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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
Review Date: 9/29/98
Authority: RB Craner
Review Date: 10/06/98
Authority: ADD W. Layne
Determination (Check Applicable)
1. Classification Retained
2. Classification Changed to: U
3. Contains No DOE Classified Information
4. Coordinate With
5. Contains UCAI? no
6. Comments: OK for Openet

File No: MC-1271, 3.2
T-16803
Project No. 13.670.00
Completed: 2-19-60

TO: DISTRIBUTION TCG-NNT-1; TCG-SAFF-1

Re: Preliminary Evaluation of Three Development MC-1271 Thermal Batteries, Fabricated by Sandia Corporation.

Summary

Three units were subjected to the following sequence of environments: linear acceleration, mechanical shock, vibration, and temperature shock. The units were x-rayed initially and after each environment. One of the units developed internal cracks in the potting during temperature shock, but no other indications of cracking or other damage were visible in the X-rays. The units were non-destructively tested after each environment; all of the readings were within the specifications.

All three of the units were activated at ambient temperature after completion of the environmental tests. The results of these activations were all within the specifications.

Object of Test

This test was a preliminary evaluation of development units prior to a planned experiment to be performed in the near future.

Authorization for Test

This test was requested by Organization 1246 in a Work Order Authorization dated 1-30-60. Mr. A. Rakoczy was the consultant.

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Functional Measurements and Methods

The non-destructive tests specified by Paragraphs 2.1.4, 2.1.5, and 2.1.6 of TR-310351, Issue J, were performed with a PT-596 Tester. Since at the time of this test there were no test requirements available for the MC-1271, the test requirements for the MC-751 were used as a guide.

The destructive test specified by Paragraph 2.2.2 of TR-310351, Issue J, was performed with a PT-695 Tester.

Procedure and Results

Three MC-1271 Thermal Battery Packages, designated as Units A, B, and C, were X-rayed prior to environment and after each of the following sequence of environments. The units were non-destructively tested

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after each environment merely as a precaution, and no quantitative data were taken for these tests.

Linear Acceleration - The units were subjected to accelerations of 69 g in both directions of the X axis, and 35 g in both directions of the Y and Z axes. These accelerations were applied for one minute in each of the directions. The axis designations are shown in Figure 4. There were no defects visible in the X-rays after acceleration. The results of the non-destructive tests after acceleration were all within the limits.

Mechanical Shock - The units were subjected to three impact shocks in both directions of each axis. The magnitude of the shocks was 100 g in both directions of the X axis, and 60 g in both directions of the Y and Z axes. The axis designations are shown in Figure 4. There were no indications of structural defects in the X-rays after shock. The non-destructive tests after shock were all within the specifications.

Vibration - All three of the units were subjected to a resonance survey and one hour of vibration at resonance in each of three axes. The input accelerations during vibration were 0.120 inch double amplitude from 5 to 15 cps, 0.080 inch double amplitude from 16 to 25 cps, 0.060 inch double amplitude from 26 to 60 cps, 0.036 inch double amplitude from 61 to 74 cps, and 10 g from 74 to 2000 cps. Acceleration was monitored in three directions on the units at a location on top of the unit, on the corner above the connectors. The input acceleration was monitored in three directions on the mounting jig at a point directly under the location of the accelerometers on the units. The resonant points and the amplifications found in the survey are shown in Table I. There were no defects visible in the X-rays after vibration. The results of non-destructive tests after vibration were all within the specifications.

Temperature Shock -The units were subjected to three eight-hour cycles consisting of four hours at -65°F followed within five minutes by four hours at +160°F. The X-rays after temperature shock showed that Unit C had developed an internal crack in the potting. There were no cracks visible in the X-rays of Units A and B. The non-destructive test results after temperature shock were all within the specifications.

Activation - The units were activated at ambient temperature using a PT-695 Tester. This tester is programmed to give the rise time and activated life of a battery package to 1500 volts, as well as provide an oscillograph recording of the activated life to 1500 volts. The results of these activation tests are tabulated in Table II. The results of the recordings are plotted graphically, for an activated life to 1700 volts in Figures 1, 2, and 3. These graphs show the response of the recorder to the battery voltage. The recorder was at a calibrated voltage, and when the firing pulse was applied to the MC-1271, the

calibrated voltage was removed and the recorder started to zero, but the battery voltage came up before the recorder reached zero. This accounts for the dip on the graphs.

All three of the units were well within the firing specifications of TR-310351, Issue J.

