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Research Department - Mound Laboratory

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The purpose of this trip was to attend a Weapons Briefing Seminar presented by the Sandia Corporation. Other personnel from Mound who attended the meeting were A. F. Vollmer, C. D. King, and G. W. Leadingham.

The meeting was conducted by R. W. Henderson who is now a vice president of some sort in the Sandia Corporation. Apparently Sandia is undergoing a major top level reorganization, and John Heinbeck is to be the new president.

The meeting consisted of eight papers, approximately 40 minutes each. A brief discussion of these papers follows:

1. Weapon Hardening - Carter Broyles

This activity is concerned both with techniques of hardening weapons against enemy defenses, and with techniques of penetrating the potential hardening techniques an enemy might employ on missiles launched against us. Hardening techniques are concerned with two facets; blast hardening to withstand effects of severe shock waves, and radiation hardening to withstand effects of neutron and x-ray radiation.

Some hardening of existing systems can be obtained with relatively little increase in cost, but there is usually some point where the costs increase rapidly because of increased weight penalty or redesign of the weapon package. Much effort is expected at Sandia in the next few years on weapon hardening. In particular the elimination of high atomic number materials for hard x-ray hardening is expected to receive strong attention. This emphasis, for example, would mean the elimination of tin or lead base solders for

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detonator bridgewires, substitution of aluminum for gold for bridgewires, and development of high explosives with very low heavy element contamination. In this respect we are remiss, in my opinion, in not pursuing development of alternate bridgewire joining techniques more vigorously.

2. Missile Aerodynamics - E. C. Rightley

This study is concerned with heating effects on warheads on atmosphere re-entry and methods of insuring heat survival. He discussed a number of ways of dissipating heat from warheads, but it is apparent that re-entry problems are fairly well solved.

3. Effects on Weapons - R. G. Clem

No significant notes were taken of this presentation.

4. Materials - L. M. Berry

This discussion was primarily concerned with ablation material studies, although he demonstrated some lead loaded foam materials used for x-ray absorption.

5. Bayonet and Beckett - D. E. Henry

This presentation was a description of two prototype low yield tactical devices, capable of being delivered from very low flying aircraft with extreme precision. Bayonet is a cratering device and utilizes a reverse-lift wing system. With this system the missile is dropped from the aircraft at an altitude of 100 feet or so, the reverse wing turns the missile downward so that earth impact is at an angle sufficient to avoid skipping, the wings shear off on impact, and the missile buries itself as much as 30 feet (depending on the type of earth) before detonation. The curved path of the missile, and underground burst permit the aircraft to escape the blast. The missile was designed



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for a 48 casing, and plans are in progress to test a 48 weapon off the shelf in this manner. Slow motion movies of the test device and launching method were shown.

Beckett is a surface burst device, also capable of launch from a low flying airplane. To protect the airplane from the surface blast, the target is marked with a flare and the missile is driven by a short burst rocket engine to the target with an optical homing device. Although the target flare and the missile are launched simultaneously, the missile flies in a short loop, thus permitting the aircraft to escape. Preliminary tests of the flare dropping system were made with a number of different pilots. With a little practice most of the pilots tested could drop a flare within 50 feet of a target from a 600 mph airplane at 50 to 100 feet altitude. Beckett has not been integrated with an existing weapon as yet.

6. New Weapon Systems - R. G. Clem

No significant notes were taken of this presentation.

7. Electronic Components - J. H. Findlay

This was primarily a discussion of the development of electronic neutron generators. The original capacitor bank accelerator types weighed about 15 lbs, but development of ferroelectric voltage generators have reduced the Zipper device to a total of about 2 lbs. A revised version of the ferroelectric Zipper has now been reduced to approximately 1 lb. This is an integrated unit produced by G. E. in Florida. The device is ignited by a Mound-built MDF timer.

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8. Electromechanical Components - L. A. Hopkins

This presentation was a display and description of many of the gadgets and hardware developed by Sandia Corporation to perform many of the timing, arming, and safing features of present day missile warheads. Included in this display was a Mound-built milliwatt generator which can be used to drive precise mechanical timers for months or years at a time.

In general we all thought the briefing was interesting and informative.

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Kenneth W. Foster

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