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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
1st Review Date: 8/20/98
Authority: ADD
Name: R Braner
2nd Review Date: 8/25/98
Authority: ADD
Name: W Layne
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1. Classification Retained
2. Classification Changed to: U
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5. Contains UCAI? NO
6. Comments: OK for Opinnet

CENTRAL TECHNICAL FILE
ACCOUNTABILITY CARD BB
FILE NO. MK 28 3-2

INVENTORIED
SEP 14 '65
3428-3

April 3, 1964
RS-7331/236
File: TX 28
T-60062
Completed: 3-31-64

To: G. J. Simmons - 1531

From: O. L. Terry 7331-3

RECEIVED
APR 8 1964
CENTRAL TECH FILE

Re: Instrumentation of the MK 28 Bomb for Lightning Tests

Introduction

Sandia Corporation has been asked by the Air Force to participate in a program to determine the effect on weapon reliability when a fighter aircraft carrying a weapon is struck by lightning. The first phase of this investigation will be conducted about April 25, 1964, at Tinker Air Force Base, Oklahoma.

Organization 7331 was requested to reinstrument the MK 28 weapon previously used for EMR testing. This request was made in the Confidential Memo, W. L. Stevens, 1531, to E. H. Copeland, 7331, dtd. 2/17/64, "Instrumentation of Lightning Test Vehicle."

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AUG 6 1964
3427-1

Summary

A MK 28, EX SC, Mod 1 Fuse, was instrumented as requested by Division 1531 for lightning investigation tests. The system requested was the one previously instrumented for EMR tests. Ten of the system's electro-explosive devices (EEDs) were instrumented with thin-film type thermocouples.

Calibration of the thermocouples was performed in the usual manner with DC current and also with 10, 50, and 100-microsecond pulses.

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
DOWNGRADING OR DECLASSIFICATION STAMP

CLASSIFICATION CHANGED TO: U	AUTHORITY: W. C. Layne
Emelda Selph 9/8/98	RECORD ID: 98SN3854
PERSON CHANGING MARKING & DATE	
W Layne 9/9/98	DATED: 8/25/98
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Test Item

The system which was reinstrumented is a MK 28 EX SC with a Mod 1 Fuse. Although the instrumentation itself is believed to be adequate for this test, the system contains several modifications to various instrumented components along with several deviations from the WR configuration in those components and parts not modified for instrumentation. The following is a list of those modifications and deviations.

1. Center Case

   a. Recorder access door approximately 14 x 18 inches cut in left-side between mounting lug.

   b. Case section not WR design (this case was formerly used for other testing and simulates the WR configuration in size and shape only)

   c. All components normally contained in center case missing except for forward bulkhead.

   d. Recorder and control mounted on 7 x 18-inch steel plate in the lower part of the case

   e. Three 1/4 x 1-inch slots were cut in the forward bulkhead for instrumentation cabling.

2. MC543 Timer

   a. Actuating arm removed and timer contacts tied in the normal position

   b. MC834 actuators replaced with instrumented MC727 squibs and a hole drilled in the side for instrumentation leads

3. MC737

   Two of the MC749 switches, which were previously instrumented, will not be monitored during this test because of faulty instrumentation which cannot be corrected in the time allotted.

4. MC691

   a. Component not sealed

   b. One of the MC727 actuators is instrumented and holes were drilled for instrumentation leads

   c. The other three MC727's are live (explosive)

5. MC713

   a. All MC860 batteries have been fired and their contents removed. All SA586 electric matches have been replaced with either instrumented matches or SA586 match headers without the explosive.

   b. The potting material was replaced with a foam-type material

   c. Leads for calibration of instrumentation were tied into the wiring harness and extended to outside the battery pack

   d. One match in each MC860 is instrumented

6. LASL Reservoir

   a. Dummy reservoir

   b. Valve assembly modified to accommodate instrumentation leads--both 1A squibs are instrumented

7. MC796

   Same modifications as MC713 except that potting material was replaced with silastic

8. MC708

   Same as MC737

9. MC886

   Actuator instrumented and leads extended outside component

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10. Due to the necessity of providing good instrumentation shielding, the case of all instrumented components were made common through the shield and tied to the weapon case at the recorder.

11. Many of the bolts and screws used in the system are not WR design. Some of those which are, have been badly worn through frequent removal and replacement.

    None of the bolts or fasteners were torqued to the prescribed amount.

12. The power leads for controlling the recorder inside the weapon are connected to connector J103 through pins F, S and J. Lines were extended from J103 through the fuse into the center case section.

13. No attempt was made to seal the system against moisture.

14. The locking set screws normally in the coupling rings between the three major sections of the weapon are missing.

15. As furnished, the system does not have a radome. A special component is being designed by 1531 for this purpose.

16. The break pins in both of the pulse plug assemblies are broken and should be replaced prior to testing.

17. The CG of the system was not determined by 7331-3.

18. Several screws which hold the pulse plug assembly in the fuse section are missing.

19. The system was furnished with a Midwestern Model 561 recorder which includes one spare film magazine, one spare lamp, and twenty-four rolls of film.

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The following is a list of those EEDs which are instrumented and will be monitored.

Component	Squib	Calibration Pins	Recorder Galva No.
MC543	MC727	D-C	1
MC543	MC727	B-C	2
MC691	MC727	V-P	3
MC713	SA586	C-D	4
MC713	SA586	E-F	5
MC886	MC886	B-C	10
LASL	LASL	A-E	11
LASL	LASL	B-F	12
MC796	SA521	G-H	13
MC796	SA521	J-K	14

Calibration

Calibration of the instrumentation was accomplished in two phases. First a DC calibration was performed. This consisted of passing DC currents of various levels through the instrumented bridge wires and recording the thermocouple output for each bridge wire. This is the normal calibration for most EMR tests.

The second part of the calibration consisted of pulsing the bridge wires with short pulses of sufficient amplitude to cause a galvanometer deflection. Pulses of approximately 10, 50 and 100 microseconds duration were used. These pulses were generated with a Fairchild, Model 404B pulse generator. The amplitude and pulse width were recorded using a Tektronix Model 531 oscilloscope and a Dumont Type 299 camera. The oscilloscope recorded the voltage across a one ohm resistor which was in series with the bridgewires. For each calibration input a picture was taken of the input pulse and the Midwestern 561C was used to record the thermocouple output. All calibration data including the pictures and oscillograph records have been furnished to Mr. D. E. Merewether, 1531-1.

Conclusions

Since the test environment that this unit will experience was not defined in the request for an instrumented vehicle, it is recommended

that the deviations, previously listed, be reviewed prior to conducting the proposed test. Some of these deviations may require changes either to the system or to the test procedure.

OLT:7331-3:hb

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