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NOV 3 1960

File No: MC-1262, 3-2
T-No: 16330
Project No: 13.817.62
Completed: 9-29-60

RBCraner 7/29/98
10/6/98 W Layne
Declassify
TCG-NNT-1; TCG-SAFF-1

To: DISTRIBUTION

Re: Linear Acceleration Testing of Prototype MC-1262 Thermal Batteries Manufactured by Eagle Picher

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CENTRAL RECORD FILE

Object of Test

This test was performed as part of the Development Program on MC-1262 Batteries. The effects and environmental limitations of the battery were to be studied during linear acceleration. Various overtest conditions were to be tried in an attempt to prove the unit's capability to withstand the triangular wave form specified in TR-313058, Form 2.

Authorization for Test

This test was requested by 1323 in a Work Order Authorization, dated 1-26-60. Mr. F. W. Boling was the requisitioner. The material for test was received 5-12-60.

Summary

Twelve early prototype MC-1262 Thermal Batteries were received for linear acceleration tests. All units were subjected to extreme overtest as follows:

Four units were activated while being accelerated at a constant applied acceleration of 200 g.

Four units were subjected to a constant applied acceleration of 100 g for the duration of battery life. Two units were fired at -65°F, and two were activated at +165°F.

Four units were activated at 200 g, then the "g" load was reduced to zero in a period of approximately 15 seconds.

Five units in this group of batteries met all functional requirements. The monitor circuit in unit No. 322 functioned properly. The other monitor circuits did not function.

A second group of later prototype batteries were subjected to acceleration for periods of time ranging from 5.5 to 10 seconds. Eight units were fired at 200 g and six units were activated at 100 g linear acceleration. No results were recorded for unit No. 5319 because of equipment failure. Units numbered 5012 and 5114 did not meet the minimum requirement for activated life in the 28 volt section. All other functional results met specifications. The monitor circuits in units numbered 5112, 5118, 5122 and 5119 did not function. The other monitor circuits operated in this group of batteries.

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MC-1262
3-2

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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW DOWNGRADING OR DECLASSIFICATION STAMP	
CLASSIFICATION CHANGED TO: U	AUTHORITY: W. C. Layne
Emilda Selph 10/08/98 PERSON CHANGING MARKING & DATE	RECORD ID: 99SN0050
W. C. Layne 10/12/98 PERSON VERIFYING MARKING & DATE	DATED: 10/06/98

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Functional Requirements and Methods

The equipment and instrumentation used in this test are listed in Table I and II.

Linear acceleration testing was conducted on the Genisco Hydraulic Centrifuge. The Statham Accelerometer instrumentation system was used to record the periods of applied acceleration. Environmental conditions were maintained as specified by the consultant.

The MS-1262 Test Console was used to perform all functional testing. The output voltages were monitored visually and recorded simultaneously by a two channel Brush Recorder, incorporated in the tester. The VOM was used to check monitor circuit operation.

Procedure and Results

Twelve XMS-1262 Thermal Batteries were received for linear acceleration tests. The units were early prototype batteries that did not contain the latest design features. All of the components were subjected to overtest acceleration conditions as requested by the consultant.

Four units, numbered 385, 390, 122 and 146, were activated while being accelerated at a constant applied acceleration of 200 g. Electrical performance results and environmental information are recorded on Page 1 of Table III.

A second group of four components was subjected to 100 g linear acceleration for the duration of their activated life. Units numbered 382 and 360 were stabilized and fired at -65°F. The two remaining units, numbered 379 and 376, were fired at +165°F. All functional and environmental data, recorded for these tests, are shown on Table III, Page 1.

The remaining four batteries, numbered 375, 388, 396 and 389, were activated while being accelerated at 200 g. At the first indication of voltage output, the "g" load was reduced to zero. The period of applied acceleration, direction of applied force, and all functional results are shown on Page 1 of Table III.

The monitor circuit in unit No. 122 operated properly. None of the monitor circuits functioned in the other batteries tested at this time.