R. L. Kurtz

R. L. KURTZ, 1611-3

R. F. Harlan

1613 Project Engineer: R. F. HARLAN, 1613-3

RLK:1611-3:cd

Enc: Tables I and II
Figures 1 thru 4

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TABLE I

MC-1271 VIBRATION RESONANT SURVEY RESULTS

UNIT	X AXIS FREQ.	X AXIS AMP.	Y AXIS FREQ.	Y AXIS AMP.	Z AXIS FREQ.	Z AXIS AMP.
A	1000	6.6	280	2.7	650	2.75
A	1200	7.8	800	6.4	975	9.0
A					1700	6.5
B	650	1.84	420	2.3	900	8.55
B	1050	6.8	750	5.8	1535	11.6
B	1150	8.0	1450	1.57		
C	1300	8.8	300	3.05	900	7.6
C			900	7.2	1900	8.0

Note 1. The units were tightened down on the mounting plate with 20 inch pounds of torque on the mounting bolts.

Note 2. The frequency at which the highest amplification occurred was used for resonant vibration.

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TABLE II

MC-1271 FIRING RESULTS

	UNIT A	UNIT B	UNIT C
Rise Time to 1500	.76 Sec.	.76 Sec.	.72 Sec.
Act. Life to 1500	202.8 Sec.	200.7 Sec.	210.8 Sec.
Rise Time to 1700	.90 Sec.	.89 Sec.	.90 Sec.
Act. Life to 1700	176.0 Sec.	173.0 Sec.	180.0 Sec.
Peak Volts	2440	2440	2410

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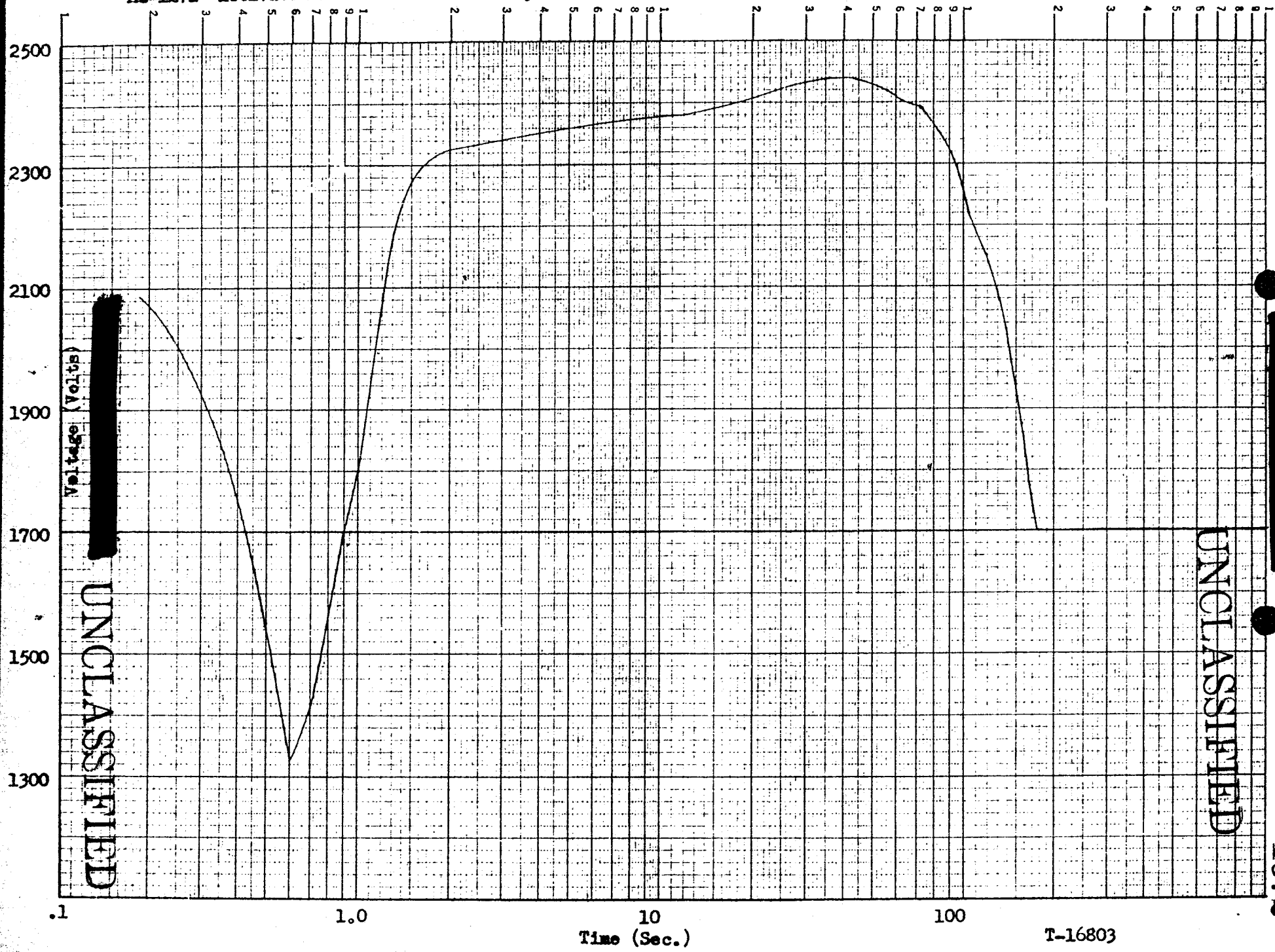
4 CYCLES X 70 DIVISIONS

