DEPARTMENT OF THE AIR FORCE
AIR FORCE HISTORICAL RESEARCH AGENCY
MAXWELL AIR FORCE BASE, ALABAMA

24 Jul 09
RSA/O/2009-2120/64868/mtg

AFRHA
600 Chennault Circle
Maxwell AFB AL 36112-6424
USA

John Greenewald
[redacted]

Dear Mr. Greenewald:

This letter is in reply to your Freedom of Information Act request of 10 July 2009. The request was received by the AFHRA on 10 July 2009 and was assigned the FOIA case number 2009-2120.

After researching your request and as per our e-mail correspondence, I have enclosed a full copy (217 pgs) of IRIS #1014334, Air Force Missile Development Center. Please note that our only copy of this document is on microfilm; we have no paper copy. This microfilm copy has several pages that are unreadable. We have tried to make these pages as clear as possible. Please note that under the Freedom of Information Act you can be charged $.15 per page copied. The first 100 pages are provided to you for free. However, the document was 217 pages. The additional 117 pages will equal a balance due of $17.55. Please send a check or money order payable to AFO MAXWELL AFB. Mail the check or money order to :

AFHRA/RSA
ATTN: For FOIA
600 Chennault Circle
Maxwell AFB AL 36112-6424

Please be advised that if we do not receive your payment within 30 days (from date of the response letter), we will begin charging an interest fee based on the current value of funds rate (CVFR) at http://www.fms.treas.gov/cvfr/. Your account will be considered to be delinquent and you will be placed on the delinquent list until your payment is received in full. Also, remember that while your account is in delinquent status, any future request will not be processed.

Sincerely,

Mrs. Marcie T. Green
Archivist

Attachment:
1. IRIS #1014334

Main: AIR FORCE MISSILE DEVELOPMENT CENTER
RECTYPE: Call: MICFILM 31794
IRIS Number: 1014334
BegDate: 01-04-1955 EndDate: 10-13-1955 PubDate: Author:
Title:
Title Extension:
Title Added Entries: GAM-63 (RASCAL MISSILE) TEST REPORTS
Class: UNCLASSIFIED LNFT: 0 AudioRec: NumPages: 0 MajCom:
Subject: GAM-63 MISSILE
Abstract: INCLUDES GAM-63 (RASCAL) WEEKLY TEST STATUS REPORTS.
DateRcvd: AddDate: 11-07-1984 IRISRef:
Admin: No Administrative Markings Listed
SecInfo:
DNotes: AVAILABLE ON MICROFILM ONLY. CALL NUMBER IS K280.1056.
AccNotes: OldAcc: AccsnrID: DateAccs: Reel: 0000031794 Frame: 1069 FrameLast: 0
DateSend: DateMflm: ScanrID: IndexID: C1 QCID:
DOC_LINK:

[redacted]

Declassified
3 July 1969
a.b.

[redacted]

3-2-10 Rascal (GAM-63)

1

1014334

IRIS # 1014334

[redacted]

RETURN TO

SHRC

AXWELL AVE. AL 36

Rec

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3 July 1969
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SECRET

18 Oct. 55

Power on RADCAL

evaluation by
Pete Luke + HADC.

Declassified
3 July 69
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RETURN TO
AFSHRC
MAXWELL AFB AL 36112

DD FORM 95

1014334

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[redacted]

FILE RD-12

MISSILE NO.	LAUNCH DATE	PURPOSES OF TEST	[redacted]
0104A	27 SEP 51	Glide flight to test launching mechanism, recovery system, and telemetry system. Missile contained no power plant, guidance system, or stabilization system. 30K 1.1M 3N.M.	The test was successful except that the rivets of one recovery parachute broke, and the other parachute failed to deploy.
0205A	18 DEC 51	Glide flight to test launching mechanism, recovery system, and telemetry system. Missile contained no power plant, guidance system, or stabilization system. 30K 1.1M 3N.M.	The test was successful except that launching separation was slightly uneven. The aft section gimbaled failed to separate the missile thus preventing satisfactory recovery of the aft unit.
0307B	30 SEP 52	To test the high pressure power plant, the stabilization system, and the recovery system. To obtain vibration and aerodynamic data. Missile contained no guidance system. 30K 1.5M 2.3N.M.	This was an excellent flight with all test objectives achieved and performance was in good agreement with predicted performance.
0409B	15 JAN 53	To test the high pressure power plant, the stabilization system, and the recovery system. To obtain pitch-response, vibration, temperature and aerodynamic data. Missile contained no guidance system. 34K 1.8M 3N.M.	This was an excellent flight except that the recovery parachute failed. The pitch programmer did not work exactly as planned, but pitch response data were obtained.
0510B	13 MAR 53	To test the high pressure power plant, the stabilization system, and the recovery system. To obtain pitch and yaw response, temperature, and aerodynamic stability data. 38K 1.6M 3.2N.M.	This was an excellent flight with all test objectives achieved. [redacted]
0615B	5 OCT 53	To test the "Dual-Operator" Radio Command Guidance System and the high pressure power plant. 32K 1.4. 2.4N.M.	Power plant operation was satisfactory. The missile became unstable after [redacted] Failure occurred [redacted] of video was [redacted] crystals. The [redacted] was inoperative [redacted] this [redacted]

1-46

[redacted]

No.	LAUNCH DATE	PURPOSE OF TEST	RESULTS OF TEST
[illegible]	12 JAN 56	To test the "Dual-Operator" Relay Command System and the high pressure power plant. 33K 1.4M 22 N.M.	After only 13 seconds of flight the missile became unstable in yaw with the onset malfunction unidentified. The power plant shut down at approximately plus 45 seconds, but this was undetectable owing to the violent missile maneuvers which followed servo instability. Guidance was apparently satisfactory for the very short time it was possible to evaluate it.
[illegible]	26 JAN 56	To test the low pressure power plant (an [illegible] system not interconnected to provide missile electrical and hydraulic power and to drive missile fuel pump. This configuration was used on all subsequent missiles except in this report)	During ground servicing of this missile prior to take-off the nitrogen tube bundles in the missile exploded as they were being pressurized. The explosion destroyed the missile. As a result of this explosion Taylor-Sherion bottles were used instead of tube bundles on all subsequent B and D series missiles. Welded tube bundles were interspersed on F series missiles.
[illegible]	15 MAY 56	To test the power plant. The guidance system was to be tested open loop, i.e. operation of the guidance system was to be evaluated except that the servo-system would not respond to guidance commands. 48K 1.8M 40.5 NM	Preliminary checks were proceeding normally until the turbine pump was fired. Then there was an explosion and fire in the tail of the missile, and the missile was jettisoned to protect the launch aircraft and crew. The explosion was apparently caused by propellants leaking into the turbine case prior to turbine fire. As a result a turbine case drain was installed; new type seals were utilized; and the H_2 purge time for the turbine case prior to turbine fire was increased.
[illegible]	28 JUN 56	To test the power plant and missile servo-mechanisms system to programmed pitch and yaw disturbances to be introduced during terminal flight. To study the instrumentation and data reduction methods to be used for obtaining structural load data in the three subsequent missiles. No guidance system was installed. 49K 1.9M 41 NM.	The flight proceeded as planned until X plus 13 seconds at which time the missile became violently unstable. The tail section of the missile was subsequently recovered, and an examination of the wreckage revealed that an intermittent electrical connection in the servo system caused the flight failure. Power plant operation was satisfactory. But very little was achieved in other test objectives.

MISSILE NO.	LAUNCH DATE	PURPOSE OF TEST	RESULTS OF TEST
1010	27 JUL 54	To test the servo system and power plant. The guidance system was to be tested open loop. To test the pressure sensing system for development of the manual firing system. 61k - 1.7/ 50NM	Preliminary checks were satisfactory except that video presentation was intermittent. Since guidance was not a primary objective it was decided to continue with the launching. Launching was normal, but the power plant shut down between 1.61 and 1.67 seconds after rocket fire. No test objectives were achieved. See results of next flight for corrective action taken.
1117B	9 AUG 54	To test the servo system, power plant, and "Dual-Operator" Relay Command guidance system. To test pressure sensing system for verbal firing system. 61k 1.6 50 NM	Pre launch checks were satisfactory except the operation of guidance equipment was poor. Because it was decided to proceed in order to test power plant and servos. Launching was normal, but the power plant shut down between 1.61 and 1.67 seconds after rocket fire. No test objectives were achieved. The exact cause of these last two missile flight failures was never determined, because telemetry was not designed to cover the portions of the power plant which would make it possible to do this. It was generally accepted that one of the ignition circuits on the power plant must be causing the shutdown. It was decided to remove these safety circuits and go to the drop launch already planned for missiles later in the program. With the drop launch the rocket motors are not fired until the missile has cleared the launch structure far enough for safe operation. No subsequent failures of this type have been encountered, so it is presumed that the safety circuits were the cause of power plant shut down on 1010 and 1117B.
1220B	8 OCT 54	To test power plant with drop launch. To obtain structural flight load data. To test the guidance system open loop. To test pressure sensing system for verbal firing system. 43k 1.9M 41 N.M.	The launching was normal and the first drop launch was successfully demonstrated. Immediately after rocket fire the missile became unstable in roll and went completely unstable after 3 or 4 seconds. Although it could not be definitely established by telemetry, it appeared that the roll rate gyro had failed. With the exception of the drop launch demonstration, very little was achieved by the flight.

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10 - 12

13,958	24 OCT 54	[illegible]	[illegible]

To test the "Hold-Operate" Relay Armature Adjustment and Test procedure covering system for Relay System.

14,000	28 OCT 54	[illegible]	[illegible]

To test the "Hold-Operate" Relay Armature Adjustment and Test procedure covering system for Relay System.

14,000	28 OCT 54	[illegible]	[illegible]

To test the "Hold-Operate" Relay Armature Adjustment and Test procedure covering system for Relay System.

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3 Jul 89

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3 July 69
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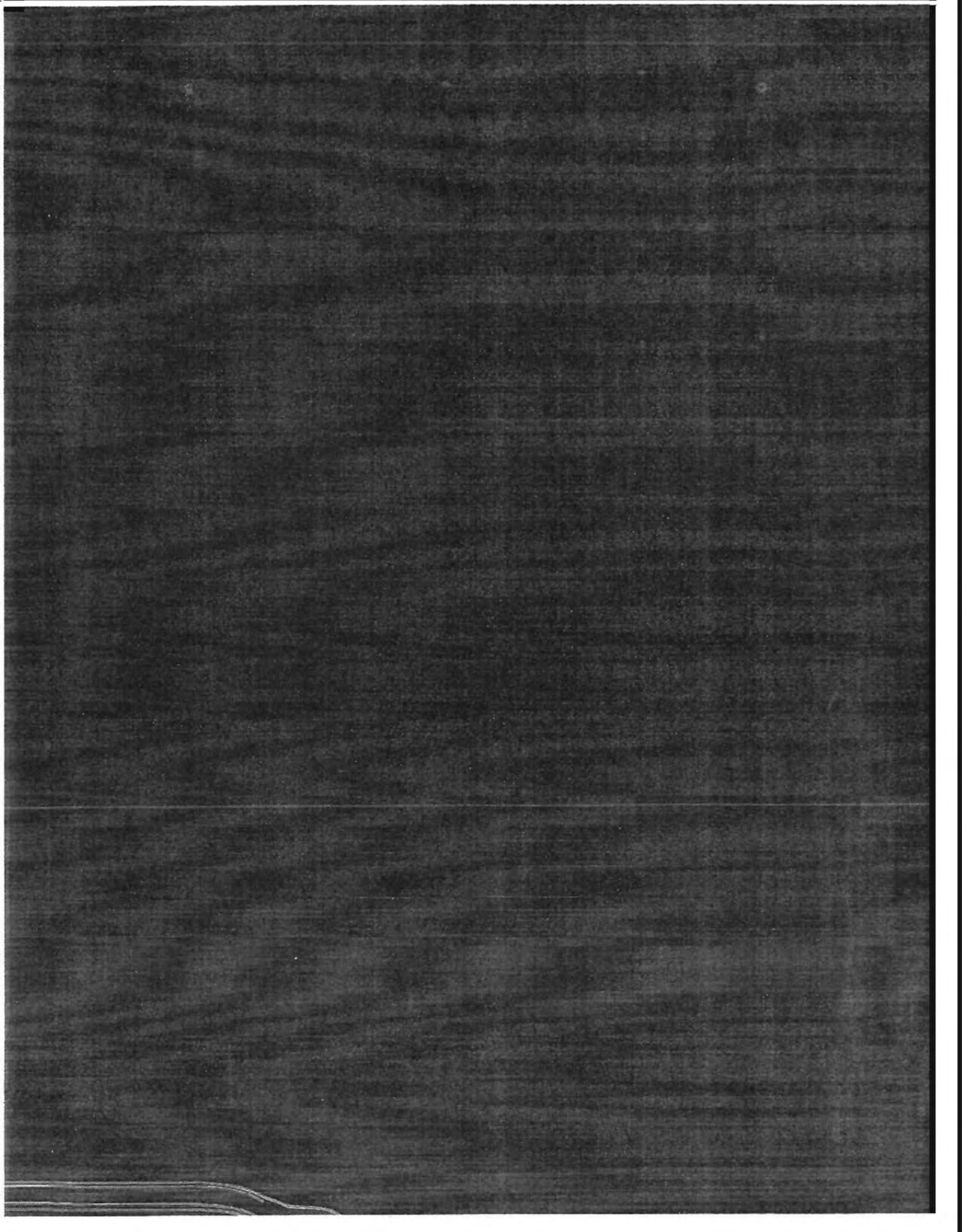
3 July 69 aB

MISSILE NO.	LAUNCH DATE	PURPOSE OF TEST	RESULTS OF TEST
2950F	11 June 52	a. To test the single operator relay Command guidance system and the single axis inertial guiding system. b. To test warhead freezing system. c. To check launch separation characteristics. d. To check pre-launch procedures.	Power plant shut down just prior to dive initiation.



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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

Declassified
3 July 1969
AB

TEST REPORT

ON

GAM-63

Number: 8

Missile Number: 3653F

Launching dater 29 September 1955

13 October 1955

Contractor: Bell Aircraft Corporation

Contract Number: W33(038)ac-14169

System Number: 112A, B, C

Test Directive Number: 5047-Ha

[redacted]

Prepared by:

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WILLIAM A. SMITH
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Approved by:

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ARCHER W. KINNY
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Deputy Director of Test and Evaluation

[redacted]

HADC 55-4881
Copy 21

[redacted]

I. PROGRAM OBJECTIVE:

The purpose of the present series of tests is to complete Program Objectives I and II, which are:

Objective I: The development of a weapon system consisting of a DB-47 director aircraft, a GAM-63 missile with a non-emanating midcourse and an emanating X-Band terminal guidance system, and an atomic warhead.

Objective II: Identical to Objective I except that a DB-36 director aircraft is substituted for the DB-47.

Tests of these two objectives are being conducted simultaneously. A total of 33 missiles is assigned for test at HADC in accomplishment of these two objectives (19 to be launched from the DB-47 and 14 to be launched from the DB-36). This was the third to be launched in the accomplishment of Objective I.

II. TEST OBJECTIVE:

The Test Objectives were:

Primary

A. To test the single operator relay-command guidance system and the single axis inertial guidance system at 58,000 feet altitude.

B. To test the simulated prime warhead.

Secondary

A. To test the warhead fuzing system.

B. To check launch separation characteristics.

Description of Flight: The missile was to be launched from a DB-47 Director Aircraft at a pressure altitude of 38,000 feet. The servo-pilot was to provide roll, pitch and yaw stabilization of the missile; control was to be provided by the altitude controller, the single axis inertial guidance system and the terminal guidance operator. At a simulated burst point, calculated to be over North Impact Point (NIP) at an altitude of 10,000 feet MSL (5196 feet tapeline above terrain); a detonation signal was to be obtained from the fuzing system. Predicted missile performance was as follows:

A. Maximum altitude - 58,000 feet pressure altitude

B. Maximum range - 69.8 nautical miles (launch point to detonation point)

C. Maximum Mach number - 1.96

D. Mach number at Simulated Burst Point - 1.17

III. TEST CONDITIONS:

This test was conducted under the following conditions:

A. Launch Time - 0725, 29 September 1955

B. Launch Heading - 348° True

C. Launch Range - 68 nautical miles

D. Launch Altitude - 38,000 feet pressure altitude

E. Launch Airspeed - 435 knots TAS (M.74)

F. Launch Aircraft - DB-47 S/N 51-5220

G. Weather Conditions - Ceiling and visibility unlimited. Wind at launch altitude 236° at 31 knots.

H. Photo Coverage - Askania and Mitchell camera coverage of entire flight. One hand-held motion picture camera in F-94 chase aircraft.

I. Radar Coverage - S-Band and L-Band for entire flight.

J. Telemetry Coverage - See APPENDIX I

K. Director Recording - See APPENDIX II

IV. TEST OPERATIONS:

A. Preparation.

Prior to the test, a standards meeting was held between the Contractor representative and the HADC Project Office representative for the purpose of establishing minimum conditions to be met before the missile would be launched. See APPENDIX III for these minimums.

B. Check-Out

XQAM-63 NR 3653F initially arrived at HADC on 26 May 1955.

Pre-flight checks, command calibrations and the weapon system check were all completed by 19 June.

First launch attempt - This missile was scheduled for a hot launch on 21 June. During the pre-launch checks several discrepancies occurred. The terminal guidance monitor scope lost its high voltage, thus making it impossible to determine whether the automatic altitude tracking system was functioning properly. Even though this would have meant a compromise in the terminal guidance phase of the flight, it was decided to continue with the mission.

The guidance operator then experienced difficulty in finding the radar aim-point and consequently it was found that the aim-point had been placed in the wrong position. It was then discovered that an Army road block had been placed in the wrong position and range safety officials ordered the flight cancelled.

Second launch attempt - The flight was rescheduled for 24 June. Take-off on the 24th was delayed two hours because of a leaky hydraulic reservoir, which was replaced.

During the pre-launch checks on the 24th, extreme difficulty was experienced in maintaining command contact. The condition could not be corrected and the flight was again cancelled.

Ground checks revealed no command system discrepancies; however, the command transmitter was replaced. Subsequent commands were satisfactory.

Third launch attempt - The flight was re-scheduled for 27 June.

During the pre-launch checks on the 27th, the command system failed in so much that no terminal guidance would be possible. However, because there were other objectives to this flight, the decision was made to continue with the launch. The countdown continued thru range coincidence. The turbine, however, did not fire within the specified time and the flight had to be cancelled.

Ground checks revealed no discrepancy such as to cause malfunction. The guidance operator stated after the flight that perhaps he may have armed the turbine after range coincidence thus causing the turbine to fail to fire.

The next day, 28 June, an internal leak in the oxidizer tank swirl separator was found. The missile was returned to Bell Aircraft Corporation, Buffalo, for repair.

XGAM-63 NR 3653F arrived back at HADC on 10 August 1955.

Pre-flight and weapon system checks were re-done by 2 September. A launch was scheduled for 9 September. However, on this date several poor workmanship items were found in several of the "black boxes"--bad soldering connections, poor routing of wires and leads, etc. The decision was consequently made to cancel the 9 September launch and thoroughly inspect the complete missile for discrepancies of any sort.

Approximately four days were spent in stripping and examining this missile as well as all other missiles at Bell, HADC. Two hundred and sixty-nine discrepancies were found on this missile. Two hundred and fifty insignificant and nineteen of such a nature that the missile's flight could have been compromised if uncorrected. The end result of finding all these discrepancies will probably mean a tightening up of the Bell "quality control" inspection procedures.

Fourth launch attempt - Missile NR 53F was reassembled on 15 September and pre-flight checks were again accomplished. Another weapon system check was performed in preparation for a launch on 23 September.

During the pre-launch checks on 23 September, trouble was experienced in obtaining a video presentation. Also the telemetry signal was lost after the transmitter was on for approximately 5 minutes. The flight was cancelled.

Ground checks revealed no discrepancy in the Terminal Guidance equipment, but the relay receiver was replaced. The telemetry battery was found to be bad and was replaced. The flight was rescheduled for 26 September but inclement weather forced another cancellation. It was rescheduled for 27 September.

Fifth launch attempt - Again during pre-flight checks trouble was experienced in obtaining a proper Terminal Guidance presentation. Flight was cancelled. Airborne troubleshooting revealed that trouble was intermittent and a function of A/C engine RPM. This suggested trouble in either the A/C alternators or in the Terminal Guidance power supply.

Ground checks revealed that the Terminal Guidance power supply was not regulating properly and was replaced. The flight was again scheduled for 29 September.

C. Operations.

1. Pre-launch checks: All pre-launch checks went well and were satisfactory thru range coincidence.

2. Missile launch and rocket fire: Angular coincidence was achieved automatically and the missile was released cleanly. Rocket fire was normal.

3. Boost, Climb and Midcourse: Missile entered programmed climb and leveled off at approximately 59,000 feet. All systems were apparently working satisfactorily until approximately X + 155 seconds at which time the guidance

operator lost the missile relay signal. The L-Band beacon was lost at this time also, which indicated a failure of the turbine. The missile entered a steep dive and impacted well short of the target.

D. Results versus Plan.

Because of the power plant malfunction prior to terminal dive, the first primary objective was not achieved. However, the other primary objective and the two secondary objectives were satisfied.

Telemetry data indicated that turbine speed, gas generator chamber pressure and fuel discharge pressure all dropped to zero almost simultaneously.

E. Instrumentation Results.

S- and L-Band tracking were satisfactory as were the Askania and Mitchell camera coverage for the duration of the flight. Telemetry was also satisfactory for the entire flight.

F. Discussion.

Telemetered data and recovered wreckage indicate failure of the Aerojet subcontracted turbine gear box. This is the second flight which was terminated by this type of failure. Since the first failure was considered purely random, no extensive investigation was conducted. The second failure initiated a joint investigation by representatives of all parties concerned at the Aerojet General plant. Preliminary information indicates that gear boxes inspected were haphazardly constructed and in some instances internally corroded. A full report of the investigation is to be compiled by Bell Aircraft. This office has no knowledge as to any incidence of gear box failures on test runs accomplished at the main plant.

G. Conclusions and Recommendations.

In regard to the number of poor workmanship items found in the missile on 2 Sep 55, the Bell quality control inspection procedures require tightening up to eliminate these items.

In regard to the turbine gear box failure, it is not known whether there have been such failures at the Bell Rocket Test Facility. There is a lack of technical liaison with this Facility and HADC, both with contractor personnel and the project office which should be removed by either the interchange of reports and/or coordination trips between Bell, HADC, and Bell, Buffalo, by both contractor and project office personnel.

APPENDIX I

TELEMETERING INSTRUMENTATION

MEASURED FUNCTION		SAMPLING RATE
Gas Generator Chamber Pressure	0 - 600 PSI	Cont.
Static Pressure Body	0 - 15 PSIA	Cont.
Range Signal	0 - 215V DC	Cont.
Commutator		5 SPS
Angle of Pitch	±67.5°	5 SPS
Angle of Yaw	±30°	5 SPS
Angle of Roll	±10°	5 SPS
Servo B+ (Regulated)	0 to 325V DC	5 SPS
Relay Antenna Position	+15° to -60°	5 SPS
Rudder Position	±33°	5 SPS
Left Aileron Position	±16.5°	5 SPS
Elevator Position	-22° to +33°	5 SPS
Relay Transmitter Power	0 to 3V DC	5 SPS
Dive Command Signal	0 or 28V DC	5 SPS
Velocity Signal	0 to 300V DC	5 SPS
Pump Speed (Alternator Frequency)	100 to 600 CPS	5 SPS
Oxidizer Outlet Pressure	0 - 1000 PSI	5 SPS
Azimuth Command Output	75 to 105V DC	5 SPS
Pitch Command Output	75 to 105V DC	5 SPS
Arming Baros #1 & #2 Timers #1 & #2	0 or 28V DC	5 SPS
Gas Generator Valve Switch	0 or 28V DC	5 SPS
Waste Gate Reg. Pressure	0 to 1000 PSI	5 SPS

MEASURED FUNCTION	INSTRUMENT RANGE	SAMPLING RATE
Fuel Outlet Pressure	0 to 1000 PSI	5 SPS
Antenna Command Output	75 to 105V DC	5 SPS
Servo B+ (Unregulated)	0 to 500V DC	5 SPS
USR Magnetron Current	0 to 20 MA	5 SPS
Alternator Voltage	0 - 150V @400 CPS	5 SPS
Chamber Pressure - Boost (Upper)	0 - 600 PSI	5 SPS
Chamber Pressure - Boost (Lower)	0 - 600 PSI	5 SPS
Chamber Pressure - Cruise	0 - 600 PSI	5 SPS
Nitrogen Source Pressure	0 - 6000 PSI	5 SPS
Fuzing Baros #1 & #2	0 or 28V DC	
Lanyard #1 & #2	0 or 28V DC	

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APPENDIX II

DIRECTOR AIRCRAFT INSTRUMENTATION

1. Director Relay Antenna - Azimuth Position
2. Director Relay Antenna - Tilt Position
3. Director Turn Angle
4. Director True Heading
5. Director True Heading
6. Missile 115 Volts
7. TGCS Altitude Track
8. Time Base Generator, GAM Away
9. TGCS PRF
10. Relay Receiver AFC
11. Relay Receiver AGC
12. Relay Antenna Azimuth Error
13. Relay Antenna Tilt Error
14. Azimuth Command - PCD
15. Pitch Command - PCD
16. Antenna Command - PCD
17. Command Transmitter Magnetron Current
18. Threshold Relay, Manual Track
19. Recorder Tie-In
20. Gas Generator Chamber Pressure Gage
21. Turbine Speed
22. Fuel Pressure Switch
23. Director Pitch Attitude
24. Director Roll Attitude
25. Starter Pressure Switch

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26. Gas Generator Pressure Switch
27. Rec. 254.4 Volts
28. Range Signal (Rt)
29. Velocity Signal (Vgt)
30. Source Pressure Switch
31. Angular Coincid.(Gyro Uncage)
32. Range Coincid. Enable
33. ACS Release
34. Release Solenoid
35. Gas Generator Valve Switch
36. Time Base Generator, GAM Away
37. Internal/External Transfer
38. Recorder Tie-In

APPENDIX III

Minimum Launch Conditions

1. Terminal Guidance

   a. Multiple heading markers shall not be a cause for cancellation, if in the opinion of the guidance operator, he is able to distinguish the correct heading marker.

   b. In the operator's opinion, he should always have sufficient return and picture of general land painting at launch altitude which he thinks will permit him to recognize the target.

   c. Manual altitude tracking before turbine fire is not acceptable. Since manual track is an emergency operation which may be required after launch, satisfactory automatic operation is required in preparation for launch.

   d. The Unattended Search Radar antenna must be in synchronization from minus 6 to minus 3 minutes before launch.

2. Command System

   a. Command must be getting through to the servo system.

   b. False commands are permissible, if, in the opinion of the operator, the sense of the true command is not obscured.