A second group of 14 thermal batteries, numbered 5115, 5082, 5132, 5117, 5112, 5118, 5084, 5102, 5119, 5120, 5114, 5113, 5110 and 5106, were received for linear acceleration tests. The units contained later design features. All batteries in this group were subjected to the acceleration forces noted on pages 1 and 2 of Table III. The tests were conducted as described in the previous paragraph describing the linear acceleration testing of units numbered 375, 388, 396 and 389. The electrical performance results are recorded on Table III, Pages 1 and 2. The monitor circuits of units numbered 5112, 5118, 5102 and 5119 did not function. All other monitor circuits in this group of units functioned properly.

The 24 test components were returned to Division 1323 after acceleration tests.

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Discussion

Item 1 (From Table III)

The Brush Recorder ran out of chart paper during this test. Since the pulse voltages were read from the recording, no data was taken for this part of the test. All other test results appeared normal on this battery.

Item 2 (From Table III)

No output voltages were recorded for unit No. 5119 until after 7.21 seconds. An investigation of the test cable connector revealed that it had been damaged by the "g" loads. The negative mating sleeve was breaking contact during acceleration. The faulty connector was replaced and all subsequent tests were conducted with no malfunctions.

Robert B. Frantz, 7321-3

Dale Buchman

Dale Buchman, 7321-5

RBF:7321-3:ez

Enc: Tables I, II, III

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TABLE I
ENVIRONMENTAL
EQUIPMENT LIST

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ITEM NO.	NAME	MFG. & MODEL	S-NO./ SER. NO.	DATE OF LAST CAL.	CAL. PER.	ACCURACY	RANGE	REMARKS	
1	CENTRIFUGE	GENISCO MOD. A944	SER. No. 001	PRIOR TO TEST	TEST	± 1 %	20-2500 g		
2	ACCELEROMETER	STATHAM ASA-1000-350	No. 5381	PRIOR TO TEST	TEST		0-1000 g		
3	AMPLIFIER	KINTEL MOD. 112 A	S-No. 113499	PRIOR TO TEST	TEST	OVERALL ± 5 %	—		
4	BRIDGE BALANCE BOX	SANDIA	—	PRIOR TO TEST	TEST		—		
5	VISICORDER	MINN. HONEYWELL MOD. 906	S-No. 84796	PRIOR TO TEST	TEST	± 2 %	0-300 g		
6	TIME MARK GENERATOR	SANDIA	S-No. 421-6	8-60	6 MONTHS	± .01 SEC.	—		

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TABLE II
FUNCTIONAL
EQUIPMENT LIST

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ITEM NO.	NAME	MFG. & MODEL	S-NO./ SER. NO.	DATE OF LAST CAL.	CAL. PER.	ACCURACY	RANGE	REMARKS	
1	MC-1262 TEST CONSOLE	SANDIA (DIV. 1323)	SER No. 1	PRIOR TO TEST	TEST	* 1/2 %	* 0-25V. 0-50V.	* PANEL METERS	
2	VOM	SIMPSON MOD. 260	S-No. 111-96	8-60	6 MONTHS	—	0-∞ Ω		

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TABLE III XMC-1262 ELECTRICAL PERFORMANCE T-16848

