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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW	
1 st Review Date: <u>7/6/98</u>	Determination (Circle Number):
Authority: <u>ADD</u>	1. Classification Retained
Name: <u>W.C. Payne</u>	2. Classification Changed to: <u>UNCL</u>
2 nd Review Date: <u>7/13/98</u>	3. Coordinate With:
Authority: <u>ADD</u>	4. Coordinate With:
Name: <u>W.C. Payne</u>	5. Contains UCI/IT
	6. Comments:
	<u>DECLASSIFY</u>

F-6
 Case No. 702.00
 Ref. Symbol: 1611
 Project No. ET-2667H
 Completed 9/2/55

TO: DISTRIBUTION

3-2

Re: Temperature and Vibration Tests of the Bussmann Type TFE Fuse (TX-15X1 Interim Report)

Object of Test

These tests were performed to determine the ambient temperature required for the type TFE fuse to open and also to evaluate the vibration resistance of the fuses. These fuses are to be used as a temperature-sensitive safing device for the TX-15X1 high voltage thermal batteries. The fuses would be in series with the battery output terminals and would be near the surface of the potted thermal cells. In the event of dangerously high ambient temperatures these fuses would melt before the batteries could be affected. Fifteen of the Bussmann fuses were supplied by Division 1241, the requesting group.

Summary of Results

Five of the fuses withstood high frequency vibration (100 to 500 cps) with input accelerations to 20 g. The temperature required to open the fuse was between 245°F and 265°F.

Procedure and Results

Vibration Test The five fuses were mounted in fuse holders which were mounted to a small aluminum block which was in turn mounted to the top of the Calidyne shaker. To monitor the displacement of the spring-loaded (Fig. 1) fuse wire, a large magnifying glass was supported a few inches above the fuses and the entire area was illuminated with a Strobolux light which was being controlled by a Slip-Synch frequency modifier. This allowed the Strobolux light frequency to automatically lead the table frequency by one cps. Excellent study of the internal assembly of the fuse was thus possible.

In Axis I (perpendicular to the fuse wire) the following tests were performed. The fuses were vibrated from 10-500-10 cps for 15 minutes at a constant acceleration of 10 g. No persistent motion of the fuse wires (relative to the fuse proper) was detected. The acceleration was increased to 15 g for the next 60 to 500 cps run and finally to 20 g for a 100 to 500 cps test. During the latter a narrow resonant frequency range was observed between 365 to 370 cps. At this point the fuse wires were experiencing perhaps a 1/16-inch displacement while the springs did not appear to move (relative to the glass case).

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW DOWNGRADING OR DECLASSIFICATION STAMP	
CLASSIFICATION CHANGED TO: <u>U</u>	AUTHORITY: <u>W.C. Payne</u>
PERSON CHANGING MARKING & DATE: <u>Emelda Selph 7/15/98</u>	RECORD ID: <u>98SN 2955</u>
PERSON VERIFYING MARKING & DATE: <u>W.C. Payne 7/16/98</u>	DATED: <u>7/13/98</u>

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To: Distribution

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Ref. Symbol: 1611
Project No. ET-2667H

A total of 30 minutes was spent cycling between 100 to 500 cps at 20 g and an additional 30 minutes was spent vibrating at the resonant frequency at 20 g. There were no fuse wire failures.

In Axis II (parallel to the fuse wire) a resonant frequency was detected at about 500 cps. At this point the springs were observed suffering a small vertical displacement relative to the glass fuse case. The fuses were vibrated at 20 g 100 to 500 cps for 30 minutes and for 15 minutes at 20 g at the 500 cps resonant frequency. Again there was no failure of the fuse wires.

Temperature Tests The fuses, five at a time, were placed in fuse holders which were secured to a Bakelite plate. A thermocouple was located on this plate in the midst of the fuses and each fuse was connected to a chatter tester so that there would be immediate indication when a fuse opened. The entire assembly was placed in a Fisher oven and the temperature was first allowed to stabilize at +200°F (a Rubicon Model 2736 potentiometer was used with the thermocouple to measure temperature). The temperature was then increased to 210°F (in less than a minute), held for 1/2 minute, and then increased to 220°F and so forth until all the fuses had opened. The fuses opened between 245°F and 265°F. After each of the fifteen fuses had been tested a high potential test was performed to assure that the fuses had broken sufficiently clean to prevent flashover across the open wire. A voltage of 13 kilovolts DC was applied across either end of each fuse. Four of the fuses (one shown in Fig. 1) broke apart during the temperature tests thus leaving small pieces of the assembly between the open contacts; however, there was no flashover across these four or any of the remaining ones tested.

D. C. McFall
Test Conducted by D. C. McFALL - 1611-4

R. S. Hooper
Approved by R. S. HOOPER - 1611-4

DCMcF:1611-4:bjm

Enc. Fig. 1

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