3. General

   a. After turbine fire, complete loss of video will be a cause for cancellation.

   b. Askania cinetheodolite coverage is required.

   c. Photographic chase aircraft is mandatory.

   d. Launch altitude will be 38,000 $\pm$ 500 feet (Pressure Altitude) and launch Mach number will be .74 $\pm$ .025.

[redacted]

HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

Declassified
30 July 1969
a.b.

TEST REPORT

ON

GAM-63

Missile Number: 3552F

Launching date: 2 September 1955

Contractor: Bell Aircraft Corporation

Contract Number: W33(038)ac-14169

System Number: 112A, B, C

Test Directive Number: 5047-RH

[redacted]

Prepared by:

S G Spears Capt USAF

JOHN E. RICHARDS
Captain, USAF
XGAM-63 Project Officer

Approved by:

A W Kinny Jr

ARCHER W. KINNY, JR.
Major, USAF
Actg Director of Test and Evaluation

[redacted]

HADC 55-4077
Copy 21

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I. PROGRAM OBJECTIVE

The purpose of the present series of tests is to complete [illegible] Objectives I and II, which are:

Objective I: The development of a weapon system consisting of a DB-47 director aircraft, a GAM-63 missile with a non-emanating midcourse and an emanating X-Band terminal guidance system, and an atomic warhead.

Objective II: Identical to Objective I except that a DB-36 director aircraft is substituted for the DB-47.

Tests of these two objectives are being conducted simultaneously. A total of 33 missiles is assigned for test at HADC in accomplishment of these two objectives (19 to be launched from the DB-47 and 14 to be launched from the DB-36). This was the sixth missile to be launched in the accomplishment of Objective II.

II. TEST OBJECTIVE

The Test Objectives were:

Primary

A. To test the single operator relay-command guidance system and the single axis inertial guidance system.

B. To test the warhead fuzing system.

Secondary

A. To check launch separation characteristics.

B. To check pre-launch procedures.

Description of Flight. The missile was to be launched from a DB-36 Director Aircraft at a pressure altitude of 42,500 feet. The servo-pilot was to provide roll, pitch and yaw stabilization of the missile; control was to be provided by the altitude controller, the single axis inertial guidance system and the terminal guidance operator. At a simulated burst point, calculated to be directly over North Impact Point (NIP) at an altitude of 8000 feet MSL (3196 feet tapeline above terrain), a detonation signal was to be obtained from the fuzing system. Predicted missile performance is as follows:

A. Maximum altitude - 50,000 feet pressure altitude

B. Maximum range - 59.5 nautical miles (launch point to detonation point)

C. Maximum Mach number - 2.46

D. Mach number at Simulated Burst Point - 1.31

[redacted]

III. TEST CONDITIONS.

This test was conducted under the following conditions:

A. Launch time - 0725 on 2 September 1955

B. Launch heading - 341° True

C. Launch range - 54 nautical miles

D. Launch altitude - 42,500 feet pressure altitude

E. Launch airspeed - 326 knots IAS (M .60)

F. Launch aircraft - DB-36H S/N 51-5710

G. Weather conditions - ceiling and visibility unlimited. Wind at launch altitude 275° at 18 knots

H. Photo coverage - two F-94's with motion picture cameras, Askania and Mitchell camera coverage of entire flight, fixed motion picture cameras on the launch aircraft.

I. Radar coverage - S-Band and L-Band for entire flight.

J. Telemetry coverage - See APPENDIX I

K. Direct recording - See Appendix II

IV. TEST OPERATIONS:

A. Preparation.

Prior to the test a standards meeting was held between the Contractor representative and the HADC Project Office representative for the purpose of establishing minimum conditions to be met before the missile would be launched. See APPENDIX III for these minimums.

In addition, because difficulty has been experienced in the power plant of recent missiles, certain additions were made in the telemetry instrumentation for this missile. These additions were:

1. Gas Generator Pressure
2. Oxidizer Discharge Pressure
3. Fuel Discharge Pressure
4. Lanyard 1 and 2

5. Command Receiver AFC

6. Gas Generated Fuel Valve Switch

7. Waste Gate Regulator Pressure.

To make these additions possible, command signal strength, relay video input, and USB repeller voltage telemetering was deleted.

B. Check out.

Missile No. 52F arrived at HADC on 11 May.

Pre-flight checks, command calibrations and the weapon system check were completed on this missile on 20 June 1955.

On 21 June, during a normal pressure check of the fuel tank, an excessive amount of pressure was accidently released to the tank which caused visible rupture to occur. Consequently, the entire missile was shipped back to Bell Aircraft Corporation, Buffalo, for repair.

The missile arrived back at HADC on 27 July.

Pre-flight checks and the weapon system check were completed satisfactorily by 26 August.

The missile was fueled and pressurized by 1 September in preparation for a 2 September launch. Pit checks were very satisfactory prior to takeoff on 2 September.

C. Operations.

GAM-63 NR 3552F was first scheduled for launch on 2 September 1955. At 0558, B-36 NR 51-5710 was airborne. Special instrumentation had been installed in the missile to record operation of the power plant.

1. Pre-flight checks. During the climb to altitude the pre-launch checks were performed and were found to be satisfactory. The command checks did not produce the proper indications on the guidance operator's panel. The "right and climb" and "left and dive" lights did not come on in the presence of proper commands. However, the scanners did verify proper action of the control surfaces in both azimuth and dive channels. A dry run was not conducted on this missile in order to save operating time on electronic equipment.

2. Missile launch and rocket fire. The hot run was continued without incident until range coincidence. The turbine was armed and fired by the Automatic Check-out System (ACS). Further checks were completed. Angular coincidence was achieved by the aircraft autopilot and accepted by the G.F. almost immediately after the enabling signal was received. For this mission the tolerance of angular coincidence had been increased to ±0.2°. Missile release and drop-away were clean and rocket fire was normal.

[redacted]

3. Boost, climb and [illegible]. Although traces of the radar relay signal, were observed during the first turn by the C-36, the signal was finally locked in solid at X plus 75 seconds. The guidance operator [illegible] the USR to turn on, checked the automatic tracking system and was prepared to track the missile when the relay signal was lost at X plus 135 seconds.

The missile had entered its programmed climb and had leveled off; however, at launch the missile had started a turn to the left which lasted for 25 seconds and 24°. The missile then flew a straight course and was crossing range safety boundary when it was destructed from the ground at X plus 135 seconds.

D. Results versus plan.

Except for the erroneous left turn experienced in the flight of this missile, all systems worked satisfactorily prior to the time of destruct.

Power plant functions were all normal up to the time of destruct.

E. Instrumentation Results.

S- and L-Band tracking were satisfactory as were the Askania and Mitchell camera coverage for the duration of the flight.

F. Conclusions.

To date, no positive theory has been advanced as to the reasons for the erroneous left turn. Telemetry records show that no false commands were received prior to or during the turn. The records also show that the yaw gyro turned to cause the servo system to command the left turn. Whether the gyro drifted or precessed of its own accord or whether it was a result of an erroneous null signal from the azimuth computer is still a point of question. Examination of the salvaged components gave little or no clues.

MEASURED FUNCTION	INSTRUMENT RANGE	SAMPLED
POWER PLANT		
Chamber pressure - boost (upper)	0 - 600 psi	S
Chamber pressure - boost (lower)	0 to 600 psi	S
Chamber pressure - cruise	0 to 600 psi	S
Nitrogen source pressure	1200 ± 200 psi	S
Pump speed (alternator freq.)	0 - 600 cps	S
Gas generator pressure	0 to 600 psi	S
Oxidizer discharge pressure	0 to 1000 psi	S
Fuel discharge pressure	0 to 1000 psi	S
Gas generator Prop valve switch		S
Waste gate regulator pressure		S
FUZING		
Static pressure - body (vibrotron)	0 - 15 psia	C
Static pressure - probe (vibrotron)	0 - 15 psia	C
Arming baro (MC-273)	0 or 28V DC	S
Timer outputs #1 and #2	0 or 28V DC	S
Fuzing baro (MC-5)	0 or 28V DC	
Impact fuze network #1 (MC-300)		
Impact fuze network #2 (MC-300)		
MISCELLANEOUS		
Vertical acceleration - fore	± 7.5g	C
Vertical acceleration - aft	± 7.5g	C

Appendix I cont'd

MEASURED FUNCTION	INSTRUMENT RANGE	SAMPLED
MISCELLANEOUS		
Lateral acceleration - fore	± 5g	C
Lateral acceleration - aft	± 5g	C
Longitudinal acceleration	± 2g	C
Rate of roll	± 150°/sec	S
Angle of attack	± 25°	S
Angle of slideslip	± 15°	S
Alternator output voltage	0 to 150V AC	S
5.4 volt reference battery	0 to 5.4V DC	S
Ram pressure	0 to 40 psia	C
Lanyard 1 and 2		

C = Continuous Channel

S = 5 Samples per Second

[redacted]

The following functions were resolved directly in actual aircraft processing in the Director Aircraft.

GUIDANCE FUNCTIONS

TGCS Synchronizer Decoder Gate Frequency

TGCS Altitude tracking

Director Relay Receiver Discriminator Voltage

Director Relay Receiver AGC Voltage

Director Relay Antenna Azimuth Position

Director Relay Antenna Tilt Position

Director Relay Antenna Azimuth Position

Director Relay Antenna Azimuth Error

Director Relay Antenna Tilt Error

Polycode Driver Azimuth Command

Polycode Driver Dive Command

Polycode Driver Antenna Command

Command Transmitter Magnetron Current

"K" System (115V 400 cps)

Director Relay Receiver Threshold Relay Actuation

Director Primary 115V (380-1000 cps)

Director Primary 115V (380-400 cps)

Director Primary 28V DC

Adapter Equip. Precision Power Supply Voltage

Director Turn Angle

Adapter Equip. Range Coincidence

Appendix II cont'd

GUIDANCE FUNCTIONS

Adapter Equip. Enabling Signal

Adapter Equip. Angular Coincidence

DIRECTOR AIRCRAFT INSTRUMENTATION

Missile External/Internal Power Transfer

Missile Release Control (Supplied from ACS)

Director True Heading (A_t from K System)

Director Range-Ground point to Target (R_t from MRNC)

Component of Director Ground Speed Directed toward the Target

Missile Release Control (Supplied to Release Mechanism from Capsule)

Time Base

DIRECTOR AIRCRAFT FUNCTIONS

Director Attitude - Pitch

Director Attitude - Roll

Director Altitude

Director True Airspeed

MISSILE FUNCTIONS

Umbilical Separation

GAM Alternator Voltage

MISSILE POWER PLANT FUNCTIONS

Gas Generator Pressure Switch Pip

Fuel Case Pressure Switch Pip

Cruise and Bypass Pilot Valve Switch Pip

Malfunction Switch Pip

Gas Generator Pilot Valve Switch Pip

Boost Pilot and Control Valves Switch Pip

[redacted]

Appendix III

Minimum Launch Conditions

1. Terminal Guidance

a. Multiple heading markers shall not be a cause for cancellation, if in the opinion of the guidance operator, he is able to distinguish the correct heading marker.

b. In the operator's opinion, he should always have sufficient return and picture of general land painting at launch altitude which he thinks will permit him to recognize the target.

c. Manual altitude tracking before turbine fire is not acceptable. Since manual track is an emergency operation which may be required after launch, satisfactory automatic operation is required in preparation for launch.

d. The Unattended Search Radar antenna must be in synchronization from minus 6 to minus 3 minutes before launch.

2. Command System

a. Command must be getting through to the servo system.

b. False commands are permissable, if, in the opinion of the operator, the sense of the true command is not obscured.

3. General

a. After turbine fire, complete loss of video will be a cause for cancellation.

b. Askania cinetheodolite coverage is required.

c. Photographic chase aircraft is mandatory.

d. Launch altitude will be 42,500 ± 500 feet (Pressure Altitude) and launch Mach number will be .60 ± .025.

[redacted]

Declassified
3 July 69
a B.

TEST REPORT

ON

XGAM-63

Number: 6

Missile Number: 3451F

9 September 1955

Launching Date: 30 August 1955

Contractor: Bell Aircraft Corporation

Contract Number: W33(038)ac-14169

System Number: 112A, B, C

Test Directive Number: 5047-H4

[redacted]

Prepared by:

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HADC 55-4045
Copy 22

[redacted]

[redacted]

I. PROGRAM OBJECTIVE.

The purpose of the present series of tests is the completion of program Objectives I and II which are:

Objective I: The development of a weapon system consisting of a DB-47 director aircraft, a GAM-63 missile with a non-emanating midcourse guidance system, an emanating X-Band terminal guidance system, and an atomic warhead.

Objective II: Identical to Objective I except that a DB-36 director aircraft is substituted for the DB-47.

Tests for these two objectives are being conducted simultaneously. A total of 33 missiles is assigned for test at HADC in accomplishment of these two objectives (19 from the DB-47 and 14 from the DB-36). This was the fifth missile to be launched in the accomplishment of Objective II.

II. TEST OBJECTIVE:

The Test Objectives were:

Primary

A. To test the single operator relay-command guidance system and the single axis inertial guidance system.

B. To test the warhead fuzing system.

C. To test the simulated prime warhead.

Secondary

A. To check launch separation characteristics.

B. To check pre-launch procedures.

Description of flight: The missile was to be launched from a DB-36 Director aircraft at a pressure altitude of 42,500 feet. The servopilot was to provide roll, pitch and yaw stabilization of the missile; control was to be provided by the altitude controller, the single axis inertial guidance system and the terminal guidance operator. At a simulated burst point, calculated to be directly over North Impact Point (NIP) at an altitude of 8000 feet MSL (3196 feet tapeline above terrain), a detonation signal was to be obtained from the fuzing system. Predicted missile performance was to be as follows:

A. Maximum Altitude - 50,000 feet pressure altitude

B. Maximum Range - 53.0 nautical miles (launch point to detonation point)

C. Maximum Mach Number - 2.21

D. Mach Number at Simulated Burst Point - 1.30

[redacted]

[redacted]

III. TEST CONDITIONS.

This test was conducted under the following conditions.

A. Launch time - 1533 on 30 August 1955

B. Launch heading - 341° True

C. Launch range - 51.6 nautical miles from NIP

D. Launch altitude - 42,500 feet pressure altitude

E. Launch airspeed - 332 knots true airspeed (M.605)

F. Launch aircraft -- EDB-36H NR 5710

G. Weather conditions - 5/10 cumulus at 6000, 2/10 cirrus at 30,000, visibility 30 miles, wind 315° at 23 knots.

H. Photographic coverage - two F-94 chase aircraft with motion picture cameras, Askania and Mitchell cameras of the entire flight, and fixed motion picture cameras on the launching aircraft.

I. Radar coverage - S-Band and L-Band tracking.

J. Telemetry coverage - See Appendix I

K. Direct Recording coverage - See Appendix II

IV. TEST OPERATIONS:

A. Preparation

Prior to the test a standards meeting was held between the Contractor representative and the HADC Project Office representative for the purpose of establishing minimum conditions to be met before the missile would be launched. See Appendix III for these minimums.

The following additional functions were brought into the B-36 through a connector (which was to separate at drop) onto an oscillograph for continuous recording up to the time of drop:

1. Fuel pressure pip
2. Turbine fire switch pip
3. Turbine speed
4. Gas generator valve switch pip
5. Starter valve switch pip
6. Source pressure pip

[redacted]

[redacted]

7. Boost control valve switch pip

8. Oxidizer outlet pressure gauge

9. Fuel outlet pressure gauge

10. Gas generator chamber pressure gauge

11. Nitrogen source 6000 PSI gauge

12. Starter pressure gauge 600 PSI

13. Fuel pressure relay

14. Gas generator pressure switch pip

15. Starter pressure switch pip

16. Back pressure control valve gauge

17. Malfunction relay overspeed

This instrumentation was added as a result of two consecutive turbine shutdowns at approximately 1.5 seconds after turbine fire.

In addition, these changes were made to the power plant configuration:

1. Power plant on 51F was replaced by power plant S/N 18 from missile 58F.

2. The line to the fuel pressure switch and its associated Gianinni telemetering gauge which normally contains some entrapped air was bled during propellant servicing of the missile.

3. The 3900-pound pressure switch in the high pressure system was functionally disconnected from the engine system; however, its operation was monitored on the B-36 oscillograph to determine its performance. The function normally performed by this pressure switch of preventing launch with source pressure below 3900 PSI was performed by the instrumentation operator monitoring the source pressure on the visual gauge.

B. Check-out.

XGAM-63 NR 3451F arrived at HADC initially on 29 April 1955.

Electrical, servo, radar and power plant pre-flight checks were completed by 2 June. The weapon system check was accomplished on 3 June.

The missile was being fueled on 6 June preparatory to an 8 June launching, from the DB-36, when a fuel leak was discovered in the power plant. The launch was cancelled and the power plant was removed for repair. The flight was rescheduled for 14 June.

[redacted]

Troubles encountered during [illegible] prior to the 14 June flight forced a rescheduling to 16 June.

Prior to take-off time on 16 June, a pressure leak was discovered in the command assembly can. The leak was repaired but the time involved in replacing the access door caused the aircraft to be late in taxing for the take-off. By this time the normal one-hour mission slide time had been used, and Mission Control cancelled the mission. Further range time could not be obtained the rest of that day or on the following day, 16 June. The flight was re-scheduled for 17 June.

First launch attempt - The aircraft took off on 17 June, but trouble was encountered during the pre-launch checks. Telemetry could not turn on and the guidance operator experienced difficulty in maintaining automatic altitude track. Conditions would not improve and it was decided to again cancel the launching. Ground checks revealed that the telemetry troubles were caused by a weak battery. The altitude tracking difficulties were attributed to an arcing thermal switch in the relay receiver.

By this time the acid in the missile had an excessive iron content. Consequently, the decision was made to drain and flush the missile. During this operation an internal leak was found in the oxidizer tank and the missile was returned to the contractors plant on 24 June for repair.

Missile NR 3451F arrived back at HADC on 13 July 1955.

Another weapon system check was completed on this missile by 27 July prior to a scheduled launch on 9 August from the B-47. The missile was fueled on 7 August.

Second launch attempt - Airborne pre-launch checks were very satisfactory on 9 August. The telemetry carrier was lost on the first hot run but seemed to be properly operating on the second run. The turbine was started but shut down after 1 1/2 seconds of running. The mission was cancelled.

The reason for the turbine shut-down could not be ascertained here at HADC, consequently the whole power plant was removed and shipped back to Bell Aircraft Corporation, Buffalo, N. Y. The power plant from NR 58F was removed and placed on NR 51F.

The missile was refueled on 21 August in preparation for a launch on 23 August.

Third launch attempt - A good airborne countdown was experienced on 23 August; however, when telemetry was turned on at T -20 minutes, the telemetry battery deteriorated immediately. The flight was cancelled.

Consensus was that the failure was definitely in the battery and not in the load. Consequently, an extra heater and more insulation were placed in the battery box in order to make the battery less susceptible to the low temperature at altitude.

[redacted]

Fourth launch attempt - Another good airborne countdown was experienced on 26 August. The turbine was fired but instrumentation showed that the nitrogen source pressure dropped below the minimum value and the flight again was cancelled.

The telemetry battery worked satisfactorily.

Ground checks revealed that actually the instrumentation had been in error and that the source pressure had sustained a proper value after turbine fire.

Fifth launch attempt - On 27 August another attempt was made to launch missile NR 51F. The Automatic Tracking Antenna System (ATRAS) malfunctioned in the director aircraft early in the countdown and the flight was cancelled.

Troubleshooting revealed that the ATRAS antenna drive motor had burned out.

Sixth launch attempt - The servo system became severely noisy during the airborne countdown on the morning of the 30th of August. The flight was cancelled.

The noise could not be duplicated during ground checks and it was concluded that possibly an intermittent umbilical connection had been the cause of the trouble.

C. Operation.

Since no cause could be found for the servo noise, GAM-63 NR 3451F was rescheduled for launch from B-36 NR 51-5710 in the afternoon of 30 August. Take-off was at 1356.

1. Pre-launch checks: During the climb to launch altitude, an airborne check-out of guidance equipment was conducted. All checks were satisfactory and were completed in minimum time. The servo noise experienced in the morning did not appear. No dry run was made so that missile guidance equipment might be spared the extra running time. Video signals were strong and land painting on the terminal guidance indicator was good.

2. Missile launch and rocket fire: After range coincidence, the Automatic Check-out System (ACS) armed and fired the turbine, and performed the other specified checks. Angular coincidence was achieved by the aircraft autopilot and the missile was released by ACS about 50 seconds after ACS received the enabling signal. Missile drop-away was clean and rocket fire was normal.

3. Boost, climb and midcourse: Shortly after the B-36 rolled out of the 180° turn, the automatic tracking system picked up and locked on to the video relay signal. This turned out to be a minor lobe but when the antenna was repositioned manually the major lobe was acquired. The guidance operator commanded the unattended search radar on and made the necessary preparation for terminal guidance.

[redacted]

The missile executed the programmed climb and leveled off. Performance was as expected during the missile's flight.

4. Terminal guidance. The guidance operator observed the target on the terminal guidance indicator and when it became apparent that the target return would cross the range cursor, he commanded the missile to dive. Dive occurred at X plus 144 seconds. The operator transmitted one azimuth command. Five seconds after dive at X plus 149 seconds the power plant and turbine shut down. The missile impacted approximately 1 mile east of the target.

5. Results versus plan. Flight path of the missile was as planned until power plant failure at X plus 149 seconds. At that time the missile entered a vertical dive but did not tumble. Although the missile lacked a few seconds of operation of successfully completing its flight, all flight test objectives were at least partially accomplished. Completion of the test of the relay-command guidance system was obviously cut short by the premature shutdown of the power plant, but a command in azimuth was received and followed immediately prior to failure.

6. Instrumentation results. Telemetry results were generally satisfactory for this flight. Turbine speed was lost. L-Band tracking was unsatisfactory because of severe interference from some other beacon. S-Band tracking was satisfactory. Askania coverage was satisfactory. Mitchell camera coverage was marginal. Carrier recording was not turned on because of operator error.

D. Discussion.

The power plant failure was evidently caused by entry of tank nitrogen into the fuel line. This is indicated by: the absence of soot in the recovered turbine exhaust system; the surge in gas generator pressure and oxidizer discharge pressure as the fuel pump unloaded; and the coincidental fluctuation of fuel pressure as it dropped off. Sandia telemetry indicates a transition from plus 1 g in level flight at X plus 144 seconds to -2.6 g's at X plus 150 seconds. Computations of fuel consumption from test stand consumption corrected for telemetered fuel pressures, and estimated fuel temperature indicate there were approximately 52 gallons of available fuel on board when the fuel inlet became uncovered. This missile utilized the large cone Corten steel fuel tank. Eight more missiles equipped with the large cone fuel tank remain to be expended. Seven of these are of 61 ST dural. Five small cone Corten steel and twelve bladder type fuel tanks are programmed. Missile NR 46 is not included in this discussion.

E. Conclusions.

It is obvious that repetition of the flight path of this missile will subject each of the remaining eight large cone missiles to the chance of repetition of the results of this firing. No corrective action other than a shortening of programmed flight times has been taken by Bell Aircraft Corporation to date. It is not felt that programming a deceleration in missile velocity just prior to dive would be adequate corrective action as has been suggested. This implies prolonged operation at boost fuel flow

[redacted]

rate. Further there is no assurance, without [illegible] acceleration tests, that fuel inlet "snorkels" will [illegible] of propellant when the missile is subjected to vertical accelerations [illegible] order encountered at dive. Unless a g limiter can be placed in the servo system to alleviate the step transition from level flight to 30° dive, the only insurance against repetition of this malfunction will be to program the flight ranges such that the cone is entirely full of fuel at the time of entry into dive.

[redacted]

APPENDIX I

The following functions were telemetered (Key: C - continuous, S - commutated at 5 samples/seconds)

MEASUREMENT DESCRIPTION	INSTRUMENT RANGE	SAMPLING RATE
Range Signal	0 to 27.5V DC	C
Lanyard #1	0 to 28V DC	C
Lanyard #2	0 to 28V DC	C
Fire Baro #1	28 or 0V DC	C
Fire Baro #2	28 or 0V DC	C
1G Accelerometer	± 19	C
Vibrotron Altimeter	0 to 75,000 ft	C
Angle of pitch	± 67.5°	S
Angle of yaw	± 30°	S
Angle of roll	± 2°	S
Platform error signal	± 1.5V at 5.4 kc	S
Relay antenna position	+ 15° to -60°	S
Rudder position	± 33°	S
Left aileron position	± 16.5°	S
Elevator position	+ 33° to -22°	S
Relay Xmtr power	0 to 3V DC	S
Dive command	0 to 28V DC	S
Velocity signal	0 to 300V DC	S
Pump speed	100 to 600 cps	S
Oxidizer outlet pressure	0 to 1000 cps	S
Azimuth command	75 to 105V DC	S

[redacted]

[redacted]

Appendix I cont'd

MEASURED FUNCTION	INSTRUMENT RANGE	SAMPLING RATE
Pitch command	75 to 105V DC	S
Timers #1 & #2, Arm #1 & #2	0 or 28V DC	S
Gas generator valve switch	0 or 28V DC	S
Lanyard switch #1 & #2	0 or 28V DC	S
Fuel outlet pressure	0 to 1000 psi	S
Relay antenna command	75 to 105V DC	S
Gas generator chamber pressure	0 to 600 psi	S
USR magnetron current	0 to 20 ma	S
Search antenna pitch error signal	± 0.5V at 400 cps	S
Upper boost chamber pressure	0 to 600 psi	S
Lower boost chamber pressure	0 to 600 psi	S
Cruise chamber preasure	0 to 600 psi	S
Nitrogen source pressure	1200 ± 200 psi	S

[redacted]

APPENDIX I

Direct recording coverage: The following functions were measured with direct recording equipment in the director aircraft:

Recorder #1

1. Director Relay Antenna Azimuth Position
2. Director Relay Antenna Tilt Position
3. Director Turn Angle
4. Director True Heading
5. Director True Heading
6. Missile 115 Volts
7. TGCS Altitude Track
8. Time Base Generator
9. TGCS PRF
10. Relay Receiver AFC
11. Relay Receiver AGC
12. Relay Antenna Azimuth Error
13. Relay Antenna Tilt Error
14. Azimuth Command PCD
15. Pitch Command PCD
16. Antenna Command PCD
17. Command Xmtr magnetron current
18. Threshold relay manual and track
19. Recorder Tie-In

Recorder #2

1. 115V (400 CPS)
2. 115V (380 - 1000 CPS)

Appendix II cont'd

Recorder #2

3. 28V DC
4. Director Pitch Attitude
5. Director Roll Attitude
6. Director Airspeed
7. Director Altitude
8. Precision 254.4 volts
9. Range Signal (R_L)
10. Velocity Signal
11. Spare Channel
12. Angular Coincidence
13. Range Coincidence, Enable
14. ACS Release
15. Release Solenoid
16. K System 115 Volts
17. Time Base generator
18. External/Internal Transfer
19. Recorder Tie-In

Power Plant

1. Back Pressure Contro Valve Gauge
2. Starter Pressure Gauge
3. N_2 Source Pressure Gauge
4. Gas Generator Chamber Pressure Gauge
5. Fuel Outlet Pressure Gauge
6. Oxidizer Outlet Pressure Gauge

Appendix II cont'd

Power Plant

7. Turbine Speed
8. Malfunction Relay
9. Fuel Pressure Relay
10. Fuel Pressure Switch Pip
11. Starter Pressure Switch Pip
12. Gas Generator Pressure Switch Pip
13. Boost Control Valve Switch Pip
14. Source Pressure Switch Pip
15. Starter Valve Switch Pip
16. Gas Generator Valve Switch Pip
17. Turbine Fire Switch Pip

APPENDIX IV

Minimum Launch Conditions

1. Terminal Guidance

a. Multiple heading markers shall not be a cause for cancellation, if in the opinion of the guidance operator, he is able to distinguish the correct heading marker.

b. In the operator's opinion, he should always have sufficient return and picture of general land painting at launch altitude which he thinks will permit him to recognize the target.

c. Manual tracking before turbine fire is not acceptable. Since manual track is an emergency operation which may be required after launch, satisfactory automatic operation is required in preparation for launch.

d. The Unattended Search Radar antenna must be in synchronization from minus 6 minutes to minus 3 minutes before launch.