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	Unit No:	385	390	382	379	360	376	375	388	396	389	122	146	5106
Rise Time	10 V.	.25 sec	.22 sec	.29 sec	.22 sec	.22 sec	.23 sec	.27 sec	.26 sec	.25 sec	.24 sec	.41 sec	.39 sec	.28 sec
	24 V.	1.03 sec	1.21 sec	1.67 sec	1.02 sec	1.66 sec	1.10 sec	1.30 sec	.95 sec	1.06 sec	1.07 sec	1.55 sec	1.35 sec	.94 sec
Peak Voltage	12 V. Section	19.5 V.	19.5 V.	19.2 V.	19.4 V.	19.2 V.	19.5 V.	19.4 V.	19.2 V.	19.2 V.	19.4 V.	18.2 V.	18.5 V.	19.0 V.
	28 V. Section	29.0 V.	28.6 V.	28.0 V.	28.7 V.	29.0 V.	29.2 V.	29.5 V.	28.9 V.	29.1 V.	28.5 V.	28.0 V.	30.5 V.	29.3 V.
Activated Life	12 V. Section	163 sec	8 sec	—	112 sec	108 sec	34 sec	114 sec	144 sec	146 sec	105 sec	No Record	16 sec	135 sec
	28 V. Section	48 sec	65 sec	96 sec	76 sec	166 sec	117 sec	260 sec	50 sec	277 sec	183 sec	4 sec	16 sec	237 sec
Time (sec)	5	29.0 V.	28.5 V.	27.8 V.	28.7 V.	28.5 V.	29.0 V.	29.0 V.	28.9 V.	29.0 V	29.2 V.	22.2 V.	26.5 V.	29.2 V.
	15	27.8	29.6	28.0	28.2	29.0	29.8	29.5	29.5	29.1	29.5	19.2	24.0	29.3
	30	26.8	27.3	27.8	27.9	29.0	28.8	29.3	25.2	29.0	28.4	16.2	18.0	29.1
28 V.	45	24.7	27.0	27.2	27.1	28.9	28.1	29.1	25.0	28.9	28.2	14.0	10.5	29.0
Section	60	20.0	26.2	26.2	26.1	28.1	27.9	28.5	23.0	28.2	27.8	11.8	9.5	28.9
Readings	75	15.2	—	25.1	24.2	27.9	26.3	28.4	17.0	28.1	27.2			28.0
	90	9.8	22.5	24.2	22.2	26.8	25.9	28.2	15.0	28.0	26.2			27.9
	120	5.8	4.2	17.1	20.3	25.5	23.8	28.0		27.6	25.4			27.1
	150	5.5						27.9		26.9	24.1			26.6
	180							27.1		26.2				26.0
	210							26.4		25.6				25.1
Surge Voltages	1.1 sec.	9.8 V.	8.9 V.	9.8 V.	9.9 V.	9.5 V.	9.2 V.	10.0 V.	9.5 V.	9.8 V.	9.8 V.	8.5 V.	6.3 V.	9.2 V.
	18 sec.	13.0 V.	5.7 V.	7.0 V.	13.1 V.	13.9 V.	8.0 V.	13.5 V.	13.1 V.	13.3 V.	11.5 V.	3.5 V.	6.2 V.	* —
	70 sec.	21.7 V.	22.7 V.	22.5 V.	23.1	25.0 V.	24.0 V.	25.2 V.	22.0 V.	25.6 V.	24.2 V.	—	—	* —
Match No.		1	2	1	2	1	2	1	2	1	2	2	1	2
Monitor Circuit		Did Not Function	Did Not Function	Did Not Function	Did Not Function	Did Not Function	Did Not Function	Did Not Function	Did Not Function	Did Not Function	Did Not Function	OK	Did Not Function	OK
Environmental Conditions:	Axes	Long.	Vert.	Vert.	Vert.	Long.	Long.	Long.	Long.	Long.	Vert.	Vert.	Lat.	Vert.
	G Level-Peak	200 g	200 g	100 g	100 g	100 g	100 g	200-0 g in 15 sec	200-0 g in 15 sec	200-0 g in 14 sec	200-0 g in 15 sec	200 g	200 g	100-0 g in 5.5 sec
	Dir. of Acc.	→ Connector	→ A Pin	→ A Pin	→ A Pin	→ Bottom	→ Bottom	→ Bottom	→ Connector	→ Connector	→ A Pin	→ A Pin	→ G Pin	→ A Pin
	Temperature	Room	Room	-65°F	+165°F	-65°F	+165°F	Room	Room	Room	Room	Room	Room	Room

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TABLE III XMC-1262 ELECTRICAL PERFORMANCE T-16848

