIFIED

Requirements

Test Values

Maximum Dimensions

Width 2"50

Depth 2"50

Length 4"62

2"20

2"06

4"00

\* Denotes non-compliance with the specification.

CONCLUSIONS

16. The subject blown-fuse transformers are of good design and workmanship and they comply with the specifications, reference (a), with the following exceptions:

- (1) The terminals are not of the usual type accepted for accommodation of Navy standard wire terminals.
- (2) The case is not finished with aluminum paint for easy vision in servicing equipment.
- (3) Neither nameplate nor identification markings of any kind (reference (b), paragraph D-5) are provided.

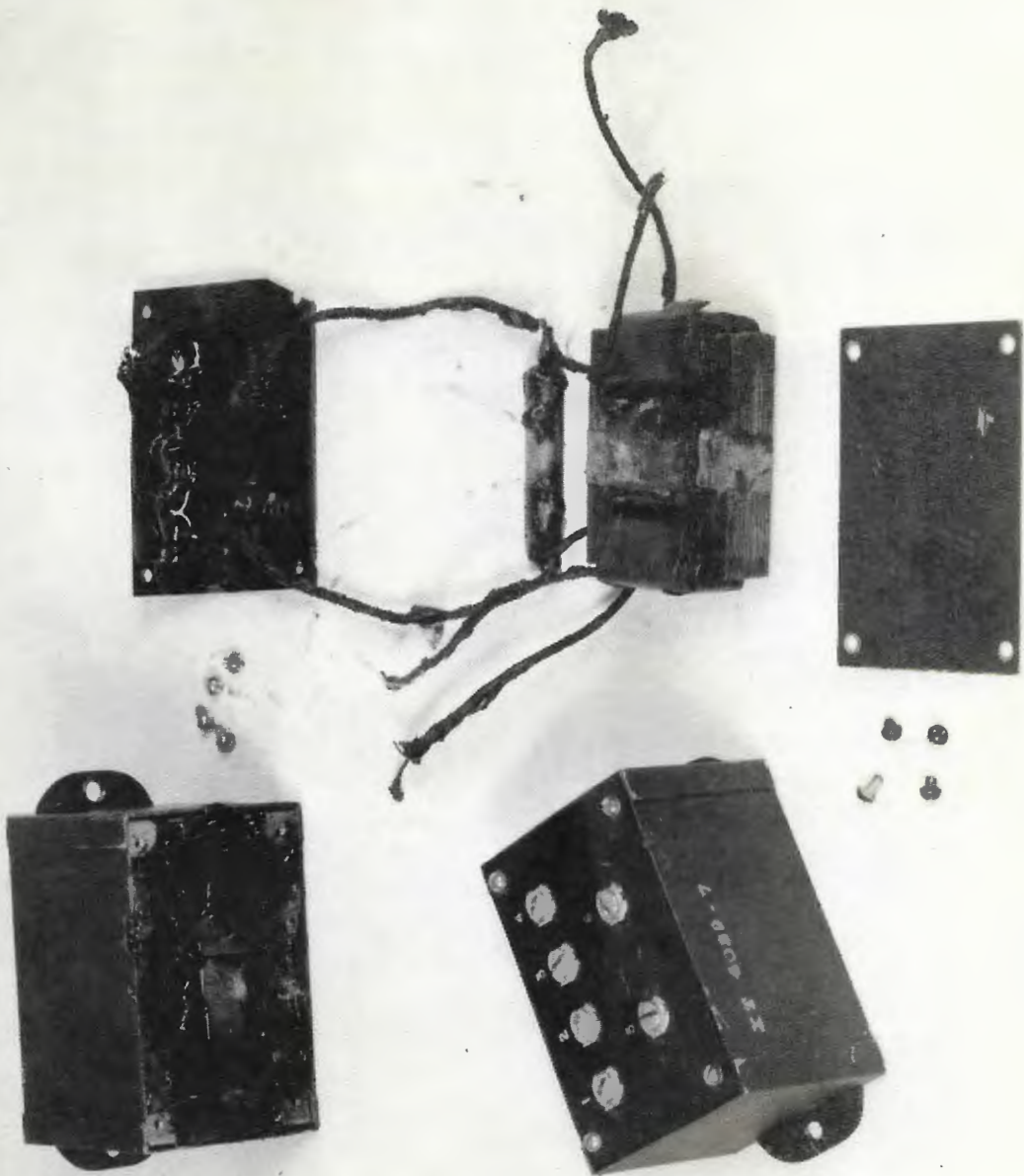
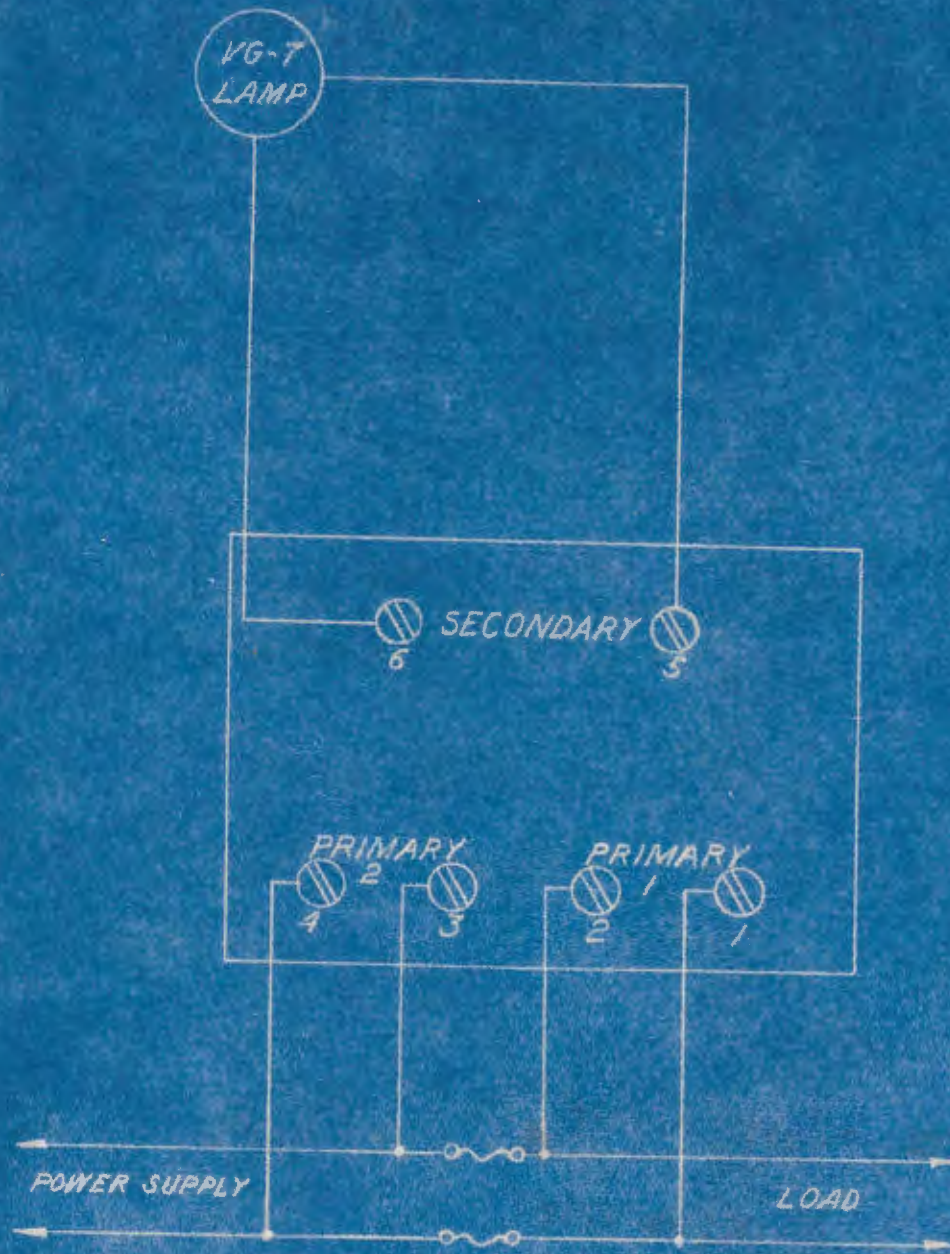


PLATE I

DECLASSIFIED



BLOWN FUSE TRANSFORMER  
TEST CIRCUIT

DECLASSIFIED

PLATE 2