2. Command System

a. Command must be getting through to the servo system.

b. False commands are permissible, if, in the opinion of the guidance operator, the sense of the true command is not obscured.

3. General

a. After turbine fire, complete loss of video will be a cause for cancellation.

b. Askania cinetheodolite is required.

c. Photographic chase aircraft is mandatory.

d. Launch altitude will be 42,500 ± 500 feet (Pressure Altitude) and launch Mach number will be .60 ± .025.

[redacted]

TEST REPORT

ON

XGAM-63

Declassified
3 July 69
A.B.

Number: 5

Missile Number: 3356F

Launching Date: 16 August 1955

24 August 1955

Contractor: Bell Aircraft Corporation

Contract Number: W33(038)ac-14169

System Number: 112A, B, C

Test Directive Number: 5047-H4

[redacted]

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WADC 55-3783
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[redacted]

I. PROGRAM OBJECTIVE

The purpose of the present series of tests is to complete Program Objectives I and II, which are:

Objective I: The development of a weapon system consisting of XGAM-63, a DB-47 director aircraft non-emanating midcourse and an emanating X-Band terminal guidance system, and an atomic warhead.

Objective II: Identical to Objective I except that a DB-36 director aircraft is substituted for the DB-47.

Tests of these two objectives are being conducted simultaneously. A total of 33 missiles is assigned for test at HADC in accomplishment of these two objectives (19 from the DB-47 and 14 from the DB-36). This was the fourth missile to be launched in the accomplishment of Objective II.

II. TEST OBJECTIVE

A. The Test Objectives were:

1. Primary

a. To evaluate the operation of the emanating and non-emanating guidance equipment at the operational flight altitude of 65,000 feet.

b. To test the accuracy of the single axis inertial guidance system.

c. To test the warhead fuzing system.

d. To evaluate USR video at 65,000 feet altitude.

2. Secondary

To test the operation of the emanating guidance system during the terminal [illegible].

B. Description [illegible]

The missile was to be launched from a DB-36 Director Aircraft at a pressure altitude of 42,500 feet. The servo-pilot was to provide roll, pitch and yaw stabilization of the missile; control was to be provided by the altitude controller, the single axis inertial guidance system, and the terminal guidance operator. At a

[redacted]

simulated burst point, calculated to be directly over North Impact Point (NIP) at an altitude of 10,000 feet MSL (5196 feet tapeline over terrain), a detonation signal was to be obtained from the fuzing system. Predicted performance is as follows:

1. Maximum altitude - 65,000 feet pressure altitude.

2. Maximum range - 70.8 nautical miles (launch point to detonation point).

3. Maximum Mach number - 1.93

4. Mach number at simulated burst point - 1.23

III. TEST CONDITIONS

This test was conducted under the following conditions:

A. Launch Time - 0759, 16 August 1955.

B. Launch Heading - 347° True.

C. Launch Range - 73 nautical miles

D. Launch Altitude - 42,500 feet pressure altitude.

E. Launch Airspeed - 327 knots true airspeed (M.62)

F. Launch Aircraft - DB-36H S/N 51-5710.

G. Weather Conditions - Zero tenths cirrus 25,000 feet south of Holloman AFB, clear to north, visibility 30 miles. Wind at launch altitude calm.

H. Photographic coverage - Two F-94 chase aircraft with motion picture cameras; Askania and Mitchell cameras of the entire flight, and fixed motion picture cameras on the launch aircraft.

I. Radar coverage - S-Band for the entire flight; L-Band until turbine shutdown.

J. Telemetry coverage - See Appendix I

K. Direct recording coverage - See Appendix II

[redacted]

[redacted]

IV. TEST OPERATIONS

A. Preparation.

Prior to the test, a standards meeting was held between the Contractor representative and HADC Project Office representative for the purpose of establishing minimum conditions to be met before the missile would be launched. See Appendix III for these minimums.

Furthermore, the two previous launching attempts with missiles 51F and 56F had resulted in turbine pump shut-downs immediately following turbine fire. In both cases there was some damage in the turbine pumps. The power plants were removed and returned to the Bell Aircraft Corporation for study and determination of causes of the malfunctions. It was decided to take the warhead out of missile 56F and assign more power plant instrumentation in an effort to determine the causes of the two malfunctions. The following functions were brought into the B-36 through a connector, which would separate at drop, onto an oscillograph for continuous recording up to the time of drop:

1. Fuel pressure pip.
2. Turbine fire switch pip.
3. Turbine speed.
4. Gas generator valve switch pip.
5. Starter valve switch pip.
6. Source pressure pip.
7. Boost Control valve switch pip.
8. Malfunction relay overspeed.
9. Oxidizer outlet pressure gage.
10. Fuel outlet pressure gage.
11. Gas generator chamber pressure gage.
12. Nitrogen source 6000 PSI gage.
13. Starter pressure gage 600 PSI.
14. Fuel pressure relay.
15. Gas Generator pressure switch pip.

[redacted]

16. Starter pressure switch pip.

17. Back pressure control valve gage.

In addition, these changes were made to the power plant configuration:

1. Power plant on missile 56F was replaced by power plant S/N 15 from missile 52F.

2. The line to the fuel pressure switch and its associated Gianinni telemetering gage, which normally contains some entrapped air, was bled during propellant servicing of the missile.

3. The 3900-pound pressure switch in the high pressure system was functionally disconnected from the engine system; however, its operation was monitored on the B-36 oscillograph to determine its performance. The function normally performed by this pressure switch of preventing launch with source pressure below 3900 PSI was performed by the instrumentation operator monitoring the source pressure on the visual gage.

B. Check-out.

XGAM-63 NR 3356F arrived at HADC on 29 June 1955.

Electrical, servo, radar and power plant preflight checks were completed by 21 July. The weapon system check was successfully completed on 25 July.

The missile was fueled and pit checks were accomplished satisfactorily by 28 July in preparation for a launch on 29 July.

First launch attempt - On 29 July during the engine warmup of the director B-36 S/N 51-5710, the #5 engine caught fire and the flight had to be cancelled. B-36 S/N 5710 was returned to Convair, Fort Worth, for an engine change and the missile was transferred to B-47 S/N 51-5220.

Second launch attempt - On 2 August 1955, during the pre-launch checks, the left aileron was found to be stuck in the full UP position and video contact was lost. The mission was cancelled. The aileron malfunction was caused by a stuck valve which was replaced. The loss of video was caused by an Unattended Search Radar failure and the receiver-transmitter and modulator units were changed.

Third launch attempt - On 4 August 1955, another attempt was made to launch missile 56F from B-47 number 5220. During pre-launch check-out, a low relay signal strength caused a marginal decoding of received intelligence. In addition the terminal guidance indicator display could not be synchronized. The mission was cancelled. Since this malfunction could not be duplicated on the ground, and the operator felt it was an indicator problem, the indicator was changed. The low signal strength was believed to have been caused by a malfunction in the relay receiver which was to aid lock-on by the automatic tracking antenna system. This modification was removed.

Fourth launch attempt - On 6 August 1955, B-47 number 5220 and missile number 3356F were airborne to conduct a launch attempt. All prelaunch checks were normal except that an intermittent decode and lock-in of relayed video information was experienced. To counter this, emanating high voltage was turned off for the remainder of the dry run and was turned on five minutes before launch on the hot run. Operation was satisfactory on the hot run and the turbine was fired at the proper time. One and one-half seconds after turbine fire, the turbine shut down and the mission was cancelled. The missile was defueled and the power plant was removed and sent to Bell Aircraft Corporation, Buffalo, New York, for tear-down and further study as to the cause of the turbine shutdown. No results of this study are known at this time.

C. Operations

For the scheduled mission on 16 August 1955, the power plant from GAM-63 number 52F was installed on missile number 3356F. Special power plant instrumentation had been installed in the missile is an effort to determine the cause of two recent turbine malfunctions immediately after turbine fire. Because the B-47 was under-going a major inspection, missile number 3356F was scheduled for launch from B-36 number 51-5710. Takeoff was at 0525 on 16 August 1955.

1. Pre-launch checks: During the climb to launch altitude, when emanating high voltage was turned on to complete the video checks, too many altitude returns were observed on the terminal guidance monitor scope. A hold was called at 21,500 feet and the guidance system was shut down for a ten-minute cooling period. After the guidance equipment was turned on the spacing was correct and a strong altitude return was visible but the video signals were low. The dry run and hot run were continued. The instrumentation operator reported the presence of some video information. The guidance operator felt that with the strong altitude return, a return from the target would be visible.

2. Missile launch and rocket fire: Count-down was continued until range coincidence, at which time the turbine was armed and fired by the Automatic Check-out System (ACS). Further checks were completed by the ACS. Angular coincidence was achieved by the aircraft autopilot

[redacted]

and the missile was released by the ACS. Missile drop-away was clean and rocket fire was normal.

3. Boost climb and midcourse: At X plus 59 seconds, the automatic tracking antenna system picked up and locked on to the video relay signal. The guidance operator commanded the Unattended Search Radar to turn on, checked the automatic altitude tracking system, and was phasing the terminal guidance indicator when the relay signal was lost at X plus 80 seconds.

The missile entered its programmed climb, but at X plus 125 seconds at an altitude of 61,000 feet, it entered a premature dive. Visual indications were that it went unstable prior to the dive. At approximately X plus 135 seconds the power plant, including the turbine, shut down.

4. Results versus Plan: Because of the midcourse flight failure, neither the primary nor the secondary objectives were achieved.

5. Instrumentations Results: Telemetry results were marginal for this flight. Because telemetry was turned on at approximately X minus 5 minutes, in order to conserve the telemetry battery, the sub-carriers were still drifting while the missile was in flight, thus precluding good quantitative data.

S-Band and L-Band tracking were satisfactory, as was the Askania and Mitchell camera coverage.

D. Discussion.

The available telemetry data indicated that the surfaces deflected to their maximum limits prior to the instability. This condition was similar to the flight of 3247F conducted just prior to this one and indicates a failure of the servo B plus power supply. The consensus is that high altitude arcing is occurring in the servo power supply. The possibility exists that the last two missiles, 3247F and 3356F, were flown with power supplies that were not meant to be flown above 50,000 feet. It is to be noted that both missiles became unstable at approximately the same pressure altitude. Until a definite fix is obtained on this condition, future missiles will have their flight plans altered such as to limit their maximum altitude to 50,000 feet.

The failure of the relay signal has been accredited to a failure of the missile relay magnetron.

E. Conclusions.

In regard to the possibility of the two missiles being launched with improper servo power supplies, it appears inexcusable for the contractor to have not properly classified the units in question such that

[redacted]

they could not have been used improperly. In any case, whether this was the cause of the failures or not, a better record should have been kept such that a doubt as to the right units being used or not would not have existed for so long a time after the incident. At time of this writing, it is still not clear exactly what power supply configuration was in 3247F or 3356F.

In regard to the drifting telemetry subcarriers, it has been decided that telemetry will be turned on at least 15 minutes prior to launch in order to allow sufficient time for warmup and frequency stabilization. If the battery voltages drop down below usable levels in this time, the flight will of course be cancelled.

F. Recommendations:

It is recommended that WADC investigate the methods used by Bell Aircraft Corporation to insure that components in missiles are the proper ones for each planned test and that these components have been tested for environmental conditions to be encountered in flight. It is further recommended that WADC compel Bell Aircraft to keep accurate up to date histories of all major missile components so that immediately following a missile flight no doubt will exist as to what components were flown in the missile.

APPENDIX I

The following functions were telemetered (Key: C - continuous, S - commutated at 5 samples/seconds.

ITEM	MEASURED FUNCTION	INSTRUMENT RANGE	SAMPLING RATE
GUIDANCE			
G.1	USR magnetron current	0 to 20 ma	S
G.3	Pitch command channel output	75 to 105V DC	S
G.4	Azimuth command channel output	75 to 105V DC	S
G.5	Antenna command channel output	75 to 105V DC	S
G.6	Relay transmitter power	0 to 3V DC	S
G.7	Relay antenna position	+ 15° to -60°	S
SERVO			
S.1	Angle of Pitch	± 67.5°	S
S.2	Angle of yaw	± 30°	S
S.3	Angle of roll	± 2°	S
S.4	Elevator position	-22° to + 33°	S
S.5	Rudder position	± 33°	S
S.6	Left aileron position	± 16.5°	S
S.7	Search antenna pitch error signal	± 0.5V AC	S
INERTIAL GUIDANCE			
I.1	Platform error signal	± 1.5V AC	S
I.2	Accelerometer signal	± 1V DC	C
I.3	Velocity signal	0 to 300 V DC	S
I.4	Range signal	0 to 300 V DC	C
I.5	Dive command signal	0 to 28V DC	S

ITEM	MEASURED FUNCTION	INSTRUMENT RANGE	SAMPLING RATE
POWER PLANT			
P.1	Chamber pressure -boost (upper)	0 to 600 psi	S
P.2	Chamber pressure - boost (aft)	0 to 600 psi	S
P.3	Chamber pressure - cruise	0 to 600 psi	S
P.4	Nitrogen source pressure	1200 ± 200 psi	S
P.5	Pump speed (alternator frequency)	0 to 600 cps	S
P.6	Oxidizer outlet pressure		S
P.7	Fuel outlet pressure		S
P.8	Gas generator main valve switch pip		S
P.9	Gas generator pressure		S
FUZING			
F.1	Static pressure - body (vibrotron)	0 to 15 psia	C
F.2	Arming Baro (MC-273)	0 or 28V DC	S
F.3	Timer outputs #1 and #2	0 or 28V DC	S
F.4	Fuzing Baro (MC-5)	0 to 28V DC	*

* The MC-5 fuzing baro is superimposed on the continuous channel assigned to Item L.4

APPENDIX II

Direct recording coverage: The following functions were measured with direct recording equipment in the director aircraft:

Guidance Functions

1. TGSC Sychronizer Decoder Rate
2. TGSC Altitude Tracking
3. Director Relay Receiver Discriminator Voltage
4. Director Relay Receiver AGC Voltage
5. Director Relay Antenna Azimuth Position
6. Director Relay Antenna Tilt Position
7. Director Relay Antenna Azimuth Error
8. Director Relay Antenna Tilt Error
9. Polycode Driver Azimuth Command
10. Polycode Driver Dive Command
11. Polycode Driver Antenna Command
12. Command Transmitter Magnetron Current
13. "K" System (115V 400 cps)
14. Director Relay Receiver Threshold Relay Actuation
15. Director Primary 115V (380 - 1000 cps)
16. Director Primary 115V (380 - 420 cps)
17. Director Primary 28V DC
18. Adapter Equip. Precision Power Supply Voltage
19. Director Turn Angle
20. Adapter Equip. Range Coincidence

21. Adapter Equip. Enabling Signal

22. Adapter Equip. Angular Coincidence

23. Missile External/Internal Power Transfer

24. Missile Release Control (Supplied from AC3)

25. Director True Heading (A_t from K-System)

26. Director Range-Ground Point to Target (R_t from MRNC)

27. Component of Director Ground Speed Directed Toward the Target

28. Missile Release Control (Supplied to Release Mechanism from Capsule)

29. Time Base

Director Aircraft Functions

30. Director Attitude - Pitch

31. Director Attitude - Roll

32. Director Altitude

33. Director True Airspeed

Missile Functions

34. Umbilical Separation

35. GAM Alternator Voltage

[redacted]

APPENDIX III

Minimum Launch Conditions

1. Terminal Guidance

a. Multiple heading markers shall not be a cause for cancellation, if in the opinion of the guidance operator, he is able to distinguish the correct heading marker.

b. In the operator's opinion, he should always have sufficient return and picture of general land painting at launch altitude which he thinks will permit him to recognize the target.

c. Manual altitude tracking before turbine fire is not acceptable. Since manual track is an emergency operation which may be required after launch, satisfactory automatic operation is required in preparation for launch.

d. The Unattended Search Radar antenna must be in synchronization from minus 6 to minus 3 minutes before launch.

2. Command System

a. Command must be getting through to the servo system.

b. False commands are permissible, if, in the opinion of the operator, the sense of the true command is not obscured.

3. General

a. After turbine fire, complete loss of video will be a cause for cancellation.

b. Askania cinetheodolite coverage is required.

c. Photographic escort aircraft is mandatory.

d. Launch altitude will be 42,500 $\pm$ 500 feet (Pressure Altitude) and launch Mach number will be .60 $\pm$ .025.

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A.B.

TEST REPORT

ON

XGAM - 63

Launching Date: 5 August 1955 Number: 4

Missile NR: 3247F 19 August 1955

Contractor: Bell Aircraft Corporation

Contract Number: W33(038)-ac-14169

System Number: 112A, B, C

Test Directive Number: 5047-H4

H 5 4

Prepared by:

John E Richards

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Approved by:

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Major, USAF
Chief, XGAM-63 Project Office

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HADC 55-3677
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I. PROGRAM OBJECTIVE:

The purpose of the present series of tests is to complete Program Objectives I and II, which are:

Objective I: The development of a weapon system consisting of XGAM-63, a DB-47 director aircraft non-emanating midcourse and emanating X-band terminal guidance system, and an atomic warhead.

Objective II. Identical to Objective I except that a DB-36 director aircraft is substituted for the DB-47.

Tests for these two objectives are being conducted simultaneously. A total of 33 missiles is assigned to HADC in accomplishment of these two objectives (19 from the DB-47 and 14 from the DB-36). This was the third missile to be launched in the accomplishment of Objective II.

II. TEST OBJECTIVE:

A. The test objectives were:

1. Primary

a. To test the operation of the emanating and non-emanating guidance systems at 59,000 feet altitude and 75 nautical mile range. This flight test provided the first step in evaluation of missile systems at altitudes and ranges approaching operational.

b. To test the simulated prime warhead.

2. Secondary

a. To test the warhead fuzing system in the subsonic Mach number region.

b. To check launch separation characteristics.

B. Description of flight: The missile was to be launched from a DB-36 director aircraft at a pressure altitude of 42,500 feet. The servo-pilot was to provide roll, pitch and yaw stabilization of the missile; control was to be provided by the altitude controller, the single axis inertial guidance system and the terminal guidance operator. At a simulated burst point, calculated to be directly over North Impact Point (NIP) at an altitude of 8,000 feet MSL (3196 feet tapoline over terrain), a detonation signal was to be obtained from the warhead fuzing system. Predicted missile performance was to be as follows:

1. Maximum altitude - 59,000 feet pressure altitude
2. Maximum range - 75.0 nautical miles (launch point to detonation point)
3. Maximum Mach number - 2.00
4. Mach number at simulated burst point - 0.90

III. TEST CONDITIONS:

This test was conducted under the following conditions:

1. Launch time - 0733

2. Launch heading - 343° True

3. Launch range - 76.1 nautical miles from NIP

4. Launch altitude - 42,500 feet pressure altitude

5. Launch airspeed - 340 knots True Airspeed (M-.60)

6. Launch aircraft - EDB-36H NR 51-5710

7. Weather conditions - 15,000 feet scattered, wind 180° at 4 knots.

8. Photographic coverage - two F-94 chase aircraft with motion picture cameras; Askania coverage only partial because of timing malfunction; Mitchell coverage for the entire flight.

9. Radar coverage - S-band during entire flight; L-Band at launch only.

10. Telemetry coverage - (See Appendix I)

11. Direct recording coverage (See Appendix II)

IV. TEST OPERATIONS:

A. Preparation.

Prior to the test a standards meeting was held between the Contractor representative and HADC Project Officer representative for the purpose of establishing minimum conditions to be met before the missile would be launched. As a result of this meeting the following minimums were established.

1. Terminal Guidance

a. Multiple heading markers shall not be a cause for cancellation if, in the opinion of the guidance operator, he is able to distinguish the correct heading marker.

b. In the operator's opinion, he should have sufficient return and picture of general land painting at launch altitude which he thinks will permit him to recognize the target.

c. Manual altitude tracking before turbine fire is not acceptable. Since manual track is an emergency operation which may be required after launch, satisfactory automatic operation is required in preparation for launch.

d. The Unattended Search Radar antenna must be in synchronization from minus 6 to minus 3 minutes before launch.

2. Command System

a. Command must be getting through to the servo system.

b. False commands are permissible, if, in the opinion of the operator, the sense of the true command is not obscured.

3. General

a. After turbine fire, complete loss of video will be a cause for cancellation.

b. Askania cinetheodolite coverage is required.

c. Photographic escort aircraft is mandatory.

d. Launch altitude will be 42,500 feet ± 500 feet (Pressure Altitude) and launch Mach number will be .60 ± .025.

B. Check-out.

XGAM-63 NR 3247F arrived at HADC on 4 May 1955. Receiving inspections were completed. Power plant checks indicated a failure of the glow plug. Upon trouble-shooting, it was found that a wire specified in the prints was missing from the junction box. The cruise thermal relief valve, the turbine pump drive regulator, and the boost NR 1 accumulator were replaced.

During the pit checks prior to the scheduled launch on 18 May, the roll rate gyro was found to be inoperative and was replaced. The new gyro checked out when installed; however, personnel at Bell Aircraft, Buffalo, N.Y., were not satisfied that this would guarantee that it would work in the air; consequently, the flight for 18 May was cancelled until proper instrumentation could be installed in the director, which would aid in checking proper operation of the roll rate gyro while airborne.

Installation of carrier aircraft instrumentation, to determine operation of the roll rate gyro, delayed the takeoff of the first launch attempt on 20 May for 5 hours. The mission was cancelled on the dry run because the automatic check-out system would not accept the fin-fold mechanism as being down and locked. The failure was attributed to faulty adjustment of the fin-fold microswitch.

The launch of this missile was again cancelled on 23 May during pre-launch checks. The instrumentation added in the director to monitor the roll rate gyro operation gave indications that the gyro was malfunctioning. Subsequent ground checks revealed that the gyro was all right but that the missile inertial guidance inverter did not have a regulated output. Further checks traced the trouble to the regulator

unit on the inverter. This unit was replaced and the flight was rescheduled for 25 May.

On 25 May, during the command checks, the wave guide switch would not switch from the test to the operational position. To clear this malfunction, the relay antenna was raised and the switch was physically turned. However, the commands were still not received in the missile so pressure was jettisoned, and the mission was cancelled. Then it was discovered that the relay antenna had not been lowered again.

This missile was rescheduled for launch on 3 June; however, on 2 June the oxidizer was found to have deteriorated far out of specifications. The flight was again cancelled and extensive investigation was begun on the acid situation.

Acid loaded into the missile tank upon the first loading on 17 May stayed within specifications with respect to total solid content for approximately 77 hours. Upon determination that the acid was out of specification the missile was defueled and reloaded with fresh acid. This acid remained in firing specification for only 32 hours. The third loading remained in specification for less than 13 hours. A conference was requested by WADC in regard to relaxing the Bell Aircraft specifications on solid content. A sliding scale of oxide content was adopted to replace the previous specifications of a maximum of 0.1% by weight of solids as anhydrous nitrates computed from the ignited oxides.

On 8 June, this missile drained of all fuel and oxidizer was ferried back to Bell Aircraft Corporation, Buffalo, N.Y., for examination and possible causes for this acid deterioration.

The missile was returned to HADC on 6 July after deciding that the three progressively shortened periods of acid storage in the missile tank were the result of failure to remove acid salts prior to refilling. It was decided that instead of cutting open the tanks to inspect them to determine if any construction flaw was responsible for the accelerating deterioration of acid, that pickling the tank with a solution of 95% HNO_3, 1% HFl, and 4% H_2O would dissolve the accumulated salts and restore the tank to operation.

On 28 July, after reaccomplishing preflight checks, the missile was again scheduled for launch. Airborne check-out indicated servo oscillations in dive, weak relay reception and telemetry interference; therefore the mission was cancelled. Upon landing, the relay receiver was replaced and a defective tube was replaced in the servo amplifier.

On 2 August, an airborne launch attempt was cancelled because of failure of the command transmitter. The command package was changed. Ground checks subsequently revealed that the failure of the command transmitter was caused by failure of a rectifier tube in the high power supply.

A second launch attempt was scheduled on the same day. Excessive operation of the hydraulic low pressure light, intermittent sweep collapse of the terminal guidance indicator, and the posibility of weather precluding

Askania coverage at impact, were considered for canceling. An error made by the guidance operator placed him five miles off his launch point and the chase aircraft did not have sufficient fuel to fly another launch run, resulting in definite cancellation.

C. Operations.

1. Launch: On 5 August, GAM-63 number 3247F was launched from B-36 number 51-5710. Takeoff was scheduled for 0500. During the climb to altitude, the pre-launch checks were accomplished and found to be satisfactory. On the dry run, the terminal guidance indicator sweep rose and fell as previously. The guidance equipment was turned off at X minus 24 minutes and turned on again at X minus 15 minutes. Following turn-off and turn-on, the terminal guidance sweep and presentation were stable and satisfactory. The count was followed normally, angular coincidence was achieved by the autopilot, and the missile was released by the automatic check-out system. Drop-away was clean and the rocket engines fired properly.

2. Climb and Midcourse: During the director aircraft turn, the relay signal from the missile was picked up by the automatic tracking antenna system. All relay signals were lost as the operator was phasing the terminal guidance indicator. At X plus 97 seconds the missile became unstable. Turbine shutdown occurred at X plus 116 seconds.

3. Results versus Plan: The flight path of the missile was as planned until X plus 97 seconds. At that time the missile entered a vertical dive. Test objectives were not achieved.

4. Instrumentation Results: Study of the telemetry at the time of failure, indicates that all control surfaces were against the stops, indicating loss of servo B+ voltage for reasons unknown. The switch pip for the gas generator propellant valve indicates that the turbine shut down for electrical reasons since the transition occurs linearly over a period of 0.9 seconds. A fluctuation in the fuel pressure loss did not affect operation of the engine. Telemetering failed at X plus 124 seconds and the missile destruct system actuated itself before impact.

