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FLIGHT TEST REPORT OF THE MB-1 AIR-TO-AIR ROCKET WITH THE W-25 WARHEAD, FLIGHT NUMBER 36

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ABSTRACT

This document is a report on Flight Test Number 36 of the W-25 warhead, the third of six flights designed to prove compatibility of the warhead with the MB-1 air-to-air rocket/F-101B aircraft. Test objectives, results, and conclusions are presented herein.

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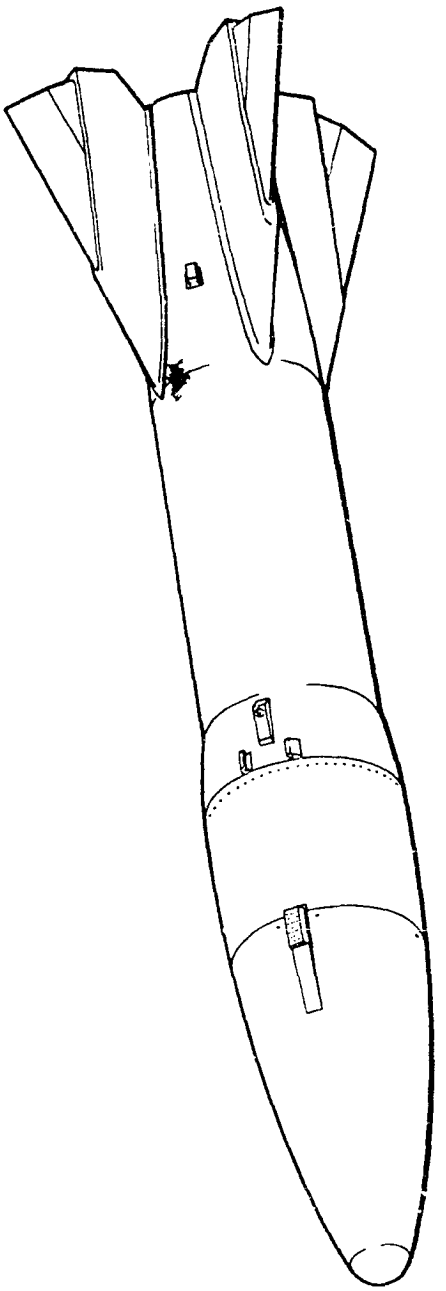

Figure 1. MB-1 Air-To-Air Rocket

FLIGHT TEST REPORT OF THE MB-1 AIR-TO-AIR ROCKET WITH THE W-25 WARHEAD, FLIGHT NUMBER 36

Summary

Flight Test 25.11-36 of the MB-1 air-to-air rocket with an XW-25 warhead equipped with instrumentation for telemetering was performed on 5 November 1958 at the Air Force Missile Development Center, New Mexico.

This rocket, Douglas Aircraft Company No. D_1-24/S, was carried internally on the rotating door of McDonnell Aircraft Corporation's F-101B aircraft No. 236. This aircraft does not have an automatic fire control system, so provisions were made for the pilot to perform the pre-launch functions.

Intermittent loss of telemetered information resulted in incomplete flight records. However, that portion of the flight during which system and environmental data were obtained was successful.

Test Objectives

The objectives of Flight Test 25.11-36 were (1) to gather environmental data, (2) to measure the fuze output under firing conditions, and (3) to assure compatibility with the MB-1 rocket/F-101B aircraft.

Test Unit Configuration

The warhead flown consisted of an MC-672 sphere case and an MC-656 X-unit. The telemetry was contained on a structure which replaced the nuclear and HE assembly in the sphere case. One detonator cable emergence hole was enlarged to accommodate the telemetry wiring. The X-unit differed from a standard X-unit in that wiring was added to allow the necessary system functions to be monitored, and holes were drilled in the mounting plate and the aft mounting ring to allow the TM wiring to reach the TM structure.

Instrumentation

A telemetry package having 12 input channels replaced the HE sphere in the MC-672. All warhead system functions were monitored. Telemetered environmental data included X-unit forward mounting plate temperature, X-unit vibration (in three mutually perpendicular planes), longitudinal vibration of the sphere, and acceleration of the sphere in three mutually perpendicular planes.

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Figure 2. F-101B Aircraft

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Launch Conditions

Launch conditions were as follows.

Altitude	41436 MSL
Mach Number	1.56
True Air Speed	1507 ft/sec (890 kts)
Free Air Temperature	-58°C
Pitch Angle	10.9° Aircraft Nose Up
Angle of Yaw	1.72° Aircraft Nose Right
Wind Direction	From 260°
Wind Velocity	40 kts
Rocket Serial Number	D_1-24/S
Rocket Location	R/H Rack
Aircraft Heading	2.4°

Test Results

Arm/safe switch actuation, thermal battery arm signals, and capacitor voltage rise were the functions that were telemetered. All of these occurred at the proper times.

The functions that were not telemetered were the two fire signals. These occurred during the time when the telemetry was not functioning. The telemetry failure occurred from -2.0 to +0.2 seconds from launch and from +3.6 to +12.9 seconds from launch. Signal strength remained normal throughout these failure periods, so the cause of failure was probably a bad connection between the subcarrier oscillator package and the transmitter.

During the times when the telemetered information was valid, no appreciable vibration was observed.

Longitudinal acceleration due to rocket thrust reached a maximum of 52 g. Complete results are given in Table I.

Conclusions

This test is considered partially successful. Environmental data was gathered and that portion of the electrical system operation which was monitored functioned properly.

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TABLE I

Flight Test 25.11-36 - November 5, 1958

Information	Subcarrier frequency (kc)	Pickup range	Pickup accuracy	Pickup location	Information recorded
Temperature	1.3	0° to 800°F	10%	X-unit forward mounting plate	No temperature change
Capacitor voltage	3.0	0 to 3000 v	10%	X-unit	2250 v at 3.6 sec see note
Horizontal acceleration	3.9	± 5 g	± .5 g	TM sphere	- 2.39 maximum
Longitudinal acceleration	5.4	- 50 to + 100 g	± 7.5 g	TM sphere	+ 52 g maximum
Vertical acceleration	7.35	± 25 g	± 2.5 g	TM sphere	No record of ejection due to loss of signal
Arm-safe switch actuation	10.5	On-off	.001 sec	X-unit	3 times before launch
Fire signal 1	10.5	On-off	.001 sec	X-unit	See note
Capacitor voltage	14.5	0 to 3000 v	10%	X-unit	2250 v at 3.6 sec see note
Thermal battery initiation 1 and 2	22.0	On-off	.001 sec	X-unit	2.155 sec and 2.162 sec
Fire signal 2	22.0	On-off	.001 sec	X-unit	See note
Longitudinal vibration	30.0	± 10 g 20 to 1000 cps	± 10%	TM sphere	No appreciable vibration during the time that the signal was good
Longitudinal vibration	40.0	± 10 g 20 to 1000 cps	± 10%	X-unit back-up plate	
Vertical vibration	52.5	± 10 g 20 to 1000 cps	± 10%	X-unit back-up plate	
Horizontal vibration	70.0	± 10 g 20 to 1000 cps	± 10%	X-unit back-up plate	

Note: No telemetering signals were received from - 2.0 to + .2 seconds from launch and from + 3.6 to + 12.9 seconds from launch.

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