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UNIT No:		5115	5082	5132	5117	5112	5118	5084	5102	5119	5120	5114	5113	5110
RISE TO	10V.	.39 SEC	.31 SEC	.29 SEC.	.28 SEC	.28 SEC	.28 SEC	.29 SEC	.31 SEC	7.21	.28 SEC	.30 SEC	.31 SEC	.29 SEC.
TIME	24V.	.98 SEC	.88 SEC	.93 SEC	.82 SEC	.81 SEC	.82 SEC	.90 SEC	.92 SEC	7.21	.85 SEC	.93 SEC	.86 SEC	.84 SEC.
PEAK	12V. SECTION	19.0V.	18.9V.	18.7V.	19.0V.	19.8V.	19.2V.	19.2V.	19.2V.		18.9V.	18.0V.	19.2V.	19.1V.
VOLTAGE	28V. SECTION	28.9V.	28.1V.	28.6V.	29.0V.	29.0V.	29.3V.	29.0V.	29.8V.	EQUIPMENT FAILURE	29.7V.	28.9V.	29.3V.	29.2V.
ACTIVATED	12V. SECTION	132 SEC	150 SEC	119 SEC	140 SEC	128 SEC	151 SEC	149 SEC	135 SEC		128 SEC	99 SEC	148 SEC	140 SEC
LIFE	28V. SECTION	108 SEC	49 SEC	106 SEC	115 SEC	230 SEC	280 SEC	177 SEC	120 SEC		208 SEC	73 SEC	98 SEC	236 SEC
TIME (SEC)	5	28.9V.	28.1V.	28.6V.	29.0V.	29.0V.	29.2V.	29.0V.	29.1V.	*	29.2V.	28.9V.	29.3V.	29.1V.
	15	28.8	27.2	28.2	28.9	29.0	29.3	29.0	29.2		29.7	28.2	27.5	29.2
	30	28.0	25.9	28.0	28.2	28.9	29.0	28.8	29.0	29.1V.	29.3	27.6	27.0	29.0
28V.	45	27.7	24.2	27.7	27.9	28.3	28.9	28.2	28.8		29.0	26.2	27.1	28.9
SECTION	60	27.0	23.1	27.0	27.2	28.0	28.6	28.1	28.2	28.9	28.9	25.5	26.9	28.8
READINGS	75	25.9	21.5	25.7	26.2	27.2	28.0	27.0	27.1		28.0	24.0	25.1	28.0
	90	25.2		24.9	25.3	27.1	27.8	26.9	25.8		28.0	22.0	24.1	27.9
	120	23.4		23.2	23.0	26.9	27.1	26.0	24.0		27.2		21.7	27.2
	150					26.1	26.3	25.0			25.8			27.0
	180					25.6	26.0	23.9			25.0			26.1
	210					24.7	25.1				24.0			25.2
SURGE	1.1 SEC	9.3V.	10.0V.	9.5V.	9.5V.	9.0V.	9.1V.	9.3V.	9.1V.	—	9.5V.	8.7V.	9.9V.	9.5V.
VOLTAGES	18 SEC	12.9V.	14.0V.	12.9V.	12.2V.	10.8V.	13.4V.	13.2V.	12.5V.	13.0V.	13.4V.	13.4V.	12.9V.	13.4V.
	70 SEC	22.4V.	18.0V.	20.9V.	22.3	22.9V.	23.4V.	22.8V.	22.5V.	23.9V.	22.9V.	17.6V.	21.0V.	23.6V.
MATCH No:		1	2	1	2	1	2	1	2	1	2	1	2	1
MONITOR CIRCUIT		OK	OK	OK	OK	DID NOT FUNCTION	DID NOT FUNCTION	OK	DID NOT FUNCTION	DID NOT FUNCTION	OK	OK	OK	OK
ENVIRONMENTAL	AXES	LAT.	LAT.	LAT.	LAT.	LAT.	LONG.	LAT.	LONG.	LONG.	LONG.	VERT.	VERT.	VERT.
CONDITIONS	G LEVEL	200-0g	100-0g	200-0g	200-0g	100-0g	200-0g	100-0g	100-0g	200-0g	200-0g	200-0g	100-0g	200-0g
	PERIOD	IN 8 SEC	IN 10 SEC	IN 7 SEC	IN 7 SEC	IN 6.5 SEC	IN 8 SEC	IN 6.5 SEC	IN 5.5 SEC	IN 7 SEC	IN 6 SEC	IN 7 SEC	IN 6 SEC	IN 6.5 SEC
DIR. OF ACC.		→ G PIN	→ G PIN	→ G PIN	→ C PIN	→ C PIN	→ CONNECTOR	→ G PIN	→ CONNECTOR	→ BOTTOM	→ BOTTOM	→ E PIN	→ E PIN	→ A PIN

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* SEE DISCUSSION ITEM 2

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