D. Discussion:

It is suspected that the loss of servo B+ power could have burned out the servo power supply, shorting input 110 volt power, and consequently dropping out the 28 volt and DC power which actuates the propellant valves.

Prime causes of the failure remain undetermined. As in the past, with no instrumentation to eliminate the suspicion of fire, boattail fire remains a simple explanation.

The sweep collapse in the terminal guidance indicator was found to have been caused by arcing on the indicator commutator. The arcing itself was a result of insulation breakdown on the commutator ring. No arcing occurred after turn-off and turn-on because with the increased range the average voltage was considerably reduced.

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APPENDIX I

The following functions were telemetered (Key: C--continuous, S - commutated at 5 samples/seconds)

ITEM	MEASURED FUNCTION	INSTRUMENT RANGE	SAMPLING RATE
GUIDANCE			
G.1	USR magnetron current	0 to 20 ma	S
G.3	Pitch command channel output	75 to 105V DC	S
G.4	Azimuth command channel output	75 to 105V DC	S
G.5	Antenna command channel output	75 to 105V DC	S
G.6	Relay transmitter power	0 to 3V DC	S
G.7	Relay antenna position	$+15^\circ$ to -60°	S
SERVO			
S.1	Angle of Pitch	$\pm 67.5^\circ$	S
S.2	Angle of yaw	$\pm 30^\circ$	S
S.3	Angle of roll	$\pm 2^\circ$	S
S.4	Elevator position	-22° to 32°	S
S.5	Rudder position	$\pm 33^\circ$	S
S.6	Left aileron position	$\pm 16.5^\circ$	S
S.7	Search antenna pitch error signal	$\pm$ 0.5V DC	S
INERTIAL GUIDANCE			
1.1	Platform error signal	$\pm$ 1.5V AC	S
1.2	Accelerometer signal	$\pm$ 1V DC	C
1.3	Velocity signal	0 to 300V DC	S
1.4	Range signal	0 to 300V DC	C
1.5	Dive Command signal	0 to 28V DC	S

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ITEM	MEASURED FUNCTION	INSTRUMENT RANGE	SAMPLING RATE
POWER PLANT			
P.1	Chamber Pressure - boost (upper)	0 - 600 psi	S
P.2	Chamber pressure - boost (lower)	0 - 600 psi	S
P.3	Chamber pressure - cruise	0 - 600 psi	S
P.4	Nitrogen source pressure	1200 ± 200 psia	S
P.5	Pump speed (alternator frequency)	0 - 600 cps	S
P.6	Oxidizer Outlet pressure	0 - 1000 psi	S
P.7	Gas generator Valve switch	0 - 28V DC	S
P.8	Fuel outlet pressure	0 - 1000 psi	S
P.9	Gas generator chamber pressure	0 - 600 psi	S
FUZING			
F.1	Static pressure - body (vobrotron)	0 - 15 psia	C
F.2	Arming Baro (MC-273)	0 or 28V DC	S
F.3	Timer outputs #1 and #2	0 or 28V DC	S
F.4	Fuzing Baro (MC-5)	0 or 28V DC	
F.5	Impact Fuze #1 (thyratron)		
F.6	Impact Fuze #2 (thyratron)		

APPENDIX II

Direct recording coverage: The following functions were measured with direct recording equipment in the director aircraft:

GUIDANCE FUNCTIONS

1. TGCS Synchronizer Decoder Rate
2. TGCS Altitude Tracking
3. Director Relay Receiver Discriminator Voltage
4. Director Relay Receiver AGC Voltage
5. Director Relay Antenna Azimuth Position
6. Director Relay Antenna Tilt Position
7. Director Relay Antenna Azimuth Error
8. Director Relay Antenna Tilt Error
9. Polycode Driver Azimuth Command
10. Polycode Driver Dive Command
11. Polycode Driver Antenna Command
12. Command Transmitter Magnetron Current
13. "K" system (115V 400 cps)
14. Director Relay Receiver Threshold Relay Actuation
15. Director Primary 115V (380 - 1000 cps)
16. Director Primary 115V (380 - 420 cps)
17. Director Primary 28V DC
18. Adapter Equip. Precision Power Supply Voltage
19. Director Turn Angle
20. Adapter Equip. Range Coincidence
21. Adapter Equip. Enabling Signal
22. Adapter Equip. Angular Coincidence

23. Missile External/Internal Power Transfer

24. Missile Release Control (Supplied from ACS)

25. Director True Heading (A_t from K-system)

26. Director Range-Ground Point to Target (R_t from MRNC)

27. Component of Director Ground Speed Directed toward the target

28. Missile Release Control (Supplied to Release Mechanism from Capsule)

29. Time Base

DIRECTOR AIRCRAFT FUNCTIONS

30. Director Attitude - Pitch

31. Director Attitude - Roll

32. Director Altitude

33. Director True Airspeed

MISSILE FUNCTIONS

34. Umbilical Separation

35. GAM Alternator Voltage

MISSILE POWER PLANT FUNCTIONS

36. Gas Generator Preasure Switch Pip

37. Fuel Case Pressure Switch Pip

38. Cruise and Bypass Pilot Valve Switch Pip

39. Malfunction Switch Pip

40. Gas Generator Pilot Valve Switch Pip

41. Boost Pilot and Control Valves Switch Pip

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Declassified
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a B

TEST REPORT

ON

GAM-63

Number: 3

Date: 19 July 1955

Missile Number: 3155F

Contractor: Bell Aircraft Corporation

Contract Number: W33(038)ac-14169

System of Project Number: 112A, B, C

Test Directive Number: 5047H

Prepared by:

John E. Richards

JOHN E. RICHARDS
Captain, USAF
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Approved by:

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for THOMAS E. SLEDGE, JR
Major, USAF
Chief, XGAM-63 Project Office

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HADC 55-343?
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I. [illegible].

[illegible] tests to the completion of Test [illegible] and II respectively.

Objective I: The development of a weapon system consisting of a DB-[illegible] director aircraft employing non-emanating guidance and emanating [illegible] missile guidance system, and an atomic warhead.

Objective II: Identical to Objective I except that a DB-36 director aircraft is substituted for the DB-47. Tests for these two objectives are being conducted simultaneously. A total of 33 missiles are assigned for test at NAMU I accomplishment of these two objectives (19 from the DB-47 and 14 from the DB-36). This was the second missile to be launched in the accomplishment of Objective I.

II. TEST OBJECTIVE.

The test Objectives were:

Primary

A. To evaluate the operation of the emanating and non-emanating guidance equipment at the operational flight altitude of 65,000 feet.

B. To test the accuracy of the single axis inertial guidance system.

C. To test the warhead fusing system.

D. To evaluate SCR video at 65,000 feet altitude.

Secondary

To test the operation of the emanating guidance system during the terminal dive.

Description of Flight: The missile was to be launched from a DB-47 director aircraft at a pressure altitude of 39,000 feet. The servo-pilot was to provide roll, pitch and yaw stabilization of the missile; control was to be provided by the altitude controller, the single axis inertial guidance system and the terminal guidance operator. At a simulated burst point, calculated directly over AIP at an altitude of 10,000 feet MSL (5[illegible] feet tangent above terrain), a detonation signal is to be obtained from the fusing system. Predicted missile performance is as follows:

A. Maximum altitude - 65,000 feet pressure altitude

B. Horizontal range - 72.9 nautical miles (from launch point to detonation point)

NAVORD 55-3627

c. [illegible]

d. [illegible]

III. TEST CONDITIONS.

The tests will be conducted under the following conditions:

a. Launch time - [illegible] on 12 May 1955

b. Launch heading - 310° true

c. Launch range - 120 nautical miles from NAF

d. Launch altitude - 30,000 feet pressure altitude

e. Launch airspeed - 440 knots true airspeed (M .74)

f. Launch aircraft - ZELL-47 AM 9620

g. Weather conditions - [illegible] cumulus at launch, clear at the target, 1500' at 7 tenths

h. Photographic coverage - Two F-86 chase aircraft with motion picture cameras and Mitchell cameras of the entire flight, and fixed motion picture cameras on the launching aircraft.

i. Radar coverage - C-band tracking for the entire flight. L-band tracking until turbine shutdown.

IV. TEST OPERATIONS.

A. Prior to the test a standby meeting was held between the Contractor representative and NADC Project Office representative for the purpose of establishing minimum conditions to be met before the missile would be launched.

1. [illegible] meeting the following minimums were established:

a. [illegible] beacon signal will not be a factor in controlling, if in the opinion of the airborne operator, he is able to distinguish the correct missile marker.

b. In the operator's opinion, he should have sufficient return and [illegible] from the missile at launch altitude which he thinks will permit [illegible] the target.

a. Manual tracking (altitude) before turbine fire is OK.

b. Power manual tracking is an emergency operation which may be used after launch, satisfactory automatic operation is required prior to launch.

d. The unattended Search Radar antenna must be in synchronization from minus 6 to minus 3 minutes before launch.

2. Command System

a. Commands must be getting through to the servo system.

b. False commands are permissible, i.e, in the opinion of the operator, the sense of the true command is not obscured.

3. General

a. After turbine fire, complete loss of video will be a cause for cancellation.

b. Askania cinetheodolite coverage is required.

c. Photographic escort aircraft is mandatory.

d. Launch altitude will be 30,000 feet plus or minus 500 feet (Pressure Altitude) and launch Mach number will be .75 plus or minus .025.

e. Check-out.

Missile XGAM-63 NR 55F arrived HADC on 23 June 1955.

Electrical, servo, radar and power plant pre-fill checks were completed by 1 July.

In an effort to slow down the reaction time of the acid once loaded in the missile tank, the missile was moved out to the pit area and its oxidizer tank was "pickled". This consisted of flushing the tank with HF_1 inhibitor solution of nitric acid.

Command calibrations were finished by 11 July. The weapon system checks were completed by 17 July.

The missile was fueled, loaded upon the B-47, and pit checks were accomplished successfully in time for a scheduled take-off on 19 July 1955.

C. Operations.

Take-off was approximately 0600 on 19 July.

1. Pre-launch checks: All airborne electrical servo and radar checks were successfully completed prior to the hot run.

[illegible] until angular coincidence. [illegible] the pilot announced that his [illegible] launch, at which time the guidance operator manually [illegible] the missile. Missile drop-away was clean and rocket fire was normal.

3. Boost climb and Midcourse: Rocket fire occurred at X plus 1.7 seconds. The missile followed programmed climb to approximately 65,000 feet. Boost shutdown was proper. The missile was [illegible] course during midcourse flight. Boost cut-out occurred at X plus 119.3 seconds. The guidance operator commanded the missile Unattended Search Radar (USR) to turn on during midcourse and observed good land painting. Just prior to dive initiation, the guidance operator acquired the target on his PPI presentation. Cruise rocket cut-out occurred at X plus 176.2 seconds.

4. Terminal Dive: The inertial guidance system initiated the terminal dive at approximately X plus 178 seconds. Dive angle was increased by the operator and the missile responded correctly. Intermittent instability of the Terminal Guidance (TG) presentation was experienced after dive initiation. As the Automatic Tracking Antenna approached zero tilt, all video relay signal indications were lost. The turbine malfunctioned at X plus 223.9 seconds and the missile became unstable and entered a vertical dive, impacting about two miles short and right of the target.

D. Discussions.

The failure of the Aerojet turbine was directly attributed to loss of nitrogen source pressure. Telemetered information indicates source pressure reached the point of unreliable pressure regulation operation (1200 PSI) at X plus 108 seconds. At the time that source pressure was insufficient to hold the gas generator propellant valve open, the turbine shut down. Source of [illegible] leak is unknown but blowout of the O ring of the high pressure jettison valve is suspected.

The probable cause for the intermittent TG presentation instability was found to be a malfunction of the relay receiver AFC system.

E. Conclusions and Recommendations: None

ITEM	MEASURED PARAMETER	INSTRUMENT RANGE	SAMPLING RATE
POWER PLANT			
P.1	Chamber pressure - boost (upper)	0-600 psi	S
P.2	Chamber pressure - boost (lower)	0-600 psi	S
P.3	Chamber pressure - cruise	0-600 psi	S
P.4	Nitrogen Source pressure	1200 ± 200 psi	S
P.5	Pump speed (alternator frequency)	0-600 cps	S
FUZING			
F.1	Static pressure - body (vibrotron)	0-15 psia	C
F.2	Arming Baro (MC-273)	0 or 28V DC	S
F.3	Timer Outputs #1 and #2	0 or 28V DC	S
F.4	Fuzing Baro (MC-5)	0 or 28V DC	S

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APPENDIX I

ITEM	MEASURED FUNCTION	INSTRUMENT RANGE	SAMPLING RATE
GUIDANCE			
G.1	USR magnetron current	0 to 20 ma	S
G.2	USR AGC voltage	0 to -5V DC	S
G.3	Pitch command channel output	75 to 105V DC	S
G.4	Azimuth command channel output	75 to 105V DC	S
G.5	Antenna command channel output	75 to 105V DC	S
G.6	Relay transmitter power	0 to 3V DC	S
G.7	Relay antenna position	+ 15° to -60°	S
G.8	Relay video input	0 to 1V DC	S
SERVO			
S.1	Angle of Pitch	± 67.5°	S
S.2	Angle of Yaw	± 30°	S
S.3	Angle of Roll	± 2°	S
S.4	Elevator position	-22° to +33°	S
S.5	Rudder position	+ 33°	S
S.6	Left aileron position	± 16.5°	S
S.7	Search antenna pitch error signal	± 0.5V DC	S
INERTIAL GUIDANCE			
1.1	Platform error signal	± 1.5V AC	S
1.2	Accelerometer signal	± 1V DC	C
1.3	Velocity signal	0 to 300V DC	S
1.4	Range signal	0 to 300V DC	C
1.5	Dive command signal	0 to 28V DC	S

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RO. [illegible]

[illegible] Items

1. [illegible] Synchronizer Decoder [illegible]
2. TADS Altitude Tracking
3. Director Relay Receiver [illegible] Voltage
4. Director Relay Receiver AGC Voltage
5. Director Relay Antenna Azimuth Position
6. Director Relay Antenna Tilt Position
7. Director Relay Antenna Azimuth Error
8. Director Relay Antenna Tilt Error
9. Polycode Driver Azimuth Command
10. Polycode Driver Dive Command
11. Polycode Driver Antenna Command
12. Command Transmitter Magnetron Current
13. "K" System (115V 400 cps)
14. Director Relay Receiver Threshold Relay Actuation
15. Director Primary 115V (380-1000 cps)
16. Director Primary 115V (380-420 cps)
17. Director Primary 28V DC
18. Adapter Equip. Precision Power Supply Voltage
19. Director Turn Angle
20. Adapter Equip. Range Coincidence
21. Adapter Equip. Enabling Signal
22. Adapter Equip. Angular Coincidence

23. Missile External/Internal Power Transfer
24. Missile Release Control (Supplied for ACS)
25. Director True Heading (A_z from K-System)
26. Director Range-Ground Point to Target (R_t from MEADS)
27. Component of Director Ground Speed Directed toward Target
28. Missile Release Control (Supplied to Release Mechanism from Capsule)
29. Time Base

Director Aircraft Functions

30. Director Attitude - Pitch
31. Director Attitude - Roll
32. Director Altitude
33. Director True Airspeed

Missile Functions

34. Umbilical Separation
35. GAM Alternator Voltage

Missile Power Plant Functions

36. Gas Generator Pressure Switch Pip
37. Fuel Case Pressure Switch Pip
38. Cruise and Bypass Pilot Valve Switch Pip
39. Malfunction Switch Pip
40. Gas Generator Pilot Valve Switch Pip
41. Boost Pilot and Control Valves Switch Pip

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Declassified
3 July 62
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TEST REPORT

ON

GAM-63

Date: 14 July 1955 Number: 2

Missile Number: 3054F

Contractor: Bell Aircraft Corporation

Contract Number: W33(038)ac-14169

System or Project Number: 112A, B, C

Test Directive Number: 5047H

HDEH

Prepared by:

John E. Richards

JOHN E. RICHARDS
Captain, USAF
XGAM-63 Project Officer

Approved by:

for A W Kinney, Major USAF

THOMAS E. SLEDGE, JR
Major, USAF
Chief, XGAM-63 Project Office

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HADC 55-3372
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I. PROGRAM OBJECTIVE:

The purpose of the present series of tests is the completion of program Objectives I and II which are:

Objective I: The development of a weapon system consisting of a DB-47 director aircraft, a GAM-63 missile with a non-emanating mid-course guidance system, an emanating X-Band terminal guidance system, and an atomic warhead.

Objective II: Identical to Objective I except that a DB-36 director aircraft is substituted for the DB-47. Tests for these two objectives are being conducted simultaneously. A total of 33 missiles are assumed for test at HADC in accomplishment of these two objectives (19 from the DB-47 and 14 from the DB-36). This was the first missile to be launched in the accomplishment of Objective I.

II. TEST OBJECTIVES:

The Test Objectives were:

Primary

A. To test the single operator relay command guidance system and the single axis inertial guidance system.

B. To test warhead fuzing system.

C. To test the simulated prime warhead.

Secondary

A. To check launch separation characteristics.

B. To check pre-launch procedures.

Description of flight: The missile was to be launched from a DB-47 Director Aircraft at a pressure altitude of 38,000 feet. The servo-pilot was to provide roll, pitch and yaw stabilization of the missile, control was to be provided by the altitude controller, the single axis inertial guidance system and the terminal guidance operator. At a simulated burst point, calculated to be directly over [illegible] at an altitude of 3,000 feet (3196 tape-line over terrain), a detonation signal was to be obtained from the warhead fuzing system. Predicted missile performance was to be as follows:

A. Maximum altitude - 50,000 feet pressure altitude

B. Maximum Range - 68.4 nautical miles (launch point to detonation point)

C. Maximum Mach number - 2.32

D. Mach number at simulated burst point - [illegible]

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III. TEST CONDITIONS:

This test was conducted under the following conditions:

A. Launch time - 0800 on 14 July 1955

B. Launch heading - 343° true

C. Launch range - 56.0 nautical miles from NIP

D. Launch altitude - 38,370 feet pressure altitude

E. Launch airspeed - 455 knots true airspeed (M .76)

F. Launch aircraft - EJDB-47 NR 5220

G. Weather conditions - Ceiling and visibility unlimited with wind at launch altitude from 350° at 23 knots.

H. Photographic coverage - two F-94 chase aircraftwith motion picture cameras: Askania and Mitchell cameras of the entire flight, and fixed motion picture cameras on the launching aircraft.

I. Radar coverage - S-Band and L-Band tracking. S-Band radar for the entire flight. L-Band track until turbine shutdown.

IV. TEST OPERATIONS:

A. Preparation:

Prior to the test a standards meeting was held between the Contractor representative and HADC Project Office representative for the purpose of establishing minimum conditions to be met before the missile would be launched.

As a result of this meeting the following minimums were established:

1. Terminal Guidance

a. Multiple heading markers shall not be a cause for cancellation, if, in the opinion of the guidance operator, he is able to distinguish the correct heading marker.

b. In the operator's opinion, he should have sufficient return and picture of general land painting at launch altitude which he thinks will permit him to recognize the target.

c. Manual tracking (altitude) before turbine fire is NOT acceptable. Since manual track is an emergency operation which may be required after launch, satisfactory automatic operation is required in preparation for launch.

d. The Unattended Search Radar antenna must be in synchronization up until 6 to 3 minutes before launch.

2. Command System.

a. Command must be getting through to the test vehicle.

b. False commands are impossible [illegible] the operator, the sense of the true command is changed.

3. Range.

a. After turbine fire, complete loss of video will be a cause for cancellation.

b. Aerial photographic coverage is mandatory.

c. Photographic escort aircraft is mandatory.

d. Launch altitude will be 38,000 feet plus or minus 500 feet (Pressure Altitude) and launch Mach number will be .75 plus or minus .02.

3. Check-out.

XQM-60 [illegible] arrived at HADC on 2 June [illegible] from Bell Aircraft Corporation, Buffalo.

Electrical, servo, radar and power plant pre-flight checks were completed by 24 June without incident.

Command calibrations and the weapon system checks were successfully completed by 28 June.

A launch was scheduled for 30 June after the missile was fueled with JP-4 but the flight had to be cancelled because of lack of chase aircraft.

The launch was re-scheduled for 7 July after the chase plane problem was solved. Pre-checks were started on the afternoon of 6 July but [illegible] chronizer trouble extended the checks into the evening. A weather forecast predicted [illegible] few thunderstorms in the area. Due to a heavy rainfall completely battened up preparatory to the storm. Quite a heavy rainfall followed after which the missile was unbattened and the [illegible] However, when power was applied to the missile, the USB was found to be completely inoperative. [illegible] of water had leaked into the forward missile [illegible] umbilical plug [illegible] into the USB synchronizer. This partially shut [illegible] the bottom and as was susceptible to water entry. The [illegible] rizer caused a short in the [illegible] out of the USB vertical.

Further examination revealed [illegible] pletely corroded out from the water and had [illegible] ing between contacts.

[redacted]

[redacted]

necessary to cancel the [redacted] prior to [redacted] flight were satisfactory.

During the aircraft prelaunch checks on 8 July, [redacted] intermittently to the missile through the umbilical [redacted] could be fixed in the air and the flight was cancelled.

On [redacted] intermittent condition. A test using [redacted] the plug would [redacted] the condition was alleviated by [redacted] that the plug would hang free after missile launch.

Inclement weather [redacted] countdown resumed through turbine fire. The automatic checkout system (ACS) completed all functions and was waiting on angular coincidence. Normal autopilot oscillations did not achieve the coincidence, consequently the pilot tried to rudder the ship through angular coincidence. He [redacted] in one direction and was about to apply opposite rudder when the flight was cancelled because of the aircraft passing the [redacted]

Ground check revealed that nothing had malfunctioned in the [redacted] equipment such as to prevent angular coincidence [redacted] aircraft had just not oscillated through [redacted] the limits at that time were proper.

It was decided that in the future [redacted] achieved either by the autopilot or the pilot. [redacted] request the pilot to rudder the aircraft [redacted] at which time the guidance operator will manually [redacted] upon the ACS will release the missile.

C. Operations

The next launch was effected on 11 July. [redacted] were satisfactory and the countdown continued through [redacted] run.

D. Missile Release and Rocket Firing

The [redacted] turning right and climb to [redacted] angular coincidence was achieved. The ACS checked and released the [redacted] angular coincidence. After a short wait, [redacted] through coincidence and the missile was released [redacted] the rocket fired normally after the proper delay [redacted]

E. Climb and Ricochet

[redacted] missile ejected [redacted] climbed slightly [redacted] rapidly to 500 feet. The missile entered slight [redacted] heading during the ricochet flight. About 10 seconds [redacted]

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[illegible] time, the missile [illegible] time. It [illegible] at this time, the missile [illegible] approximately [illegible] miles [illegible] and [illegible] the guidance operator lost the [illegible] seconds after the [illegible]. L-Band beacon signal was also lost at this time.

F. Results versus Plan:

The flight path of the missile with the exception of [illegible] was as planned up to about X plus 170 seconds. At this time the NSR went off, thus precluding the accomplishment of the terminal guidance objectives. The warhead checks were, however, satisfactorily accomplished as this equipment is battery powered.

G. Instrumentation Results:

Prior to launch, the missile telemetry commutator failed and consequently the majority of telemetry information was lost for the entire flight. Radar tracking was satisfactory as well as Askania coverage and other optical coverage.

H. Discussion:

Certain problem areas were [illegible] during the checkout and flight of this missile which warrant some discussion.

1. The realization that this missile is by no means waterproof is worthy of serious consideration by the contractor.

Environmental testing has been performed on an XGAM-63 including water testing. The missile came through these tests without [illegible]. Apparently with the results of these tests the contractor has not considered the waterproof aspects of the missile.

Examination of the damage inflicted on XGAM-63 NR [illegible] seems to indicate that the main leakage point was at the [illegible]. A study is now in progress by the contractor to determine methods of providing a better seal at this point.

2. The [illegible] itself is being considered for [illegible] after encountering the intermittent [illegible] condition experienced on [illegible] missiles. This trouble [illegible] and the [illegible] of a series of [illegible] certainly seems to be in order [illegible] with this article. A redesign [illegible].

3. The problem of [illegible] [illegible]

[illegible] flight [illegible] It is the [illegible] [illegible]

[illegible]

1. Conclusions:

Failure of the flight was due to power plant shutdown. Absence of telemetry and destruction of the engine upon impact precludes any surmise of the cause of failure. Computations indicate that there was fuel available at the time of shutdown. Examination of the wreckage indicates that the turbine exhaust duct was running hot since there was a singular absence of carbon. A running seal leakage of the oxidizer was suspected but teardown of the pump seal refuted this suspicion.

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APPENDIX -

Telemetry coverage - The following functions were telemetered. Commutations were not sampled because of the failure of the commutator.