MC-1271 Activated Life for Unit A - Figure 1



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MC-1271 Activated Life for Unit B - Figure 2

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MC-1271 Activated Life for Unit C - Figure 3

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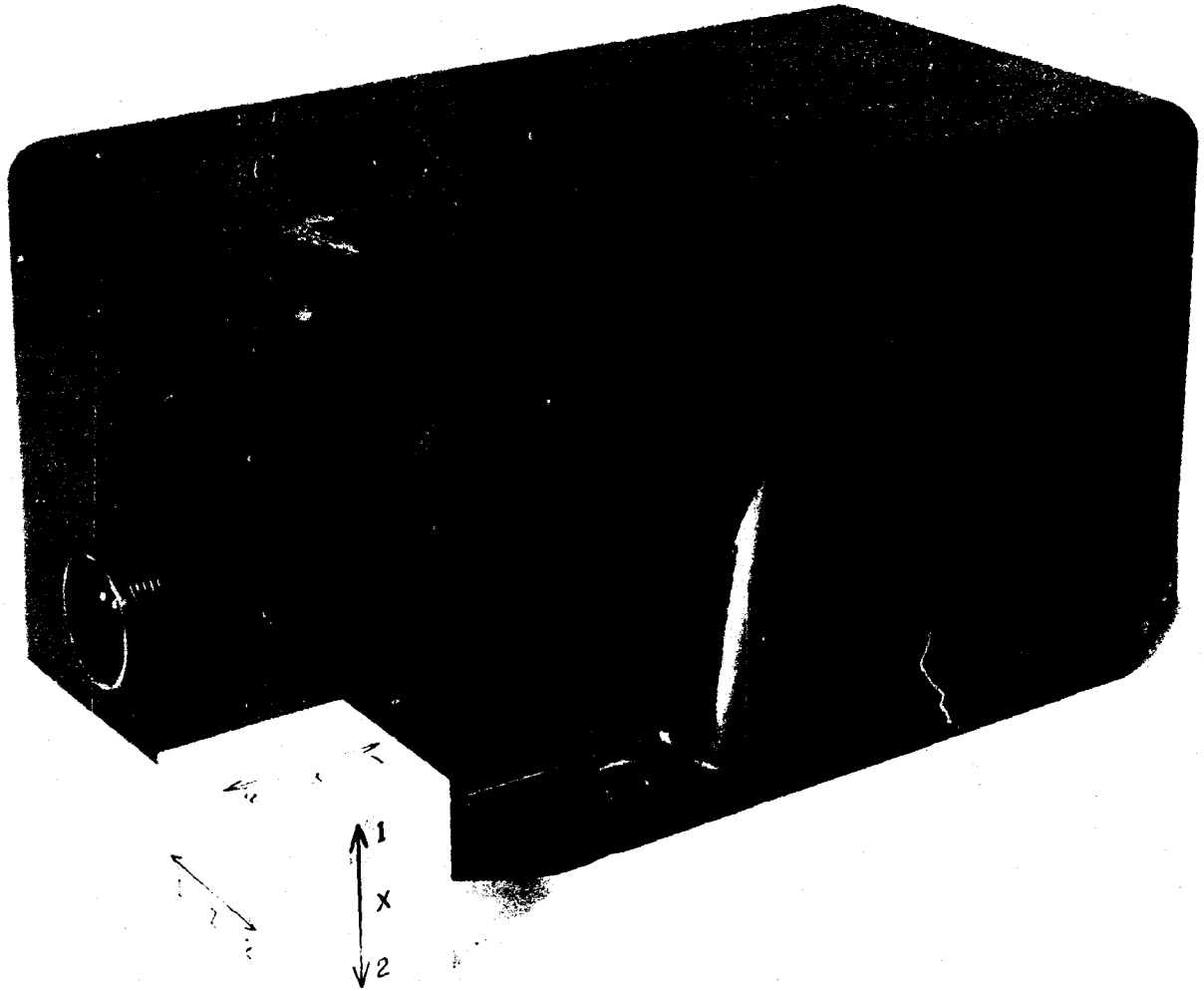

FIGURE 4. MC-1271 THERMAL BATTERY AXIS DESIGNATIONS. T-16803

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