ITEM	MEASURED FUNCTION	INSTRUMENT RANGE	SAMPLING RATE
	INERTIAL GUIDANCE		
I.2	Accelerometer signal	±10 DC	
I.4	Ramps signal	0 to 300V DC	
	BUZZING		
F.1	Static pressure - body (vibrotron)	0 - 15 psia	

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APPENDIX II

Direct recording coverage - The following functions were recorded with direct recording equipment in the director aircraft:

GUIDANCE FUNCTIONS

1. TGCS Synchronizer Decoder Rate
2. TGCS Altitude Tracking
3. Director Relay Receiver Discriminator Voltage
4. Director Relay Receiver AGC Voltage
5. Director Relay Antenna Azimuth Position
6. Director Relay Antenna Tilt Position
7. Director Relay Antenna Azimuth Error
8. Director Relay Antenna Tilt Error
9. Polycode Driver Dive Command
10. Polycode Driver Antenna Command
11. Polycode Driver Azimuth Command
12. Command Transmitter Magnetron Current
13. "X" System (115V-400 cps)
14. Director Relay Receiver Threshold Relay Actuation
15. Director Primary 115V (380-1000 cps)
16. Director Primary 115V (380-420 cps)
17. Director Primary 28V DC
18. Adapter Equip. Precision Power Supply Voltage
19. Director Turn Angle
20. Adapter Equip. Range Coincidence
21. Adapter Equip. Enabling Signal
22. Adapter Equip. Angular Coincidence

23. Missile External/Internal Power Transfer

24. Missile Release Control (Supplied for ACS)

25. Director True Heading (A_t from K System)

26. Director Range-Ground Point to Target (R_t from MRUD)

27. Component of Director Ground Speed Directed toward the Target

28. Missile Release Control (Supplied to Release Mechanism from Console)

29. Time Base

DIRECTOR AIRCRAFT FUNCTIONS

30. Director Attitude - Pitch

31. Director Attitude - Roll

32. Director Altitude

33. Director True Airspeed

MISSILE FUNCTIONS

34. Umbilical Separation

35. GAM Alternator Voltage

MISSILE POWER PLANT FUNCTIONS

36. Gas Generator Pressure Switch Pip

37. Fuel Case Pressure Switch Pip

38. Cruise and Bypass Pilot Valve Switch Pip

39. Malfunction Switch

40. Gas Generator Pilot Valve Switch Pip

41. Boost Pilot and Control Valves Switch Pip

Declassified
3 July 68
DB

DISPOSITION FORM

SECURITY CLASSIFICATION (If any)

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FILE NO.	SUBJECT
	Semi-Annual Progress Report

TO HDL-10 | FROM [redacted] | DATE 1 July 1960 | COMMENT NO. 1

1. Submitted herewith is the XGAM-63 Project Engineering report for the period 1 January to 30 June 1960.

a. Accomplishments and Deficiencies:

(1) The first six months of calendar 1960 marked the completion of XGAM-63 launching from the DB-36 and the launching of the DB-47 aircraft as the launching aircraft. Six "D" series missiles were launched from the DB-36, and two "F" series missiles were launched from the DB-47. No missiles were launched from the DB-47, although several launchings were attempted. Of the eight launchings accomplished only two could be considered satisfactory. Five failures were caused by various aircraft malfunctions, and one failure was caused by a roll rate gyro failure. (C)

(2) A second DB-36 and a second DB-47 arrived at Holloman for modification as launching aircraft. Neither of these planes are quite completely changed out as launching aircraft. The two DB-36 aircraft are still at NADC; however, modification instructions have been requested as they are to be modified to the needs of this project. (C)

(3) The great deficiency, in the opinion of this writer, has been found to be low missile reliability (See last XGAM-63 Progress Report). Two unattempted test continue to fail because of failure of components within the Missile System. Furthermore, there has been no significant improvement in reliability in the last six months. It appears extremely doubtful that there will be sufficient improvement in reliability by the completion of the Project Objective I and II to consider the XGAM-63 as operationally practical weapon system. (C)

b. Unresolved and Unresolvable Problem Areas: The previously mentioned Semi-Annual Report has been completed on schedule. However, [redacted] made for use of the Ft. Bliss [redacted] launching of the long range XGAM-63. (C)

c. Significant Personnel and Facilities:

(1) One additional officer was assigned to the project by the Bureau of Aeronautics, the Director [redacted] [illegible] qualified for the increase of responsibility [redacted] [illegible] system will terminate on the 31st of December [redacted] [illegible] Project Officer. [redacted] [illegible] launching aircraft modification. [redacted] [illegible] will continue to participate in [redacted] [illegible] DB-36. (C)

[redacted]

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DD FORM 1 FEB 50 96 REPLACES NAVEXOS FORM 96, 1 OCT 48 WHICH MAY BE USED

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SUBJECT: HADC Semi-Annual Progress Report

(2) The facilities at HADC for testing the XGAM-63 are considered complete, and a maximum firing schedule of approximately one missile launching per week can be supported with presently assigned facilities and personnel. (C)

d. Future Plans and Program: Present official plans call for the launching of 31 XGAM-63's during the remainder of calendar 1955. This is considered to be an unrealistic schedule, and this program will undoubtedly slip at least three months beyond that date. The firing of these 31 missiles will complete the R & D program for objectives I and II. (C)

for Thomas E. Sledge
THOMAS E. SLEDGE, JR., MAJOR, USAF
XGAM-63 Office Chief

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Semi-Annual Progress Report

8 July 1955

EDLAB

EDYR

1. Submitted herewith is the XGAM-63 Project information requested for the HADC Semi-Annual Progress Report:

a. Accomplishments and Deficiencies:

(1) The first six months of calendar 1955 marked the completion of XGAM-63 launchings from the DB-50 and the conversion to DB-36 and DB-47 aircraft as the launching aircraft. Six "D" series missiles were launched from the DB-50, and two "F" series missiles were launched from the DB-36. No missiles were launched from the DB-47, although several launchings were attempted. Of the eight launchings accomplished only two could be considered satisfactory. Five failures were caused by various power plant malfunctions, and one failure was caused by a roll rate gyro failure. (C)

(2) A second DB-36 and a second DB-47 arrived at Holloman for ultimate use as launching aircraft. Neither of these planes are quite completely checked out as launching aircraft. The two DB-50 aircraft are still at HADC; however, disposition instructions have been requested as they are surplus aircraft to the needs of this project. (C)

(3) The greatest deficiencies, in the opinion of this writer, continues to be low missile reliability (See last HADC Semi-Annual Progress Report). Tests and attempted test continue to fail because of various random component failures within the Weapon System. Furthermore, there has been no significant improvement in reliability in the last six months. It appears extremely doubtful that there will be sufficient improvement in reliability by the completion of the Program Objective I and II to consider the GAM-63 an operationally practical weapon system. (C)

b. Resolved and Unresolved Problem Areas: The problem area discussed in the last Progress Report has been resolved in that a satisfactory arrangement has been made for use of the Ft. Bliss range during launchings of the long range GAM-63. (U)

c. Funding, Personnel and Facilities:

(1) One additional officer was assigned to the project for the purpose of evaluating the director guidance system. A rated Observer was assigned in this position for the purpose of conducting actual in flight evaluation of the weapon system with emphasis on the Guidance Operator's functions and problems. In spite of objections by the contractor permission was obtained for this officer to ride in the launching aircraft during tests. This officer has participated in the last three launchings and will continue to participate in future launchings from the DB-36. (C)

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(2) The facilities at HADC for testing the XGAM-63 are considered complete, and a maximum firing schedule of approximately one missile launching per week can be supported with presently assigned facilities and personnel. (C)

d. Future Plans and Program: Present official plans call for the launching of 31 XGAM-63's during the remainder of calendar 1955. This is considered to be an unrealistic schedule, and this program will undoubtedly slip at least three months beyond that date. The firing of these 31 missiles will complete the R & D program for objectives I and II. (C)

THOMAS E. SLEDGE, JR, MAJOR, USAF
GAM-63 Office Chief

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TEST REPORT

ON

XGAM-63

Declassified
30 July 69
AB

Number: 1

Date: 30 June 1955

Missile NR: 2950F

Launching Date: 11 June 1955

Contractor: Bell Aircraft Corporation

Contract Number: W33(038)-ac-14169

System or Project Number: 112A,B,C

Test Directive Number: 5047-Hh

Prepared by:

John E Richards

JOHN E. RICHARDS
Captain, USAF
XGAM-63, Project Officer

Approved by:

Thomas E Sledge

THOMAS E. SLEDGE
Major, USAF
Chief, XGAM-63 Office

55-240

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I. PROGRAM OBJECTIVE:

The purpose of the present series of tests is to complete program Objectives I and II, which are:

Objective I: The development of a weapon system consisting of XGAM-63, a DB-47 director aircraft non-emanating midcourse and an emanating X-Band terminal guidance system, and an atomic warhead.

Objective II: Identical to Objective I except that a DB-36 director aircraft is substituted for the DB-47.

Tests for these two objectives are being conducted simultaneously. A total of 33 missiles is assigned for test at HADC in accomplishment of these two objectives (19 from the DB-47 and 14 from the DB-36). This was the second missile to be launched in the accomplishment of Objective II.

II. TEST OBJECTIVE:

A. The test objectives were:

1. Primary

a. To test the single operator relay-command guidance system and the single axis inertial guidance system.

b. To test the warhead fuzing system.

2. Secondary

a. To check launch separation characteristics.

b. To check pre-launch procedures.

B. Description of flight: The missile was to be launched from a DB-36 director aircraft at a pressure altitude of 42,500 feet. The servo-pilot was to provide roll, pitch and yaw stabilization of the missile; control was to be provided by the altitude controller, the single axis inertial guidance system, and the terminal guidance operator. At a simulated burst point, calculated to be directly over NIP at an altitude of 8,000 feet MSL (3196 feet tapeline over terrain), a detonation signal was to be obtained from the warhead fuzing system. Predicted missile performance was to be as follows:

1. Maximum altitude - 50,000 feet pressure altitude
2. Maximum range - 62.1 nautical miles (launch point to detonation point)
3. Maximum Mach number - 2.42
4. Mach number at simulated burst point - 1.29

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III. TEST CONDITIONS:

This test was conducted under the following conditions:

1. Launch time - 1345 on 11 June 1955
2. Launch heading - 340° true
3. Launch range - 58.5 nautical miles from NIP
4. Launch altitude - 42,500 feet pressure altitude
5. Launch airspeed - 336 knots true air speed (M= .61)
6. Launch aircraft - DB-36H NR 51-5710
7. Weather conditions - Ceiling and visibility unlimited with wind at launch altitude from 273° at 53 knots.
8. Photographic coverage - two T-33 chase aircraft with motion picture cameras; Askania and Mitchell cameras on the entire flight; and fixed motion picture cameras on the launching aircraft.
9. Radar coverage - S-Band and L-Band (Miran) tracking for the entire flight.
10. Telemetry coverage (See Appendix I)
11. Direct recording coverage (See Appendix II).

IV. TEST OPERATIONS:

A. Preparation.

Prior to the test a standards meeting was held between the Contractor representative and HADC Project Office representative for the purpose of establishing minimum conditions to be met before the missile would be launched.

As a result of this meeting the following minimums were established:

1. Terminal Guidance

a. Multiple heading markers shall not be a cause for cancellation, if, in the opinion of the guidance operator, he is able to distinguish the correct heading marker.

b. In the operator's opinion, he should have sufficient return and picture of general land painting at launch altitude which he thinks will permit him to recognize the target.

c. Manual altitude tracking before turbine fire is not acceptable. Since manual track is an emergency operation which may be required after launch, satisfactory automatic operation is required in preparation for launch.

d. The unattended search radar antenna must be in synchronization from minus 6 to minus 3 minutes before launch.

2. Command System

a. Commands must be getting through to the servo system.

b. False commands are permissible if, in the opinion of the operator, the sense of the true command is not obscured.

3. General

a. After turbine fire, complete loss of video will be a cause for cancellation.

b. Askania cinetheodolite coverage is required.

c. Photographic escort aircraft is mandatory.

d. Launch altitude will be 42,500 feet ± 500 feet (Pressure Altitude) and launch Mach number will be .60 ± .025.

B. Check Out.

XGAM-63 NR 50F arrived at HADC on 29 April via a B-50 ferry aircraft from Bell Aircraft Corporation, Buffalo.

This missile was the first to be scheduled for a launch from the B-47 director aircraft. Consequently, several captive flights were conducted in order to perform an extensive airborne check-out of the B-47/XGAM-63 weapon system in preparation for a hot launching. Following are the results of these captive flights.

1. Date of Flight: 13 May. All checks were satisfactorily accomplished with the exception of the relay/video checks. Ground checks revealed that the relay magnetron was erratic in operation. This magnetron was replaced.

2. Date of Flight: 19 May. Trouble was experienced during the relay/video checks. It was found that the relay signal could not be decoded and locked in for proper reception. This condition was intermittent and was worse at high altitudes. Trouble was also encountered in command reception in the missile. This was later traced to a faulty adjustment of the command receiver Automatic Frequency Control (AFC).

3. Date of Flight: 23 May. The same intermittent interference in the relay/video system was experienced as on the last flight. No cause for the interference could be found at this time.

4. Dates of Flights: 26 and 27 May. These two flights were engineering check flights, with the B-47 only, for the sole purpose of determining the cause of the airborne relay video interference. The interference was found to have been caused by a thermally operated switch actuating a blower in the relay receiver. This switch and blower were installed for cooling the rectifier tubes in the relay receiver during ground operation. At altitude the unpressurized thermostat had been arcing, thus causing the relay receiver interference. The difficulty was overcome by shorting the thermostat and maintaining continuous blower operation while airborne.

5. Date of Test: 4 June. All checks were satisfactorily accomplished including the relay/video checks.

The B-47/XGAM-63 NR 50F weapon system was now considered ready for a hot launch and preparations were begun for a scheduled launch on 10 June. Unattended Search Radar preflight checks and command calibrations were accomplished without incident. However, during the latter part of the calibrations, severe servo noise was experienced. The noise was traced to a defective gyro on the stable platform requiring that the platform be replaced prior to the weapon system ground check. The weapon system check was accomplished without incident.

The missile was fueled, loaded upon the B-47, and electrical pit checks were accomplished. At this time a discrepency was found in the power plant because of a lack of foresight. A drain line is located in the bottom of the turbine case to provide drainage for any acid accumulation prior to turbine fire. However, when the missile is mounted on the B-47 with a 13° roll, this drain line is no longer located at the lowest point of the system and it is consequently still possible for acid to accumulate. It was decided to change the missile over to the B-36. The change was accomplished in 5 1/2 hours in preparation for a possible 1600 take-off on 10 June. Hazy weather precluded a 10 June launch and the flight was re-scheduled for Saturday, 11 June.

C. Operations

1. 1st Launch Attempt:

The aircraft took-off at 0733 on 11 June. During the pre-launch checks, instrumentation in the aircraft indicated that the missile

roll-rate gyro had stopped. The aircraft landed and ground checks revealed that the gyro was frozen and would not spin under power. The gyro was replaced and takeoff was re-scheduled for 1200, 11 June.

2. Launch.

Aircraft take-off at 1209. Pre-launch checks were accomplished satisfactorily, including the roll-rate gyro check, prior to range coincidence. Multiple heading markers were evident on the terminal guidance indicator but the false markers were intermittent and in bunches.

3. Missile Release and Rocket Fire.

The gas turbine fired and came up to normal speed after range coincidence was achieved. The Automatic Check-out System (ACS) checked and performed all functions except angular coincidence. After a short wait, the pilot ruddered the aircraft through coincidence and the missile was released. Breakaway was clean and the rockets fired normally after the proper delay time.

4. Climb and Mid-Course.

The missile entered the programmed climb and leveled off at about 48,000 feet MSL. The missile maintained a very accurate heading during the climb and cruise. The guidance operator re-established the relay link approximately X plus 120 seconds. The relay signal remained as the ATRAS was switched to the automatic tracking mode. The operator commanded the Unattended Search Radar (USR) ON, but at this time (X plus 160 sec) the relay signal was lost and never picked up again. The missile was observed to enter a very steep premature dive and impacted about 19 miles short of the target.

5. Results versus Plan.

The flight path of the missile was as planned up to X plus 160 seconds. At that time a power plant failure occurred and the missile entered a vertical dive. The USR had been on only a few seconds prior to internal power failure, hence, none of the primary objectives of the flight was achieved. The secondary objectives were achieved.

6. Instrumentation Results.

Telemetry reception was satisfactory throughout the flight. L-Band (Miran) tracking was rather noisy probably because of a weak beacon in the missile. Askania and other optical coverage was satisfactory. Alternator speed and servo hydraulic output instrumentation failed so the only available estimates of turbine speed are at X plus 160 seconds when the 40 volt servo power supply and the alternator regulator ceased to regulate. This is estimated to be between 10,000 and 12,000 RPM of the turbine. Telemetry indicates all three thrust chamber pressures fluctuated between 510 and 460 PSI during the flight. Since these data are commutated no valid statement

[redacted]

can be made as to the cyclic frequency, but the [illegible] would put the frequency at 1.6 seconds per cycle. During the last ten seconds of flight the frequency and magnitude of these oscillations increased, chamber pressure fell off from 500 to 300 PSI for about 2 seconds and then went to zero (See Fig. 11).

D. Discussion

Recovered hardware clearly indicates that the direct cause of failure was the failure of number 4 turbine nozzle. The hot gases escaping from this blossomed nozzle burned out the control vessels and the line to the hydraulic accumulator which actuates the main gas generator propellant valve. This is borne out by the 2-second plateau of 300 PSI chamber pressure immediately prior to shutdown when the turbine was operating on 5 of its 6 nozzles. Estimated turbine speed at this time is between 10,000 and 12,000 RPM as compared to design RPM of 14,700 in cruise condition.

The recovered turbine pump was immediately shipped back to the main plant for teardown and investigation. The actual cause of failure is unknown but several facts are pertinent. Keeping in mind that the turbine gases are burned at a stoichiometric mixture ratio in the gas generator and are cooled to about 1500°F with excess fuel prior to entry into the nozzle collection ring, an excess of oxidizer or a lack of fuel at the diluent injector would create an over-temperature of the turbine gas. Examination of the oxidizer cooled gas generator chamber indicated that no burn-out of the wall had occurred. No flow check was made at this station prior to shipment but has undoubtedly been made at the main plant. The waste gate which varies the turbine back pressure to provide a constant propellant pressure was apparently not bent by an explosion but did appear to be unusually free from soot. Since the nozzle burn-out occurred before the throat, the possibility of a running oxidizer seal leak into the turbine gase (down stream of the throat) is almost eliminated.

The variation of the chamber pressure throughout the flight suggests a pin hole leak of tank pressurizing nitrogen into the line (possibly into the swirl separator). All efforts of the project office to have the Bell Aircraft facility at this station investigate this possibility have been met with postponement because of the heavy work-load involved in cutting the lines out of all tank sections. As of the date of writing this report an order was received from the main plant to accomplish this job. Whether a hypothetical nitrogen leak of the type conjectured could cause generator combustion oscillations and failure of a turbine nozzle remains to be determined.

E. Conclusions:

It is felt that power plant instrumentation is entirely inadequate. In view of the consideration which has been placed on acid solids, an oxidizer inlet pressure should be telemetered. With the presently existing doubt about being able to reach design range with the present expulsion of the fuel tank as compared to the programmed accelerations, the fuel inlet pressure is necessary. From these inlet pressures and the turbine speed the discharge pressures can be inferred. In the event of a shutdown, the

[redacted]

gas generator pressure can be used to indicate whether the fault lies in the turbine or the rest of the system. If some of the aerodynamic data telemetry channels, which are duplicated by Askania coverage, could not be made available, a revision of power plant channels could be made. Telemetering both boost chamber pressures is a luxury that could be eliminated. Operation of the boost chambers can be inferred from acceleration data. While the magnitude of these boost pressures is invaluable, the value of one can be inferred from the other. The chamber pressure values presented in Figure I were taken from one of the three commutated pins on this flight. As long as chamber pressures are commutated, the precise instant of shutdown cannot be determined and if no other channels can be made available, one of these chamber pins for each chamber could have been made available for additional information.

F. Recommendations

It is recommended that the telemetered instrumentation program for future flights be reviewed by the Joint Project Office at WADC in conjunction with Bell Aircraft to determine the justification for each piece of information presently planned as compared to the justification for power plant instrumentation presented in conclusions above.

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APPENDIX I

The following functions were telemetered (key: C= continuous, S, 2S or 3S - commutated at 5, 10 or 15 samples/second respectively)

ITEM	MEASURED FUNCTION	INSTRUMENT RANGE	SAMPLING RATE
GUIDANCE			
G.1	USR crystal current	0 to 0.5 ma	S
G.2	USR magnetron current	0 to 30 ma	S
G.3	USR AGC voltage	0 to -5V DC	S
G.4	USR L.V. power supply	0 to 30V DC	S
G.5	Pitch command channel output	75 to 105V DC	S
G.6	Azimuth command channel output	75 to 105V DC	S
G.7	Antenna command channel output	75 to 105V DC	S
G.8	Command signal strength	0 to -2.5V DC	S
G.9	Relay transmitter power	0 to 3V DC	S
G.10	Relay H. V. power supply	0 to +1800V DC	S
G.11	Relay +250V power supply	0 to +250V DC	S
G.12	Relay -300V power supply	0 to -350V DC	S
G.13	Relay crystal shutter	0 to 28V DC	S
G.14	Relay video output	0 to 1V DC	S
G.15	USR repeller voltage	-125 to -150V DC	S
SERVO			
S.1	Angle of pitch	± 67.5°	C
S.2	Angle of yaw	± 30°	S
S.3	Angle of roll	± 90°	C
S.4	Elevator position	-22° to + 33°	S,C

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Appendix I (Cont'd)

ITEM	MEASURED FUNCTION	INSTRUMENT RANGE	SAMPLING RATE
SERVO			
S.5	Rudder position	± 33°	S
S.6	Right aileron position	± 16.5°	S
S.7	Left aileron position	± 16.5°	C
S.8	Hydraulic pump discharge pressure	0 - 4000 psi	2S
S.9	Hydraulic flow rate	0.9 to 9.0 gpm	C
S.10	5.4kc oscillator voltage	32 to 42V AC	S
S.11	Spin drive armature voltage	0 to 70V DC	S
S.12	28 volt DC source	0 to 32V DC	S
S.13	Search antenna pitch error signal	± 0.5V AC	S
S.14	Relay antenna position	+15° to -60°	S
INERTIAL GUIDANCE			
I.1	Platform error signal	± 1.5V AC	C
I.2	Accelerometer signal	± 1V DC	C
I.3	Velocity signal	0 to 300V DC	2S
I.4	Range signal	0 to 300V DC	C
I.5	Dive command signal	0 to 28V DC	2S
I.6	± 300V power supply	250 to 350V DC	2S
POWER PLANT			
P.1	Chamber pressure - boost (upper)	0 - 600 psi	3S
P.2	Chamber pressure - boost (lower)	0 - 600 psi	3S

Appendix I (Cont'd)

ITEM	MEASURED FUNCTION	INSTRUMENT RANGE	SAMPLING RATE
POWER PLANT			
P.3	Chamber pressure - cruise	0 - 600 psi	3S
P.4	Nitrogen source pressure	1200 ± 200 psi	2S
P.5	Pump speed (alternator frequency)	0 - 600 cps	S
FUZING			
F.1	Static pressure - body (vibrotron)	0 - 15 psia	C
F.2	Static pressure - probe (vibrotron)	0 - 15 psia	C
F.3	Arming baro (MC-273)	0 or 28V DC	2S
F.4	Timer outputs #1 and #2	0 or 28V DC	S
F.5	Fuzing baro (MC-5)	0 or 28V DC	
F.6	Impact fuze network #1 (MC-300)		
F.7	Impact fuze network #2 (MC-300)		
MISCELLANEOUS			
M.1	Vertical acceleration - fore	± 7.5g	C
M.2	Vertical acceleration - aft	± 7.5g	C
M.3	Lateral acceleration - fore	± 5g	C
M.4	Lateral acceleration - aft	± 5g	C
M.5	Longitudal acceleration	± 2g	C
M.6	Rate of roll	± 150°/sec.	2S
M.7	Angle of attack	± 15°	S
M.8	Angle of sideslip	± 15°	S
M.9	Alternator output voltage	0 to 150V AC	S
M.10	5.4 volt reference battery	0 to 5.4V DC	S
M.11	Ram pressure	0 to 40 psia	C

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APPENDIX II

Direct recording coverage: The following functions were measured with direct recording equipment in the director aircraft:

GUIDANCE FUNCTIONS

1. TGCS Synchronizer Decoder Rate
2. TGCS Altitude Tracking
3. Director Relay Receiver Discriminator Voltage
4. Director Relay Receiver AGC Voltage
5. Director Relay Antenna Azimuth Position
6. Director Relay Antenna Tilt Position
7. Director Relay Antenna Azimuth Error
8. Director Relay Antenna Tilt Error
9. Polycode Driver Dive Command
10. Polycode Driver Antenna Command
11. Polycode Driver Azimuth Command
12. Command Transmitter Magnetron Current
13. "K" System (115V 400 cps)
14. Director Relay Receiver Threshold Relay Actuation
15. Director Primary 115V (380-1000 cps)
16. Director Primary 115V (380-420 cps)
17. Director Primary 28V DC
18. Adapter Equipment Precision Power Supply Voltage
19. Director Turn Angle
20. Adapter Equipment Range Coincidence
21. Adapter Equipment Enabling Signal

Appendix II (Cont'd)

GUIDANCE FUNCTIONS

22. Adapter Equipment Angular Coincidence
23. Missile External/Internal Power Transfer
24. Missile Release Control (Supplied from ACS)
25. Director True Heading (from K-System)
26. Director Range-Ground Point to Target (R_t from MRNC)
27. Component of Director Ground Speed Director toward the Target
28. Missile Release Control (Supplied to Release Mechanism from Capsule)
29. Time Base

DIRECTOR AIRCRAFT FUNCTIONS

30. Director Attitude - Pitch
31. Director Attitude - Roll
32. Director Altitude
33. Director True Airspeed

MISSILE FUNCTIONS

34. Umblical Separation
35. GAM Alternator Voltage

POWER PLANT DATA

50F FINAL FLIGHT 6-11-55

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FIG 1

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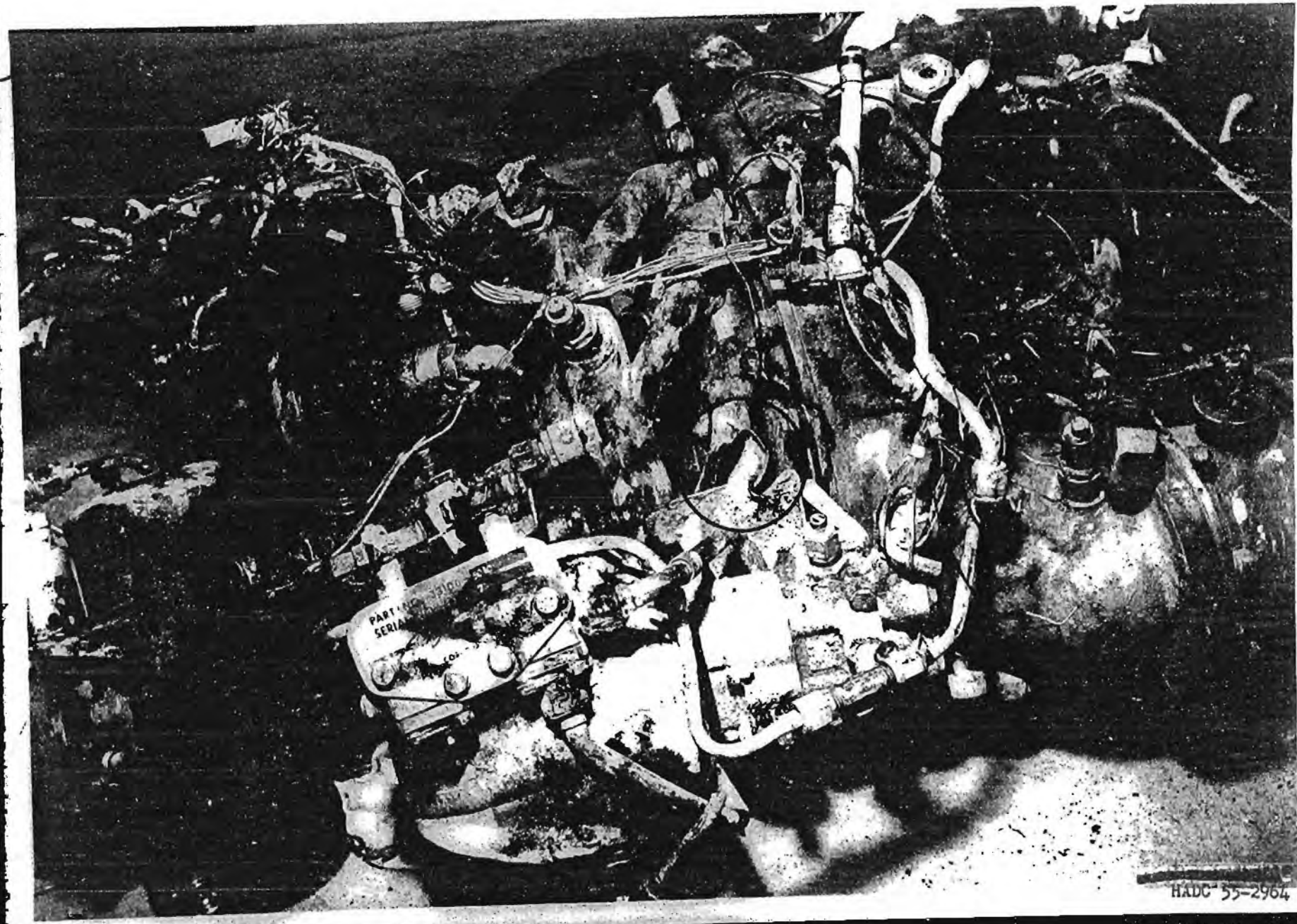
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3 July 69
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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM-63, System NR 112A, Project Priority 1-A, Precedence Rating II-3, For Week Ending 26 June 1955. Program Stage NR 4, Program Objective: To test the propulsion system; to evaluate the single operator guidance station; to test the single axis inertial system and the warhead components. Preliminary reports issued during period: None. Agency conducting test: Bell Aircraft Corporation. (~~Confidential~~)

1. Check-out Operations: (~~Confidential~~)

a. XGAM-63 NR 51F: This missile was ferried back to Bell Aircraft Corporation, Buffalo, New York, on 24 June for oxidizer tank repair.

b. XGAM-63 NR 52F: This missile was in standby status awaiting shipment to the contractors plant for replacement of oxidizer tank.

c. XGAM-63 NR 53F: This missile was scheduled for a hot launch on 21 June. During the pre-launch checks several discrepencies occurred. The terminal guidance monitor scope lost its high voltage thus making it impossible to determine whether the automatic altitude tracking system was functioning properly. Even though this would have meant a compromise in the terminal guidance phase of the flight, it was decided to continue with the mission.

The guidance operator experienced difficulty in finding the radar aim-point and consequently it was found that the aim-point had been placed in the wrong position. It was then discovered that the road block was in a wrong position and range safety officials ordered the flight cancelled.

The flight was rescheduled for 24 June. Take-off on the 24th was delayed two hours because of a leaky hydraulic reservoir, which was replaced.

During the pre-launch checks, extreme difficulty was experienced in maintaining command contact. The condition could not be corrected and the flight was again cancelled.

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Ground checks revealed no command system discrepencies; however the command transmitter was replaced. Subsequent command checks were satisfactory.

The flight was rescheduled for 27 June.

d. XGAM-63 NR 54F: Electrical pre-flight checks were started on this missile prior to a scheduled launching on 30 June.

e. XGAM-63 NR 55F: This missile arrived at HADC on 23 June. Receiving inspections have been accomplished.

f. F-80 NR 48-848: This aircraft is in standby status.

g. B-47 NR 51-5220: The command transmitter was replaced in this aircraft in hopes of correcting command system discrepencies in connection with XGAM-63 NR 53F.

h. B-50 NR 48-11 and B-50 NR 48-075: These aircraft are still in standby status awaiting bailment termination from WADC.

i. B-47 NR 51-5219, B-36 NR 51-5710 and B-36 NR 51-5706: Normal maintenance and servicing were accomplished on these aircraft.

2. Test Operations:

No successful test operations were accomplished during this period.

3. General:

a. Aircraft used and hours flown:

B-47 51-5220 5 hours

b. Contractor personnel: 181 permanent, 21 temporary

c. Project personnel: 5 Officers

d. Number of visitors (Not assigned to HADC): None

4. Conclusions and Recommendations: None

John E Richards
JOHN E. RICHARDS
Captain, USAF
XGAM-63 Project Officer

for R W Kinney Major USAF
JOHN G. HEMANS
Lt. Col, USAF
Director of Test and Evaluation

NOTICE

The HADC Weekly Test Status Report which you have been receiving is being discontinued. It is being replaced by a Test Report which will be written on each individual test. The purpose is to keep you better informed on the test program by presenting timely and meaningful information on each specific test accomplished.

The Test Report will be written no more than ten working days after a test date. When no tests are scheduled on a project for a period of thirty days, a Test Report will be written every two weeks in order to keep you informed of the preparations that are being made.

The format of the Test Report is as follows:

I. Program Objective - Reference the specific test to a task or phase of the program.

II. Test Objective - Indicate the parameters to be measured.

III. Test Conditions - Give the physical conditions to be met. (Mach number, altitude, etc.)

IV. Test Operations:

A. Preparation - What has been going on prior to test?

B. Operations - How was the test conducted?

C. Results vs. Plan - What happened vs. what was supposed to happen?

D. Discussion - Comments on above plus conclusions and recommendations on the specific test.

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

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3 July 69
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WEEKLY TEST STATUS REPORT

Report on XGAM-63, System NR 112A, Project Priority 1-A, Precedence Rating II-3 For Week Ending 19 June 1955. Program Stage NR 4, Program Objective: To test the propulsion system, to evaluate the single operator guidance station, to test the single axis inertial system and the warhead components. Preliminary reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. ([redacted])

1. Check-out Operations: ([redacted])

a. XGAM-63 NR 51F: This missile was scheduled to be launched on 14 June. It was fueled on 12 June but during the electrical pit checks on 13 June several discrepencies appeared. The telemetry equipment would not come on in the missile and the missile fin fold system would not work. The missile had to be unloaded from the B-36 and the warhead door taken off. Examination revealed a broken telemetry plug and a leaking hydraulic accumulator. The plug was replaced with a new one. Thinking that replacement of the accumulator would take considerable time, the contractor personnel requested cancellation of the 14 June range time. Actually, the work was completed in time because of extreme good fortune but another mission had already taken the range time. The flight was re-scheduled for 15 June.

Prior to takeoff time on 15 June, a pressure leak was discovered in the command assembly can. The leak was repaired but the time involved in replacing the access door caused the aircraft to be late in taxiing for the takeoff. By this time the normal one-hour mission slide time had been used, and Mission Control cancelled the mission. Further range time could not be obtained the rest of that day or on the following day, 16 June. The flight was re-scheduled for 17 June in range time originally scheduled for the launch of XGAM-63 NR 53F.

The aircraft took off at 1100 on 17 June. Trouble was encountered during the pre-launch checks. Telemetry would not turn on and the guidance operator experienced difficulty in maintaining automatic altitude track. Conditions would not improve and it was decided to again cancel the launching.

By this time the acid in the missile had an excess iron content. Consequently, the decision was made to drain and flush this missile and re-schedule it later.

Ground checks revealed that the telemetry troubles were due to a weak battery. The altitude tracking difficulties are still being investigated. ([redacted])

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b. XGAM-63 NR 52F: The weapon system check was accomplished on this missile in conjunction with B-36 NR 51-5710. (~~Confidential~~)

c. XGAM-63 NR 53F: The weapon system check was accomplished on this missile in conjunction with B-47 NR 51-5220. (~~Confidential~~)

d. XGAM-63 NR 54F: Unattended Search Radar pre-flight checks were successfully completed on this missile. (~~Confidential~~)

e. F-80 NR 48-848: This aircraft is in standby status. (Unclassified)

f. B-50 NR 48-111 and B-50 NR 48-075: These aircraft are still in standby status awaiting bailment termination from WADC. (Unclassified)

g. B-47 NR 51-5220, B-36 NR 51-5710 and B-36 NR 51-5706. Normal maintenance and servicing were accomplished on these aircraft. (Unclassified)

h. B-47 NR 51-5219: This aircraft arrived at HADC on 18 June for duty as a director aircraft. (Unclassified)

2. Test Operations:

No test operations were accomplished during this period.

3. General:

a. Aircraft used and hours flown:

B-36	51-5710	3 hours	20 minutes
F-80	48-848		20 minutes

b. Contractor personnel: 178 permanent, 30 temporary

c. Project personnel assigned: 5 Officers, 1 Airman

d. Number of visitors (Not assigned to HADC): None

4. Conclusions and Recommendations: None

John E Richards
JOHN E. RICHARDS
Captain, USAF
XGAM-63 Project Officer

for A W Kenney, Major USAF
JOHN G. HEMANS
Lt. Col., USAF
Director of Test and Evaluation

The reason for the overall ~~Confidential~~ classification of this report is the XGAM-63 guidance and controls details are Confidential.

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3 July 69
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Report on XGAM-63, System NR 112A, B, and C, Project Priority 1A, Test Vehicle Rating II-3 For Week Ending 12 June 1957. Program Stage III b.

Program objectives: To test the propulsion system, to evaluate the single operator guidance station, and to test the single axis inertial system and the warhead components. Preliminary reports issued during period: None.

Agency conducting tests: Bell Aircraft Corporation. (Contractor)

1. Check-out Operations: (Confidential)

a. XGAM-63 NR 47F: This missile was drained of all fuel and oxidizer and ferried back to Bell Aircraft Corporation, Buffalo, for examination for possible causes of acid deterioration. (Unclassified)

b. XGAM-63 NR 50F: This missile was scheduled to be launched on 10 June from the B-47. The missile was fueled, loaded upon the B-47 and electrical pit checks were accomplished. At this time a discrepancy was found in the power plant because of a lack of foresight. The drain line is located in the bottom of the turbine case to provide drainage for any acid accumulation prior to turbine fire. However, when the missile is mounted on the B-47 with a 13° roll, this drain line is no longer located at the lowest point in the system and it is consequently possible for acid to accumulate in the turbine case. Thus, with the possibility of acid accumulating in the exhaust duct, it was decided to change the missile over to the B-36. The change was accomplished in 5 1/2 hours in preparation for a possible 1600 take-off on 10 June. Poor weather precluded a 10 June launch and the flight was re-scheduled for Saturday, 11 June.

During the pre-launch checks on 11 June, recently added instrumentation showed that the roll rate gyro was malfunctioning. The aircraft landed and ground checks revealed that the gyro was frozen and would not spin under power. The gyro was replaced and the aircraft took off for the second time. The missile was launched, the results of which are explained in the following section. (Confidential)

c. XGAM-63 NR 51F: The power plant was replaced because of a faulty turbine seal found prior to the scheduled launch on 8 June. The flight was rescheduled for 14 June. (Confidential)

d. XGAM-63 NR 52F: Unattended Search Radar (USR) pre-flight [illegible] were accomplished without incident. (Confidential)

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[redacted]

h. B-50 NR 48-111 and B-50 NR 48-075: These aircraft are still in standby status awaiting ballcont contract termination from WADC. (Unclassified)

i. B-47 NR 51-5220, B-36 NR 51-5730 and B-36 NR 51-5700: Normal maintenance and servicing were accomplished on these aircraft. (Unclassified)

2. Test Operations: ([redacted])

a. XGAM-63 Launch:

(1) Date of Test: 11 June 1955.

(2) Aircraft Involved: B-36 NR 51-5710 and GAM-63 NA 56F.

(3) Purpose of Test: (a) To test the single operator relay-command guidance system and the single axis inertial guidance system and (b) to test the warhead fusing system and (c) to check pre-launch procedures.

(4) Description of Test: The launch aircraft flew at the launch altitude of 42,500 feet for one dry run and the hot run. The launch heading was 343° true and the range-to-target was 62.1 nautical miles. All pre-launch checks were accomplished without incident. The Automatic Checkout System ran completely thru its problem and achieved angular coincidence thru the autopilot. The missile separated cleanly and rocket fire was normal. A programmed climb was accomplished to approximately 50,000 feet. The guidance operator established the relay/command link and turned on the USR. Normal video presentation was achieved for a few seconds until approximately X plus 160 seconds. At this time all internal power was lost in the missile. The missile entered a near-vertical dive and impacted 19 miles short of the target.

(5) Results of Test: Telemetry indicates that the cruise chamber pressure dropped prematurely leading to the consensus that available fuel was consumed prior to normal cutoff.

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Weekly Test Status Report, XGAM-63, 12 June 1953.

b. Schedule of Test Operations for following week:

(1) B-36 NR 51-5710 and XGAM-63 NR 53F Not Flown, 12 June 1953.

(2) B-36 NR 51-5710 and XGAM-63 NR 53F Not Flown, 17 June 1953.

3. General:

a. Aircraft used and hours flown:

B-36	51-5706	3 hours	
B-36	51-5710	3 hours	15 minutes
B-47	51-5220	1 hour	19 minutes
F-80	48-8184		40 minutes

b. Contractor personnel assigned: 173 permanent, 27 temporary

c. Project personnel assigned: 5 officers, 1 airman

d. Number of visitors (Not assigned to WADC): None

4. Conclusions and Recommendations: None

The reason for the overall Confidential classification of this report is the XGAM-63 guidance and control details are Confidential.

JOHN E. RICHARDS
Captain, USAF
XGAM-63 Project Officer

FOR

for JOHN G. HEMANS
Lt Col, USAF
Director of Test and Evaluation

A W Kinney Major USAF

WADC 55-274

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Declassified 3 July 69 AB

HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM-63, Systems NR 112A, B and C, Project Priority 1-A, Precedence Rating II-j, For Week Ending 5 June 1955. Program Stage NR 4. Program objectives: To test the propulsion system, to evaluate the single operator guidance station, and to test the single axis inertial system and warhead components. Preliminary reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Check-out Operations: (Confidential)

a. XGAM-63 NR 47F: This missile had been re-scheduled for a launch on 3 June; however, on 2 June the oxidizer was found to have deteriorated far out of specifications. The flight was again cancelled and extensive investigation was begun on the acid situation. (Confidential)

b. XGAM-63 NR 50F: Severe servo noise in this missile was traced to a defective gyro on the stable table. The table was replaced prior to a weapon system check with the B-47. (Confidential)

c. XGAM-63 NR 51F: Command calibrations and weapon system check were accomplished on this missile without incident. (Unclassified)

d. XGAM-63 NR 52F: This missile was in standby status awaiting the firing of missile NR 51F. (Unclassified)

e. XGAM-63 NR 53F: Unattended Search Radar pre-flight checks were accomplished without any discrepancies. (Confidential)

f. XGAM-63 NR 54F: This missile arrived at HADC on 2 June. Receiving inspections have been accomplished. (Unclassified)

g. F-80 NR 48-684: This aircraft is in standby status. (Unclassified)

h. B-50 NR 48-111 and B-50 NR 48-075: These aircraft are still in standby status awaiting bailment contract termination from WADC. (Unclassified)

i. B-47 NR 51-5220, B-36 NR 51-5710, B-36 NR 51-5706: Normal maintenance and servicing were accomplished on these aircraft. (Unclassified)

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Weekly Test Status Report, XGAM-63, 5 June 1955.

2. Test Operations: ~~(Confidential)~~

a. XGAM-63 Captive Flight:

(1) Date of Test: 4 June 1955

(2) Aircraft Involved: B-47 NR 51-5220 and XGAM-63 NR 50F

(3) Purpose of Test: To perform an airborne check-out of the weapon system prior to a hot launching.

(4) Description of Test: The aircraft flew at 38,000 feet and made several simulated and hot runs along the launch azimuth.

(5) Results of Test: All checks went exceptionally well except that again trouble was experienced in retracting and extending the aircraft relay antenna. The relay receiver interference encountered on previous flights was not present on this flight.

b. Schedule of Test Operations for Following Week:

(1) B-36 NR 51-5710 and XGAM-63 NR 51F Hot Flight, 8 June 1955

(2) B-47 NR 51-5220 and XGAM-63 NR 50F Hot Flight, 10 June 1955

3. General:

a. Aircraft used and hours flown:

B-47 NR 51-5220 2 hours

F-80 NR 48-848[illegible] 55 minutes

b. Contractor personnel assigned: 173 permanent, 23 temporary.

c. Project Personnel assigned: 5 Officers, 1 Airman.

d. Number of visitors (Not assigned to HADC): 2 military
1 civilian

4. Conclusions and Recommendations: None.

John E Richards

JOHN E. RICHARDS
Captain, USAF
XGAM-63 Project Officer

for A W Kenney Major USAF

JOHN G. HEMANS
Lt. Col., USAF
Director of Test and Evaluation

The reason for the overall Confidential classification of this report is the XGAM-63 guidance and control details are Confidential.

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HADC 55-2625

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

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WEEKLY TEST STATUS REPORT

Report on XGAM-63, System NR 112A, Project Priority 1-A. Precedence Rating II-3 For Week Ending 29 May 1955. Program Stage NR 4. Program Objectives: To test the propulsion system, to evaluate the single operator guidance station, to test the single axis inertial system and the warhead components. Preliminary reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (~~Confidential~~)

1. Check-out Operations: (~~Confidential~~)

a. XGAM-63 NR 47F: The launch of this missile was again cancelled on 23 May during pre-launch checks. The instrumentation added in the director to monitor the roll rate gyro operation gave indications that the gyro was malfunctioning. Subsequent ground checks revealed that the gyro was all right but that the missile inertial guidance inverter did not have a regulated output. Further checks traced the trouble to the regulator unit on the inverter. This unit was replaced and the flight was rescheduled for 25 May.

During the pre-launch checks on 25 May, command contact could not be established. After several attempts, it was realized that the waveguide switch in the director relay/command antenna was not functioning. The aircraft was depressurized while a guidance operator manually operated the waveguide switch on the retracted antenna. Several more attempts were made to establish command contact, all of which failed. Again the mission was cancelled and the aircraft landed.

Upon landing, the guidance operators realized that perhaps the reason for command failure during the time when the waveguide switch was manually operated was that the relay antenna was retracted into the aircraft. Command checks on the ground proved that this was the reason; an operator oversight.

Examination of the power plant after this last flight revealed a small acid leak in the start tank line. This necessitated de-fueling the missile for the second time, removal of the power plant, purge of the engine and tanks, and replacement of the start tank.

The launch has been re-scheduled for 3 June.

b. XGAM-63 NR 50F and XGAM-63 NR 51F: These missiles were in standby status.

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c. XGAM-63 NR 53F: This missile arrived at HADC on 26 May. Receiving inspections were accomplished.

d. F-80 NR 48-8484: This aircraft is in standby status.

e. B-50 NR 48-111 and B-50 NR 48-075: These aircraft are still in standby status awaiting bailment contract termination from WADC.

f. B-47 NR 51-5220: The thermal switch in the relay receiver which activates a blower was paralleled with a manual switch in order that the blower could run continuously while in flight. (See Test Operations below)

g. B-36 NR 51-5706 and B-36 NR 51-5710: Normal maintenance and servicing were accomplished on these aircraft.

2. Test Operations: ~~(Confidential)~~

a. XGAM-63 Captive Flight:

(1) Date of Test: 23 May 1955.

(2) Aircraft Involved: B-47 NR 51-5220 and XGAM-63 NR 50F.

(3) Purpose of Test: To perform an airborne check-out of the weapon system prior to a hot launching.

(4) Description of Test: The aircraft flew at 38,000 feet and made several simulated dry and hot runs along the launch azimuth.

(5) Results of Test: All systems worked satisfactorily except for severe relay/video interference which has been experienced on previous captives. No cause could be found for the interference.

b. B-47 Engineering Check Flights: (Confidential)

(1) Date of Tests: 26 and 27 May 1955.

(2) Aircraft Involved: B-47 NR 51-5220.

(3) Purpose of Tests: These flights were flown for the sole purpose of determining the cause of airborne relay receiver interference that had been experienced during several B-47 captive flights.

(4) Description of Tests: The aircraft was flown off range while the relay receiver was checked for proper operation.

(2) Results of Tests: The unsatisfactory [illegible] caused by a thermally operated switch actuating a blower in the relay receiver. This switch and blower were used for cooling the rectifier tubes in the relay receiver during ground operation. At altitude the unpressurized [illegible] has been cooling. This difficulty has been overcome by the thermostat and maintaining [illegible]

b. Schedule of Test Operations for Following Weeks:

B-36 MR 51-5710 and XGAM-63 MR 47P: Not Flt Rdy. 3 June 57

3. General: (Unclassified)

a. Aircraft used and hours flown:

B-36 MR 51-5710 6 hours, 45 minutes

C-47 MR 51-5220 12 hours, 20 minutes

b. Contractor personnel assigned: 171 permanent, 10 temporary

c. Project Personnel assigned: 5 officers, 1 airman

d. Number of visitors (Not assigned to MADC): None

4. Conclusions and Recommendations: None

The reason for the overall Confidential classification of this report is the XGAM-63 guidance and control details are Confidential

JOHN F. RICHARDS
Captain, USAF
XGAM-63 Project Officer

JOHN C. HELMS
Lt. Col., USAF
Director of Test and Evaluation

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GAM-63 BRIEFING

(Delivery time approximately 30 minutes.)

Project MX-776 was initiated in 1946 as a study program leading to the development of a subsonic air-to-surface missile. The requirements were subsequently changed to make the pilotless bomber, commonly known as Rascal, a supersonic missile. A development program was immediately begun.

The great cost of a Rascal missile dictated an initial development program incorporating a scaled down research test vehicle. The missile, known as the Shrike, was used to solve many problems in stability and control, propulsion, handling, test and checkout of pilotless aircraft, launch procedures, etc. Development of Shrike was begun early in 1948 and the Rascal development program was changed to development of Rascal guidance only.

In December of 1949, the full Rascal development program was again initiated. Shortly thereafter, the project was assigned a 1-A priority and in August 1950 it was substantially accelerated. In December 1951, the Air Force announced that the production missile would be designated the B-63.

In February of 1952 the program was reoriented to attain a B-63 for operational use by the military in 1955. The program reached a major milestone in September of 1952 when the first Rascal was released from a B-50 director aircraft to fly under its own power. In January 1953, the Shrike flight program, which included 28 missiles, was successfully completed. The experience gained from this program is now being applied to the Rascal development.

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The GAM-63 pilotless parasite bomber has an overall length of 32 feet, a body diameter of 4 feet, and a gross weight of approximately 18,500 pounds, half of which is fuel. Structurally, the GAM-63 consists of five major sections: radome, forward body, warhead compartment, center body and aft body. These divisions are based on functional requirements as well as component accessibility and ease of shipment.

For its specific employment in the Weapon System, the GAM-63 missile comprises four closely integrated component systems: (1) a guidance system to direct it to the target, (2) a servo system for flight stabilization and control, (3) a rocket propulsion system to accelerate it to supersonic speeds and (4) armament for target destruction.

These systems are encompassed by the Rascal airframe which combines a cylindrical semi-monocoque fuselage with a canard cruciform wing configuration.

Operationally, the GAM-63 will be launched from B-36 and B-47 aircraft. It will be launched at altitudes in the vicinity of 40,000 ft., climb to 60,000 ft. for cruise, and then enter a 30 degree to the horizontal dive to the target. Range is intended to be 90 nautical miles, cruising speed from Mach 2 to Mach 2.5 and impact velocity about Mach 1.5. Total time of flight will be on the order of 4.5 minutes. The desired accuracy is for 50% of the missiles fired to fall within 1500 feet of vertical line through the target and within ± 500 feet of a predetermined altitude.

The GAM-63 will be capable of carrying a 3000 pound warhead, either atomic, chemical, or biological. In the research and development missiles, the space allocated for the warhead is used to house telemetry equipment.

GUIDANCE SYSTEM

Guidance of the Rascal Weapon is accomplished by a modified K-4 navigation

system in the director aircraft, an inertial system in the GAM-63, and a track and command radar system, components of which are located in both the GAM-63 and the director aircraft.

The director aircraft is navigated to the IPB launch point by means of a modified K-series radar system which continuously determines location with respect to known geographical points, computes heading to and distance from the target, provides accurate continuous ground speed, and prepares the foregoing information so that it can be supplied as initial condition data to the inertial system of the Rascal when it is launched.

From launch point to the terminal dive point the missile is guided by a homemanating inertial system. Components include an autopilot which maintains stability and holds the pre-established course in azimuth, altitude-sensing circuit to establish the climb to altitude, and a single-axis range computer which measures distance traveled and initiates terminal dive.

As the 30 degree terminal dive is initiated, the unattended search radar (USR) in the nose of the missile is automatically activated and scans the area ahead of the missile over a 150 degree sector. Radar return from the target and surrounding area, complete with indication of missile position and heading, is sent to the director aircraft via a microwave link. In the director aircraft, the relayed radar information is displayed on a PPI scope from which suitable data are obtained for missile flight path corrections.

After the position of the missile relative to the target has been ascertained, the guidance operator determines what corrections, if any, must be made to the flight path. Corrections in pitch and azimuth are calculated automatically by simple computers as the guidance operator lines up cursors on the radar display in coincidence with the target. Then, by means of the relay and

command equipment in the director aircraft, these corrections are transmitted to the missile where they override the controlling servo system thereby insuring high-precision target acquisition.

SERVO SYSTEM

Rascal Servo Systems stabilize and maneuver the missile about its three major axes. In addition, servo-mechanisms are used to maintain the relay antenna of the missile continuously focused on the director aircraft, to stabilize the unattended search radar antenna, and to provide a pitch-stabilized reference platform for the single-axis inertial system.

The pitch stable platform provides the vertical reference required for the autopilot and the antenna servos. Since the inertial guidance system utilizes the twice-integrated output of an accelerometer to measure ground distance traveled by the missile, the attitude of the accelerometer is maintained by the pitch stable platform so that only accelerations along the projection of the flight path in a horizontal plane are measured. Should the normal to the stable platform not correspond to the vertical, an error signal causes the servo control motor to drive the platform to its proper horizontal position.

The autopilot uses information from the vertical gyro and the pitch stable platform to maintain pitch and roll stability. To satisfy relay antenna requirements, the missile is held to minimum roll so that yaw maneuvering is accomplished by flat, skidding turns. In addition to stabilized flight, the autopilot controls the missile flight path to a predetermined altitude, maintains constant altitude, and obeys the dive signal from the guidance operator.

The antenna of the unattended search radar (USR) in the nose of the missile is pitch stabilized with respect to the stable platform so that uniform coverage of the earth's surface ahead of the missile is obtained. To eliminate

the effects of yawing motions of the missile and to satisfy navigational requirements, the USR antenna is rotated at a constant angular velocity about a vertical axis.

As the GAM-63 follows the climb, cruise, and dive called for in its flight plan, a servo system stabilizes and orientates the relay antenna which transmits a directed beam of X-beam signal to the director aircraft.

An additional function of the servo system is to limit maneuvering accelerations. The design of the pilotless parasite bomber had been based on the requirement that the airframe withstand maximum loads of $\pm$ 6g in the vertical plane and $\pm$3g in the horizontal plane. So that these values are not exceeded, g- limiting accelerometers are coupled into the servo system. Once the load limit has been reached, accelerometers prevent control surface movement in the direction producing additional load.

PROPULSION SYSTEM

The Rascal is powered by a rocket power plant which uses a non-hypergolic (not self igniting) propellant combination, gasoline or JP-4 as fuel and white fuming nitric acid as oxidizer. For ignition, a hydrazine slug precedes the fuel into the combustion chamber to form with the oxidizer a self-igniting mixture.

The rocket engine consists of three identical thrust chambers that are regeneratively cooled. Each chamber has a 4000 pound thrust rating at an altitude of 40,000 feet and 500 psi chamber pressure. Other power plant components are the fuel pressurizing system, the turbine pump, and the propellant valves and tanks.

The propellants are supplied under pressure to the thrust chambers by a turbine pump driven by a gas generator. The gas generator, essentially

a small thrust chamber, operates on propellants from the turbine pump discharge. The same propellant supply is used for both the gas generator and the thrust chambers. For starting, however, the propellants are fed to the gas generator from pressurized start-tanks and are electrically ignited. The oxidizer and fuel pumps are located on opposite sides of the turbine wheel and are driven at turbine speed. An alternator and a hydraulic pump are also driven by the turbine through a reduction gear box.

Tube bundles, which store nitrogen gas at 6000 psi, are located between the propellant tanks, in the warhead compartment, and behind the search radar antenna. After undergoing a two-stage reduction, this gas is used to pressurize the propellant tank to 55 psi, thus supplying propellants under pressure to prevent fuel or oxidizer pump cavitation.

The propellant tanks are integral parts of the airframe and have capacities of 615 gallons of oxidizer and 295 gallons of fuel. Propellant loading is accomplished at high speeds without spillage by means of quick-disconnecting lines in separate, closed propellant systems.

In a typical flight plan, the missile is launched from the director aircraft with all three thrust chambers operating to accelerate it to supersonic speed. During this boost period the missile climbs from 40,000 feet and enters the cruise phase at an altitude of 60,000 feet and a Mach number of 2.0. After attaining cruise velocity, two thrust chambers shut down while the third remains in operation and increases missile Mach number to 2.4 at end of cruise. As the missile enters the terminal dive, this thrust chamber is shut down, but the turbine pump assembly continues to operate on remaining propellants to supply hydraulic and electrical power to impact.

ARMAMENT

The Rascal weapon has been designed to accommodate warheads up to 3000 pounds. Warheads weighing 5000 pounds may be carried as overload. Atomic warheads have the first priority followed by chemical and biological warheads.

The warhead is carried in a section of the GAM-63 aft of the forward wing and forward of the oxidizer tanks. The lower part of the airframe section serves as a structural door for warhead installation.

Through a sequence of safety features, a fuzing system arms and detonates the warhead. Detonation is triggered by a barometric switch which can be set to close at a particular pressure altitude to satisfy altitude-detonation requirements of various warheads and targets.

TRAINING

F-80 and B-50 aircraft, modified to simulate a B-63 and director aircraft, respectively, have been used as a team for actual air-to-surface training. The guidance operator directs and controls the F-80 in the same manner he would control a B-63 in combat. The F-80/DB-50 flight team can also be used to train support personnel.

PROGRESS AND FUTURE PLANNING

To date, approximately 26 missiles have been launched at HADC. These launchings have borne out the following conclusions:

(1) The thrust developed by the Rascal power plant under actual conditions is essentially as predicted and will be adequate for its intended use.

(2) The servo-airframe combination has demonstrated its ability to maintain three-axis stabilized flight, and to perform the maneuvers which have been required thus far in the evaluation program.

(3) Guidance equipment check-out and development is in progress with the launchings currently scheduled at HADC.

(4) The major problems experienced to date on GAM-63 launchings are power plant and servo malfunctions. Of 26 powered missiles launched, there have been 10 power plant failures and 9 servo failures.

(5) It has been demonstrated that the video presentation obtained from the missile Unattended Search Radar (USR) at 60,000 feet altitude is of the quality that the guidance operator can identify target returns. Three GAM-63 missiles have impacted within the specified CEP of 1500 feet.

The official schedule calls for the following:

(1) Completion of R&D Objectives I and II (RB-47/GAM-63 and B-36/GAM-63) by January 1956. OST to begin January 1956 and completion in January 1957. The first SAC Squadron is scheduled to be operational in 1958.

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3 July 1969
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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM-63, Systems No. 112A,B, and C, Project Priority 1-A. Precedence Rating II-3, For Week Ending 22 May 1955. Program Stage No. 4. Program Objectives: To test the propulsion system, to evaluate the single operator guidance station, to test the single axis inertial system and the warhead components. Preliminary Reports issued During Period: None. Agency conducting tests: Bell Aircraft Corporation. (~~Confidential~~)

1. Check-out Operations:

a. XGAM-63 No. 47F: During the pit checks prior to the scheduled launching on 18 May, the roll rate gyro was found to be inoperative and was replaced. The new gyro checked out when installed; however, personnel at Bell Aircraft, Buffalo, New York, were not satisfied that this would guarantee that it would work in the air; consequently, the flight for 18 May was cancelled until proper instrumentation could be installed in the director, which would aid in checking proper operation of the roll rate gyro while airborne. The flight was rescheduled for 20 May. (~~Confidential~~)

During the pre-launch checks on 20 May, the guidance operator received an indication that the bottom vertical fin was not extended and locked. The fin when locked in place properly should close a series of three micro-switches which in turn provide a circuit to a "fin extend" indicator on the guidance panel. It was felt that the fin was locked but the doubt still existed because of the lack of proper indication. Consequently, the flight was cancelled. (~~Confidential~~)

Ground checks revealed that one of the "fin extend" micro-switches was intermittent in operation because of its being out of alignment. This alignment is extremely critical being of the order of one-thousandth of an inch. It is definitely indicative of poor design and is being investigated. (~~Confidential~~)

At the request of the Wheatfield plant, the acid oxidizer was bled and replenished. The flight was rescheduled for 23 May. (Unclassified)

b. XGAM-63 No. 50F: The relay magnetron was replaced in this missile after the captive flight of 13 May wherein relay/video troubles were experienced. (~~Confidential~~)

After the captive flight 19 May, the Automatic Frequency Control (AFC) of the command receiver was in need of adjustment. This was the cause of the command reception difficulties experienced on this latter captive flight. (~~Confidential~~)

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Weekly Test Status Report, XGAM-63, 22 May 1955

c. XGAM-63 No. 51F: This missile is in standby status awaiting the firing of XGAM-63 No. 47F. (Unclassified)

d. F-80 No. 48-848: This aircraft is in standby status. (Unclassified)

e. B-50 No. 48-111 and B-50 No. 48-075: These aircraft are still in standby status awaiting bailment contract termination instructions from WADC. (Unclassified)

f. B-47 No. 51-5220: Extensive troubleshooting is being conducted on this aircraft in trying to find relay receiver discrepancies that have consistently occurred during the last several captive flights. To date no fix has been found. ([redacted])

g. B-36 No. 51-5706 and B-36 No. 51-5710: Normal maintenance and servicing were accomplished on these aircraft. (Unclassified)

2. Test Operations: ([redacted])

a. XGAM-63 Captive Flight:

(1) Date of Test: 19 May 1955.

(2) Aircraft Involved: B-47 No. 51-5220 and XGAM-63 No. 50F.

(3) Purpose of Test: To perform an airborne check-out of the weapon system prior to a hot launching. ([redacted])

(4) Description of Test: The aircraft flew at 38,000 feet and made several simulated dry and hot runs along the launch azimuth. ([redacted])

(5) Results of Test: All checks went satisfactorily until the relay/video checks. It was found that the relay signal could not be decoded and locked in for proper reception. This condition was intermittent and was worse at high altitudes. Trouble was also encountered in command reception in the missile. This was later traced to a faulty adjustment of the command receiver AFC. ([redacted])

Another captive flight will be necessary before the hot launch of weapon systems B-47/XGAM-63 No. 50F. (Unclassified)

b. Schedule of Test Operations for the Following Week:

(1) B-47 No. 51-5220 and XGAM-63 No. 50F Captive Flight, 23 May 55.

(2) B-47 No. 51-5220 and XGAM-63 No. 50F Captive Flight, 25 May 55.

[redacted]

~~CONFIDENTIAL~~

Weekly Test Status Report, XGAM-63, 22 May 1955

3. General: (Unclassified)

a. Aircraft used and hours flown:

B-36 No. 51-5706 6 hours, 15 minutes

B-36 No. 51-5710 13 hours, 20 minutes

B-47 No. 51-5220 6 hours, 40 minutes

b. Contractor personnel assigned: 169 permament, 22 temporary.

c. Project personnel assigned: 5 Officers, 1 Airman.

d. Number of visitors: (Not assigned to HADC): None.

4. Conclusions and Recommendations: None.

for JOHN E. RICHARDS
Capt, USAF
Chief, GAM-63 Office

for JOHN G. HEMANS,
Lt. Col. USAF
Director of Test and Evaluation

The reason for the overall ~~Confidential~~ classification of this report is the XGAM-63 guidance and control details are ~~confidential~~.

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

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3 July 69
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WEEKLY TEST STATUS REPORT

Report on XGAM-63, System No. 112A, Project Priority 1-A. Precedence Rating II-3 For Week Ending 15 May 1955. Program Stage No. 4. Program objectives: To test the propulsion system, to evaluate the single operator guidance station, to test the single axis inertial system and the warhead components. Preliminary reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (~~Confidential~~)

1. Check-out Operations:

a. XGAM-63 No. 48F: This aircraft was ferried back to Bell Aircraft Corp. at Buffalo for reconditioning. (Unclassified)

b. XGAM-63 No. 47F: All preflight checks have been accomplished including the weapon system check prior to the scheduled launching on 18 May. (Unclassified)

c. XGAM-63 No. 50F: All preflight checks were accomplished satisfactorily prior to a captive flight on 13 May. (Unclassified)

d. XGAM-63 No. 51F: All preflight checks have been accomplished except the command calibration. This missile is in a standby status awaiting the firing of XGAM-63 No. 47F No captive flight is scheduled for this missile prior to its tentative scheduled launching on 2 June 1955. (Unclassified)

e. F-80 No. 48-8484: This aircraft is still in standby status. (Unclassified)

f. B-50 No. 48-111 and B-50 No. 48-075: These aircraft are still in standby status awaiting bailment contract termination from WADC. (Unclassified)

g. B-47 No. 51-5220, B-36 No. 51-5706 and B-36 No. 51-5710: Normal maintenance and servicing were accomplished on these aircraft. (Unclassified)

2. Test Operations:

a. XGAM-63 Captive Flight:

(1) Date of Test: 10 May 1955.

(2) Aircraft Involved: B-36 No. 51-5710 and XGAM-63 No. 47F.

(3) Purpose of Test: To perform an airborne check-out of the weapon system prior to a hot launching. (Unclassified)

(4) Description of Test: The aircraft flew at 40,000 feet and made both simulated dry and hot runs along the launch azimuth. (Unclassified)

(5) Results of Test: All checks were accomplished satisfactorily with the following exceptions: (Confidential)

(a) The radar aimpoint could not be seen properly in order to establish a launching track. It was decided to use more than one corner reflector for the next captive flight in order to improve this situation.

(b) Angular coincidence could not be obtained automatically. This condition has existed on previous flights and is being studied. Sensitivity of the aircraft autopilot is suspected. It is not a serious malfunction because the pilot, at the request of the guidance operator, can override the autopilot and achieve coincidence manually within a few seconds.

b. XGAM-63 Captive Flight: (Confidential)

(1) Date of Test: 13 May 1955.

(2) Aircraft Involved: B-47 No. 51-5220 and XGAM-63 No. 50F.

(3) Purpose of Test: To perform an airborne check-out of the weapon system prior to a hot launching.

(4) Description of Test: The aircraft flew at 38,000 feet and made several simulated dry and hot runs along the launch azimuth.

(5) Results of Test: All checks were satisfactorily accomplished with the exception of the relay/video checks. It is believed that some malfunction occurred in the relay receiver which precluded the completion of these checks. Three corner reflectors were used for the radar aimpoint and were seen quite well for establishing the launch track.

c. Schedule of Test Operations for Following Week:

(1) B-36 No. 51-5710 and XGAM-63 No. 47F Hot Flight, 18 May 55.

(2) B-47 No. 51-5220 and XGAM-63 No. 50F Captive Flight, 19 May 55.

Weekly Test Status Report XGAM-63, 15 May 1955

3. Other:

a. Further data reduction from the firing of XGAM-63 No. 49F revealed that the relay magnetron stopped oscillating at launch and did not regain oscillation at any time during the abbreviated flight. No immediate reason could be found for this malfunction either at HADC or at Bell Acft. Corp, Buffalo.

b. Extensive examination of blueprints finally revealed to the HADC personnel the reason for the magnetron shutdown. A single relay holds high voltage on the relay magnetron. This relay is de-energized when the umbilical plug is pulled and re-energized when the lanyard switch is pulled. Consequently, the relay is de-energized for approximately .1 second. This is time enough for the relay magnetron to stop oscillating because of the high voltage interruption. Even though the high voltage comes back on in .1 second the magnetron will not resume oscillating. A filament reheating cycle must be accomplished to restart the magnetron whenever the high voltage is interrupted.

c. It is felt that this malfunction was a result of poor preliminary design. It was general knowledge that the relay magnetron could not tolerate any brief high voltage interruption. A thorough search should have been made before the test flight for any situation, such as the one described above, which would cause a high voltage interruption to the magnetron.

d. HADC personnel received authorization to incorporate a wiring change in the missiles already at HADC which will eliminate the aforementioned problem.

4. General: (Unclassified)

a. Aircraft used and hours flown:

B-36	#51-5706	3 hours, 40 minutes
B-36	#51-5710	4 hours
B-47	#51-5220	6 hours, 50 minutes

b. Contractor personnel assigned: 174 permanent, 26 temporary.

c. Project personnel assigned: 5 officers, 1 airman.

d. Number of visitors: (not assigned to HADC): 15 military.

5. Conclusions and Recommendations: None

John E. Richards

JOHN E. RICHARDS
Captain, USAF
Chief, GAM-63 Office

John G. Hemans

JOHN G. HEMANS
Lt. Col., USAF
Director of Test and Evaluation

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

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WEEKLY TEST STATUS REPORT

Report on XGAM-63, System No. 112A, Project Priority 1-B. Precedence Rating II-3, For Week Ending 8 May 1955. Program Stage No. 4. Program Objectives: To test the propulsion system, to evaluate the single operator guidance station, to test the single axis inertial system and to test the warhead components. Preliminary reports issued during period: Preliminary TWX covering 5 May flight test. Agency conducting tests: Bell Aircraft Corporation.

(~~Confidential~~)

1. Check-out Operations:

a. XGAM-63 No. 48F: Normal maintenance and servicing were accomplished on this missile. (Unclassified)

b. XGAM-63 No. 47F: This missile arrived at HADC on 4 May 1955. Receiving inspections have been accomplished. Power plant checks indicated a failure of the glow plug. Upon trouble shooting it was found that a wire specified in the prints was missing from the junction box. The cruise thermal relief valve, the turbine pump drive regulator, and the boost No. 1 accumulator were replaced. (~~Confidential~~)

c. XGAM-63 No. 49F: Propellant servicing was delayed 4½ hours because of a failure of the HAFB commercial power system. Pressure checks subsequent to servicing were satisfactory but pulling the missile out of the pit evidently created enough twist to crack the main oxidizer line at the bellows. A definite quantity of acid leaked out. Disassembly of the joint indicated metal chips on the gasket (presumed to have come from the flange). The gasket was replaced and the propellant line was recharged satisfactorily. Subsequent electrical checks revealed the servo system inoperative. Trouble-shooting revealed that the acid had reached the roll-pitch cathode follower unit and corroded it, rendering it inoperative. The unit was replaced and further servo and electrical checks were satisfactory. The entire area wherein the acid had leaked, which included the cathode follower unit and the roll rate gyro, was flushed out with water. Unfortunately however, a ground check of the roll rate system was not made after the cathode follower unit was replaced. (Secret)

d. XGAM-63's No. 50F and No. 51F: Autopilot and Unattended Search Radar preflight checks have been accomplished without incident on both of these missiles. Power plant preflights have been completed with the exception of the low pressure check on missile No. 50F. (~~Secret~~)

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Weekly Test Status Report, XGAM-63, 8 May 1955.

e. F-80 No. 48-848: This aircraft is still in standby status. (Unclassified)

f. B-50 No. 48-111 and B-50 No. 48-075: These aircraft are in standby status awaiting bailment contract termination instructions from WADC. (Unclassified)

g. B-47 No. 51-5220 and B-36 No. 51-5706: Normal maintenance and servicing were accomplished on these aircraft. (Unclassified)

h. B-36 No. 51-5710: The command transmitter was replaced in this aircraft. During the pit checks of missile No. 49F it was found that no output resulted from the transmitter. A bad tube was found to be the reason for malfunction. (Secret)

2. Test Operations

a. XCAM-63 Test Flight:

(1) Date of Test: 5 May 1955. (Unclassified)

(2) Aircraft Involved: DB-36 No. 51-5710 and XGAM-63 No. 49F. (Unclassified)

(3) Purpose of Test: The purposes of this flight were: Primary: (1) To test the single operator relay-command guidance system and the single axis inertial guidance system. (2) To test the warhead fuzing system. (3) To test the simulated prime warhead. Secondary: (1) To check launch separation characteristics. (2) To check pre-launch procedures. (Secret)

(4) Description of Test: The launch aircraft flew at the launch altitude of 40,000 feet for one dry run and the hot run. The launch heading was 343° true and the range-to-target was 54 nautical miles. All pre-launch checks were accomplished without incident. The Automatic Check-out System ran completely through its problem but stopped at the last check (which was angular coincidence). The operator waited approximately 10 seconds for this check and then asked the pilot to turn the aircraft. Immediately upon turning, angular coincidence was achieved and the missile was released. The release was achieved although the top fin hit its housing upon leaving (probably because the aircraft was in a bank at the time of release). Simultaneous with rocket fire, the missile became unstable about its roll axis. Power plant shutdown occurred at X plus 23 seconds after the missile had inverted and entered a high "nose up" attitude. Destruct was commanded at 20,000 feet and the missile separated properly. (Confidential)

(5) Results of Test: Telemetry indicates malfunction of the roll rate system similar to one which occurred in missile 1221B on 8 October 1954. Recovery of the aft section did not show any acid on the roll rate gyro or its wiring. Because of limited instrumentation the precise cause of the malfunction remains unknown. With the exception of limited Sandia telemetry none of the primary purposes of the test were achieved. (Secret)

b. XGAM-63 Captive Flights:

(1) Dates of Test: 3,4 and 6 May 1955. (Unclassified)

(2) Aircraft Involved: B-47 No. 51-5220 and XGAM-63 No. 48F. (Unclassified)

(3) Purpose of Tests: To perform a final evaluation of the Terminal Guidance Control Station and the Inertial Guidance Station in the B-47 director aircraft. (Secret)

(4) Description of Tests: The aircraft flew at 38,000 feet and made several simulated launch runs while the various electrical systems were checked out. (Unclassified)

(5) Results of Tests: All three flights were successfully completed. These flights terminated the development and evaluation study by the contractor's development group. All flights, both captive and hot, will be flown by the contractor's HADC test group. (Confidential)

c. Schedule of Test Operations for Following Week: (Unclassified)

(1) B-36 No. 51-5710 and XGAM-63 No. 47F Captive Flight, 10 May 1955.

(2) B-47 No. 51-5220 and XGAM-63 No. 50F Captive Flight, 13 May 1955.

3. General: (Unclassified)

a. Aircraft used and hours flown: (Unclassified)

B-36	No. 51-5710	2 hours, 30 minutes
B-47	No. 51-5220	8 hours

b. Contractor personnel assigned: 167 Permanent, 36 temporary. (Unclassified)

c. Project personnel assigned: 5 Officers, 1 Airman. (Unclassified)

d. Number of visitors (not assigned to HADC): 1 military. (Unclassified)

Weekly Test Status Report, XGAM-63, 8 May 1955.

4. Conclusions: The servo system failure on missile No. 49F is further evidence that the primary weakness in the GAM-63 weapon system is lack of reliability. Generally speaking, primary objectives of tests are not being accomplished because of premature termination of missile flights caused by servo system or power plant failures. However, the amount of telemetry being allocated for determination of servo and power plant malfunctions is not adequate to identify the sources of trouble. It is fully appreciated that reliability must be designed and manufactured into a missile and can never be flight tested into a missile. Furthermore this Center is unaware of all steps being taken by the contractor to improve reliability. On missile 49F the majority of available telemetry was utilized for coverage of the warhead. This will be the case on several missiles to be launched in the near future. Any extensive reallocation of available telemetry within the missile might result in some delay in achievement of certain primary flight test objective as presently outlined. This in turn could cause an overall delay in the program. (Confidential)

5. Recommendations: It is recommended that WADC investigate the possibility of directing increased telemetry coverage which would identify the sources of malfunctions within the servo system and the power plant system. It is recommended that consideration be given to delaying the warhead tests until later in the program if this is necessary to make adequate telemetry channels available for the servo and power plant systems. (Confidential)

JOHN E. RICHARDS
Capt. USAF
XGAM-63 Project Officer

JOHN G. HEMANS
Lt. Col. USAF
Director of Test and Evaluation

The reason for the overall Secret Classification of this report is the XGAM-63 guidance and control details are Secret. (Unclassified)

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

Declassified 3 July 69 DoD

WEEKLY TEST STATUS REPORT

Report on XGAM-63, Systems No. 112A, Project Priority 1-A, Precedence Rating XX-3 For Week Ending 1 May 1955. Program Stage No. 4. Program Objectives; To obtain aerodynamic data: to test the propulsion system, the servo system and Model III X-Band guidance system; and to test the components of the warhead fuzing system. Preliminary reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Check-out Operations:

a. XGAM-63 No. 48F: Normal maintenance and servicing were accomplished on this missile. (Unclassified)

b. XGAM-63 No. 49F: The weapon systems check-out was initiated on 29 April with director aircraft B-36 No. 51-5710. The unattended search radar magnetron became low in power output and was replaced. No other major discrepancies occurred and this check-out was completed on 30 April prior to the scheduled launching on 5 May 1955. Final power plant checkouts have been accomplished in preparation for launching on 5 May. Leaks in the glow plug and in the turbine pump drive regulator butterfly vane were corrected. (Secret)

c. XGAM-63 No. 50F: This missile arrived at HADC on 29 April. Receiving inspections have been accomplished. (Unclassified)

d. XGAM-63 No. 51F: This missile arrived at HADC on 27 April 1955. Receiving inspections have been accomplished. Power plant pressure checks were very satisfactory. The boost No. 1 thermal relief valve and the oxidizer pressure transmitter were replaced. Sequence checks were accomplished satisfactorily. (Confidential)

e. F-80 No. 48-8484: This aircraft is in standby status. (Unclassified)

f. B-50 No. 48-075 and B-50 No. 48-111: These aircraft are in standby status awaiting bailment contract termination instructions from WADC. (Unclassified)

g. B-47 No. 51-5220, B-36 No. 51-5710 and B-36 No. 51-5706: Normal maintenance and servicing were accomplished on these aircraft. (Unclassified)

Weekly Test Status Report XGAM-63, 1 May 1955.

2. Test Operations: (Secret)

a. XGAM-63 Captive Flight:

(1) Date of Test: 25 April 1955.

(2) Aircraft Involved: B-47 No. 51-5220 and XGAM-63 No. 48F.

(3) Purpose of Test: To perform a final evaluation of the B-47 Terminal Guidance Control Station.

(4) Description of Test: During the climb to altitude, the pilot experienced a severe case of nausea. It was necessary to land the aircraft immediately. Two B-47/XGAM-63 No. 48F Captive Flights scheduled for 27 and 29 April were cancelled because of the resignation of the Bell B-47 pilot.

b. XGAM-63 Captive Flight: (Secret)

(1) Date of Test: 25 April 1955.

(2) Aircraft Involved: B-36 No. 51-5710 and XGAM-63 No. 49F.

(3) Purpose of Test: To perform an airborne, operational check of all systems in missile No. 49F and director B-36 No. 51-5710 prior to launching of missile No. 49F.

(4) Description of Test: The director aircraft flew at launch altitude of 40,000 feet and made several simulated launch runs.

(5) Results of Test: All systems checked out satisfactorily except the director relay antenna. This antenna would not lower all the way automatically, and consequently prevented the Automatic Check-out System (ACS) from completing its sequence. The aircraft was brought down to 10,000 feet where the antenna was manually lowered. The aircraft climbed to 15,000 feet where a launch sequence was successfully completed. However, another captive flight was deemed necessary because the latter sequence was not accomplished at launch altitude.

c. XGAM-63 Captive Flight: (Confidential)

(1) Date of Test: 27 April 1955.

(2) Aircraft Involved: B-36 No. 51-5710 and XGAM-63 No. 49F.

(3) Purpose of Test: To perform an airborne, operational check of all systems in missile No. 49F and director B-36 No. 51-5710 prior to launching of missile No. 49F.

(4) Description of Test: The director aircraft flew at launch altitude of 40,000 feet and made several simulated launch runs.

(5) Results of Test: A successful launch sequence was accomplished at 40,000 feet and consequently the weapon system was considered ready for a hot launching.

d. Schedule of test operations for following week:

(1) B-47 No. 51-5220 and XGAM-63 No. 48F Captive Flight, 3 May 55.

(2) B-47 No. 51-5220 and XGAM-63 No. 48F Captive Flight. 4 May 55.

(3) B-36 No. 51-5710 and XGAM-63 No. 49F Hot Flight, 5 May 55.

(4) B-47 No. 51-5220 and XGAM-63 No. 48F Captive Flight, 6 May 55.

3. General: (Unclassified)

a. Aircraft used and hours flown:

B-36	No. 51-5710	6 hours, 20 minutes.
B-47	No. 51-5220	1 hour, 20 minutes.

b. Contractor personnel assigned: 117 Permanent, 36 temporary.

c. Project personnel assigned: 5 officers, 1 airman.

d. Number of visitors (not assigned to HADC): 9 military, 28 civilians.

4. Conclusions and Recommendations: None.

John E. Richards

JOHN E. RICHARDS
Captain, USAF
XGAM-63 Project Officer

John G. Hemans

JOHN G. HEMANS
Lt. Col. USAF
Director of Test and Evaluation

SECRET

HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

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3 July 69
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WEEKLY TEST STATUS REPORT

Report on XGAM-63, Systems No. 112A, Project Priority 1-A, Precedence Rating II-3 For Week Ending 24 April 1955. Program Stage No. 4. Program Objectives: To obtain aerodynamic data; to test the propulsion system, the servo system and Model III X-Band guidance system; and to test the components of the warhead fuzing system. Preliminary reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Check-out Operations:

a. XGAM-63 No. 48F: Normal maintenance and servicing were accomplished on this missile. (Unclassified)

b. XGAM-63 No. 49F: This missile was thoroughly checked after its 20 April captive flight. Several loose plugs were found and tightened but actually no major discrepancies were found. The destructor unit was prereplaced and the transient destruct signals, that had been experienced previously, were eliminated. The oxidizer pressure transmitter on the turbine pump drive regulator was replaced because of a leaking diaphram and the back pressure control valve was replaced because of leaks. Captive flight on 20 April failed to achieve a turbine ready light. The sequence box was removed, checked, cold tested and reinstalled without finding the discrepancy. (Confidential)

c. B-50 No. 48-075 and B-50 No. 48-11: These aircraft are in standby status awaiting bailment contract termination from WADC. (Unclassified)

d. F-80 No. 48-8484: This aircraft is in standby status. (Unclassified)

e. B-47 No. 51-5220, B-36 No. 51-5710 and B-36 No. 51-5706. Normal maintenance and servicing were accomplished on these aircraft. (Unclassified)

2. Test Operations:

a. XGAM-63 Captive Flight:

(1) Date of Test: 20 April 1955.

(2) Aircraft Involved: B-36 No. 51-5710 and XGAM-63 No. 49F.

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(3) Purpose of Test: To perform an airborne, operational check of all systems in missile No. 49F and director No. 51-5710 prior to the launching of No. 49F. (Confidential)

(4) Description of Test: The director aircraft flew at the launching altitude of 40,000 feet and made several simulated launch runs. (Confidential)

(5) Results of Test: Several minor discrepancies occurred during this flight, plus a malfunction of the turbine fire system. Because of these conditions simulated launch could not be accomplished; consequently, the flight was unsuccessful. Another captive flight will be run on 25 April and the hot launch will be tentatively scheduled for 4 May depending upon the results of the 25 April captive flight. (Confidential)

b. XGAM-63 Captive Flight: (Secret)

(1) Date of Test: 20 April 1955.

(2) Aircraft Involved: B-47 No. 51-5220 and XGAM-63 No. 48F.

(3) Purpose of Test: To perform an evaluation of the Terminal Guidance Control Station in the B-47.

(4) Description of Test: The aircraft flew at 38,000 feet and made several simulated runs on the target as the Terminal Guidance equipment was checked out.

(5) Results of Test: All checks were accomplished as scheduled and the flight was successful.

c. XGAM-63 Captive Flight: (Secret)

(1) Date of Test: 22 April 1955.

(2) Aircraft Involved: B-47 No. 51-5220 and XGAM-63 No. 48F.

(3) Purpose of Test: To perform a final evaluation of the Terminal Guidance Control Station in the B-47.

(4) Description of Test: The aircraft flew at 38,000 feet and made several simulated runs on the target as the Terminal Guidance equipment was checked out.

(5) Results of Test: Severe interference was experienced on the Terminal Guidance indicater which precluded the completion of the evaluation. Another flight will be necessary to accomplish the required objectives. Ground Terminal Guidance checks revealed no interference. Ground [illegible] interference during the flight is suspected.

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Weekly Test Status Report, XGAM-63, 21 April 1955.

d. Schedule of Test Operations for Following Week:

(1) B-47 #51-5220 & XGAM-63 #43F Captive Flight, 25 Apr 55.

(2) B-36 #51-5710 & XGAM-63 #49F Captive Flight, 25 Apr 55.

(3) B-47 #51-5220 & XGAM-63 #43F Captive Flight, 27 Apr 55.

(4) B-36 #51-5710 & XGAM-63 #49F Captive Flight, 27 Apr 55.

(5) B-47 #51-5220 & XGAM-63 #43F Captive Flight, 29 Apr 55.

3 General: (Unclassified)

a. Aircraft used and hours flown:

B-36	#51-5706	3 hours, 20 minutes
B-36	#51-5710	7 hours, 15 minutes
B-47	#51-5220	6 hours, 35 minutes

b. Contractor personnel assigned: 168 permanent, 38 temporary

c. Project personnel assigned: 5 officers, 1 airman.

d. Number of visitors (not assigned to HADC): None.

4. Conclusions and Recommendations: None.

Everett D. Abbott, 2/LT USAF
FOR JOHN E. RICHARDS
Captain, USAF
XGAM-63, Project Officer

John G. Hemans
JOHN G. HEMANS
Lt. Col. USAF
Director of Test and Evaluation

HADC 55-1991

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Declassified 3 July 69 AB

Report on XGAM-63, Systems No. 112A, Project Priority 1-A. Precedence 1-3, For Week Ending 17 April 1955. Program Stage No. 4. Program Objectives: To obtain aerodynamic data; to test the propulsion system, the servo system and Model III X-Band guidance system; and to test the components of the warhead fuzing system. Preliminary Reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Check-out Operations:

a. XGAM-63 No. 48F: Normal maintenance and servicing were accomplished on this missile. (Unclassified)

b. XGAM-63 No. 49F: High pressure checks, functional checks, and sequence checks were performed during the latter part of the week in preparation for launching on 28 April. A few high pressure leaks had developed as a result of the captive flights flown in the past few weeks. The turbine sequence box was removed. (Confidential)

c. B-50 No. 48-075 and B-50 No. 48-111: These aircraft are in standby status awaiting bailment contract termination from WADC. (Unclassified)

d. F-80 No. 45-8484: This aircraft is in standby status.

e. B-47 No. 51-5220: A burned out potentiometer and its coaxial lead were replaced in the range calibrator unit. These components burned out during the attempted captive flight on 11 April 1955. (Secret)

f. B-36 No. 51-5710 and B-36 No. 51-5706: Normal maintenance and servicing were accomplished on these aircraft. (Unclassified)

2. Test Operations:

a. XGAM-63 Captive Flight (Secret)

(1) Date of Test: 11 April 1955.

(2) Aircraft Involved: B-47 No. 51-5220 and XGAM-63 No. 48F.

(3) Purpose of Test: Terminal Guidance Control Station evaluation.

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(4) Description of Flight: Soon after the aircraft had attained altitude, smoke was observed to be coming from the guidance equipment. This required a shut down of all the electrical gear. No fix could be obtained in the air and consequently the flight was cancelled.

(5) Results of Flight: Because of equipment malfunction, no results were obtained from this flight.

b. XGAM-63 Captive Flight: (Secret)

(1) Date of Test: 13 April 1955.

(2) Aircraft Involved: B-36 No. 51-5710 and XGAM-63 No. 49F.

(3) Purpose of Test: Terminal Guidance Control Station evaluation.

(4) Description of Test Flight: The aircraft flew at 40,000 feet and made several simulated runs on the target as the K-system, USR and associated equipment were checked out.

(5) Results of Test: No major discrepancies were encountered during this flight and its purpose was fulfilled.

c. XGAM-63 Air-to-Air Captive Flight (Secret)

(1) Date of Test: 15 April 1955.

(2) Aircraft Involved: B-36 No. 51-5710 and B-47 No. 51-5220 and XGAM-63 No. 48F.

(3) Purpose of Test: Automatic Tracking Antenna System (ATRAS) evaluation, Command System evaluation and Terminal Guidance Control Station evaluation.

(4) Description of Test: XGAM-63 No. 48F was flown attached to the B-47. The B-36 played the role of director aircraft. Both aircraft flew together down the launch line, the relay/ command link was established and a simulated launch was accomplished wherein the B-47 accelerated toward the target and the B-36 turned 180°. Commands were sent from the director and their reception was monitored by the guidance operator in the B-47.

(5) Results of Test: This was a most successful flight. All systems operated satisfactorily and the command link was maintained for a separation of 180 nautical miles.

d. Schedule of Test Operations for Following Week:

(1) B-47 #51-5220 & XGAM-63 #48F Captive Flight, 18 Apr 55

(2) B-47 #51-5220 & XGAM-63 #48F Captive Flight, 20 Apr 55

(3) B-36 #51-5710 & XGAM-63 #49F Captive Flight, 20 Apr 55

(4) B-47 #51-5220 & XGAM-63 #48F Captive Flight, 22 Apr 55

3. General: (Unclassified)

a. Aircraft used and hours flown:

B-36	#51-5710	7 hours, 15 minutes
B-47	#51-5220	4 hours, 20 minutes
F-80	#48-8484	50 minutes

b. Contractor personnel assigned: 170 permanent, 36 temporary.

c. Project personnel assigned: 5 officers, 1 airman.

d. Number of visitors (not assigned to HADC): 4 [illegible], Ice Hion.

4. Conclussions and Recommendations: None

John E. Richards
JOHN E. RICHARDS
Captain, USAF
XGAM-63 Project Officer

John G. Hemans
JOHN G. HEMANS
Lt. Col. USAF
Director of Test and Evaluation

Declassified
3 Jul 68 AB

3-2-10

SECURITY CLASSIFICATION (If any)

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DISPOSITION FORM

FILE NO.	SUBJECT Transmittal of Figures for Test Plan
TO HDO	FROM MDiC DATE 10 AUG 55 COMMENT NO. 1 mjt/RC-59

1. Attached are copies of Figures 9 and 10 which were omitted in Test Plan No.1 on the GAM-63, copy 8, which was forwarded to you earlier this year. Will you please attach these figures to the back page of the copy you received.

Roy D. Garlick

ROY D. GARLICK, Major, USAF
Chief, MCM Laboratory

2 Incls
1. Figure 9
2. Figure 10

"THIS INDORSEMENT NO. [redacted] IS WITHDRAWN OR NOT APPLICABLE WHEN CLASSIFICATION OF THIS COMPLETED FORM IS CHANGED OR CANCELLED."

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Transmittal of Figures for Test Plan

HDO HDLC 10 AUG 55

mjt/RC-59

1. Attached are copies of Figures 9 and 10 which were omitted in Test Plan No.1 onthe GAM-63, copy 8, which was forwarded to you earlier this year. Will you please attach these figures to the back page of the copy you received.

2 Incls
1. Figure 9
2. Figure 10

ROY D. GARLICK, Major, USAF
Chief, MCM Laboratory

[redacted]

[redacted]

HADC 55-1161

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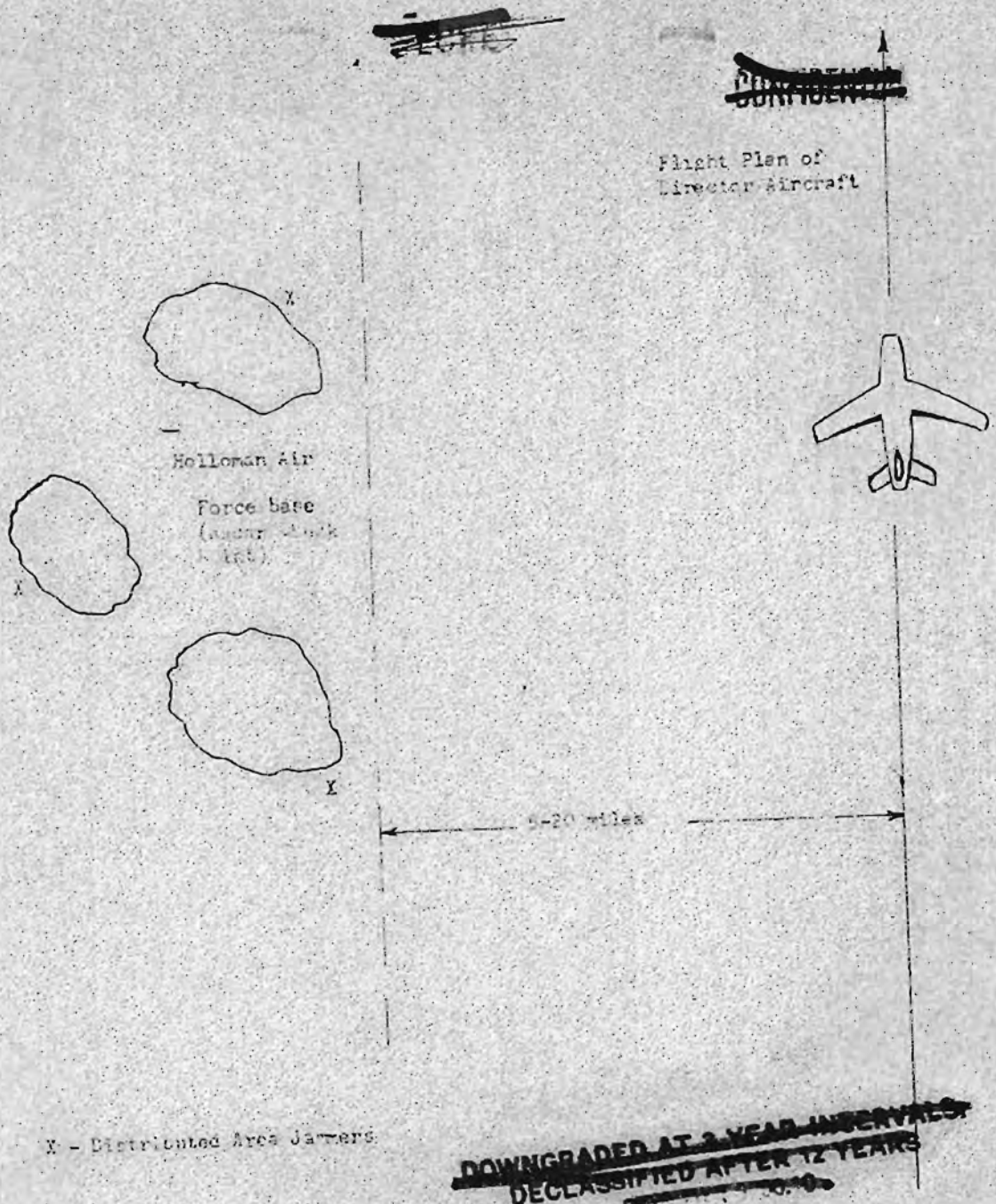

X - Distributed Area Jammers

Figure 9. Basic Flight Plan of Tests to Determine Effects of Distributed Area Jammers on Radar Set AN/APS-64

HADC 55-1860

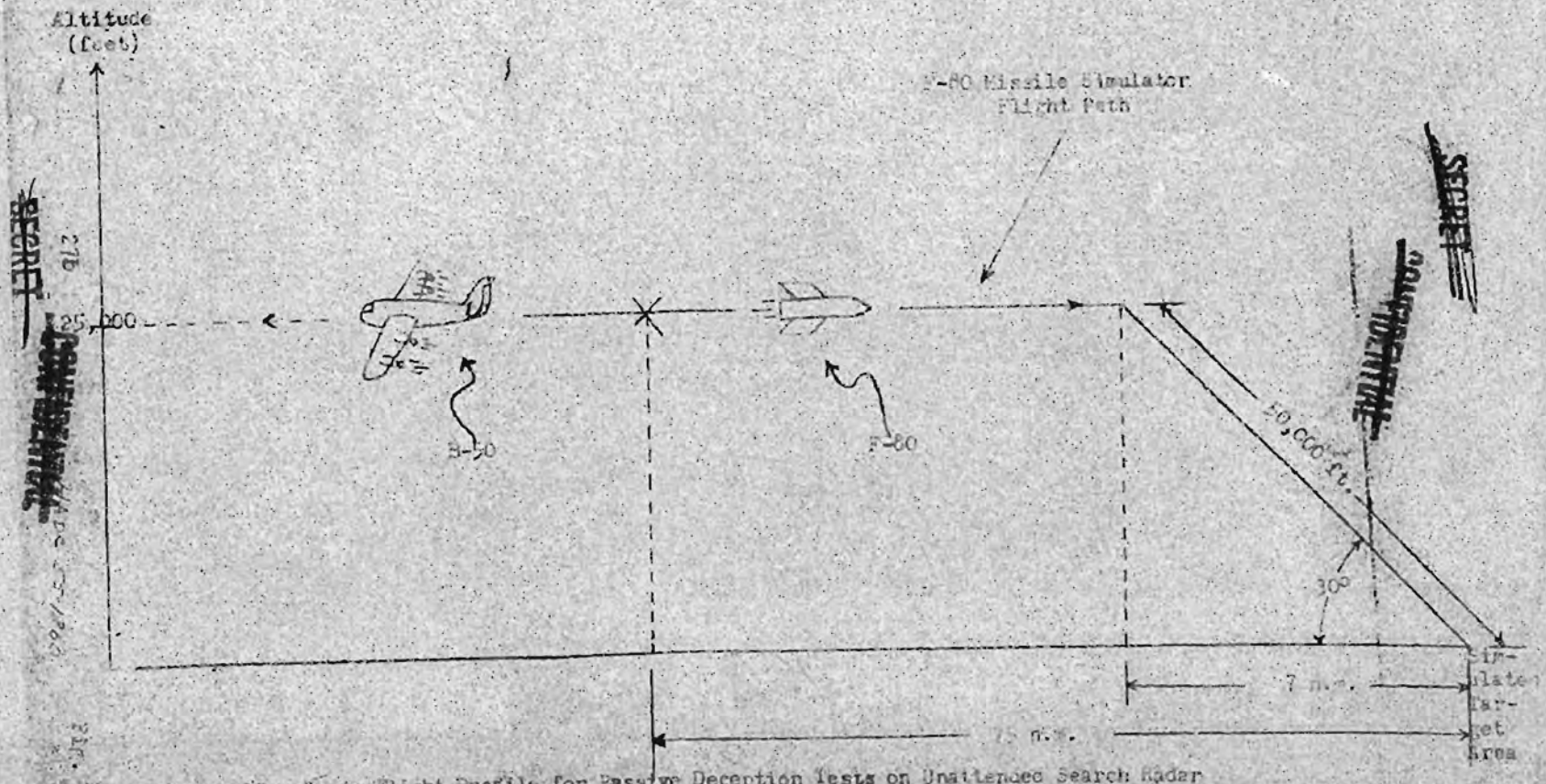

Figure 10. Basic Flight Profile for Passive Deception Tests on Unattended Search Radar

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HOLLOMAN AIR DEVELOPMENT CENTER

Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM-63, Systems No. 112A, Project Priority 1-A, Precedence Rating II-3, For Week Ending 10 April 1955. Program Stage No 4. Program Objectives: To obtain aerodynamic data; to test the propulsion system, the servo system and Model III X-band guidance system, and to test the components of the warhead fuzing system. Preliminary Reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Assembly and Check-out Operations:

a. XGAM-63 No. 48F: Normal maintenance and servicing were accomplished on this missile. (Unclassified)

b. XGAM-63 No. 49F: This missile was grounded from captive flying during this period due to the necessity of replacing a faulty relay antenna actuator valve. (Secret)

c. F-80 No. 45-8484: This aircraft is in standby status. (Unclassified)

d. B-50 No. 48-075: and B-50 No. 48-111: These aircraft are in standby status awaiting bailment contract termination from WADC. (Unclassified)

e. B-47 No. 51-5220 and B-36 No. 51-5710: Normal maintenance and servicing were accomplished on these aircraft. (Unclassified)

f. B-36 No. 51-5706: This aircraft is in standby status to be used only in case B-36 No. 51-5710 is inoperative. (Unclassified)

g. Cardox representatives arrived 5 April. Overhaul of compressor and trailer is three-quarters completed. (Unclassified)

2. Test Operations:

a. XGAM-63 Captive Flight:

(1) Date of Test: 4 April 1955.

(2) Aircraft Involved: B-47 No. 51-5220 and XGAM-63 No. 48F.

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(3) Purpose of Test:

(a) Primary Purpose: To perform an operational check of all electrical and electronic systems of XGAM-63 No. 48F and director B-47 No. 51-5220 during a simulated launch. (Secret)

(b) Secondary Purpose: To increase the proficiency of flight and ground personnel in preparation for the launching of single axis inertial guidance missiles. (Secret)

(4) Description of Test: The aircraft flew at 38,000 feet and made several simulated runs on the target as the K-system, USR and associated equipment were checked out. (Secret)

(5) Results of Test: All systems operated satisfactorily except that the video link could not be established. A faulty relay magnetron in the missile was found to be the cause of the above malfunction. Mono X-band interference was experienced; the same type that had been seen during several previous captive flights. It was finally determined that this interference was caused by the radio frequency RF associated with the zero-time tone signal emanating from one of the range facilities. This RF carrier frequency is 79.2 megacycles which is just below the upper limit of the IF band pass in the APS-23 receiver. A slight detuning of the receiver successfully eliminated the interference. (Secret)

b. XGAM-63 Air-to-Air Captive Flight:

(1) Date of Test: 6 April 1955.

(2) Aircraft Involved: B-47 No. 51-5220, B-36 No. 51-5710 and XGAM-63 No. 48F.

(3) Purpose of Test: To establish the capabilities of the relay/command link. (Secret)

(4) Description of Test: XGAM-63 No. 48F was flown attached to the B-47. The B-36 played the role of director aircraft. Both aircraft would fly together down the launch line, the relay/command link would be established and a simulated launch accomplished wherein the B-47 would accelerate toward the target and the B-36 would turn 180°. Commands were sent from the director and their reception was monitored by the guidance operator in the B-47. (Secret)

(5) Results of Test: This was a very successful flight. All systems worked exceptionally well and the command link was maintained for an estimated 161 nautical miles. (Secret)

c. XGAM-63 Captive Flight:

(1) Date of Test: 8 April 1955.

(2) Aircraft Involved: B-36 No. 51-5710 and XGAM-63 No. 48F.

(3) Purpose of Test: Same as in paragraph (a) above. (Secret)

(4) Description of Test: The aircraft flew at 40,000 feet and made several simulated runs on the target as the K-system, USR and associated equipment were checked out. (Secret)

(5) Results of Test: No discrepancies were encountered during this flight and its purpose was fulfilled. (Unclassified)

d. Schedule of Test Operations for Following Week:

(1) B-47 XGAM-63 No. 48F Captive flight 11 April 1955. (Confidential)

(2) B-47 B-36 XGAM-63 No. 48F Captive flight 13 April 1955. (see 2 b(4) above) (Confidential)

(3) B-36 XGAM-63 No. 49F Captive Flight 15 April 1955. (Confidential)

3. General: (Unclassified)

a. Aircraft used and hours flown:

B-36	#51-5710	5 hours	
B-47	#51-5220	1 hour	50 minutes

b. Contractor personnel assigned: 169 permanent, 36 temporary.

c. Project personnel assigned: 5 Officers, 1 Airman.

d. Number of visitors (not assigned to HADC): None.

4. Conclusions and Recommendations: None

Note: The reason for the overall SECRET classification of this report is the XGAM-63 guidance and control details are SECRET (Unclassified)

JOHN E. RICHARDS
Captain, USAF
XGAM-63 Project Officer

for JOHN G. HEMANS
Lt. Col., USAF
Director of Test and Evaluation
HADC 55-1770

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM-63, Systems No. 112A, Project Priority 1-A, Precedence Rating II-3 For Week Ending 3 April 1955. Program Stage No. 4. Program Objectives: To obtain aerodynamic data; to test the propulsion system, the servo system and Model III X-Band guidance system; and to test the components of the warhead fuzing system. Preliminary Reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Assembly and Check-out Operations:

a. XGAM-63 No. 33D: This missile was in standby status prior to its rescheduled launching on 28 March. A total of three O rings in the high pressure jettison valve have been replaced to date. Lack of Askania coverage (due to bad weather) precluded launching and the mission was rescheduled for 29 March. (Confidential)

b. XGAM-63 No. 46F: Normal maintenance and servicing were accomplished on this missile. (Unclassified)

c. XGAM-63 No. 49F: All preflight checks were accomplished on this missile satisfactorily. This missile will be used extensively with the B-36 director aircraft in captive flights for the next several weeks. (Unclassified)

d. F-80 No. 45-8484: This aircraft is in standby status. (Unclassified)

e. B-50 No. 48-075 and B-50 No. 48-111: These aircraft have terminated their duty as director aircraft for the XGAM-63 program. They are now in standby status awaiting bailment contract termination instructions from WADC. (Unclassified)

f. B-47 No. 51-5220: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

g. B-36 No. 51-5710: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

h. B-36 No. 51-5706: This aircraft is completely outfitted for director aircraft duty with the "F" series missiles. However it will remain on standby status to be used only in case B-36 No. 51-5710 is inoperative. B-36 No. 51-5706 does not have all the instrumentation facilities that B-36 No. 51-5710 has and consequently is not to be preferred as an R&D director. (Unclassified)

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2. Test Operations:

a. XGAM-63 Captive Flights:

(1) Date of Tests: 30 March and 1 April 1955.

(2) Aircraft Involved: B-47 No. 51-5220 and XGAM-63 No. 49F.

(3) Purpose of Test:

(a) Primary Purpose: To perform an airborne operational check of all electrical and electronic systems of XGAM-63 No. 49F and director B-47 No. 51-5220 during a simulated launch. (Secret)

(b) Purpose: To increase the proficiency of flight and ground personnel in preparation for the launching of single axis inertial guidance missiles. (Secret)

(4) Description of Test: The aircraft flew at 38,000 feet and made several simulated runs on the target as the K-System, USR and associated equipment were checked out. (Secret)

(5) Results of Test: Except for some intermittent X-band interference, these flights went exceptionally well. (Unclassified)

b. XGAM-63 Captive Flight:

(1) Date of Test: 2 April 1955.

(2) Aircraft Involved: B-36 No. 51-5710 and XGAM-63 No. 49F.

(3) Purpose of Test: This was the initial captive flight with XGAM-63 No. 49F and its primary purpose was to accomplish inflight check-outs of all the missile systems. (Unclassified)

(4) Description of Test: Two engines failed on the B-36 after take-off and the aircraft was unable to climb above 10,000 feet. It remained in the air for only an hour. (Unclassified)

(5) Results of Test: All the intended checks were not accomplished; however good video checks were obtained. (Secret)

c. XGAM-63 Launching:

(1) Date of Test: 29 March 1955.

(2) Aircraft Involved: DB-50 No. 48-111 and XGAM-63 No. 33D.

(3) Purpose of Test:

(a) Primary Purpose: To test the operation of the "fluid operator" relay-command guidance system. The missile was to be guidance controlled during both the mid-course and terminal phases of flight. The TGR system was to be turned on at launch and the video presentation on the TG indicators monitored during the mid-course phase of flight. In addition, it was planned to test the pressure sensing system, the barometric pressure switch, and the impact fuzes which are intended for use in the warhead fuzing system. (Secret)

(b) Secondary Purpose: To obtain airframe-servo-pilot response to commands introduced through the relay l[illegible]

(4) Description of Test: A normal "free-drop" launch was accomplished. However, only the cruise motor ignited. Consequently, with the subnormal thrust, the missile was unable to climb and actually flew approximately level for about 120 seconds. It entered a shallow dive and destruction was commanded at 18,000 feet at X + 168 seconds. Recovery of the forward section was successful. (Confidential)

(5) Results of Test: Examination of the recovered equipment revealed a loose pin in electrical plug 2002 which failed to transmit current to operate the boost propellant pilot valve. This failure precluded accomplishment of any test objectives. Telemetry was excellent. Comparison of the traces of the damped and undamped Gianinni power plant pressure transducers on this first flight showed little difference. Both traces were excellent. (Confidential)

3. General: (Unclassified)

a. Aircraft used and hours flown:

B-36	#51-5710	1 hour, 45 minutes.
B-47	#51-5220	2 hours.

b. Contractor personnel assigned: 169 permanent, 43 temporary.

c. Project personnel assigned: 5 Officers, 1 Airman.

d. Number of visitors (not assigned to WADC): 8

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4. Conclusions:

Failure of missile 33D was caused by intermittent contact in the P-2002 plug. This plug, Amphenol SN-3106-20-27S, is the new type with the blue phenolic block replacing the old olive drab block (also manufactured by Amphenol).

5. Discussion:

a. The consensus of opinion of Bell Aircraft electricians is that failures of the new type connector are far more frequent than has been experienced with the old type. The primary cause of spreading these pin sockets is probably the insertion of oversized test probes during missile check-out.

b. Comparison of the pin sockets indicates that the new MS socket is mechanically weaker than the former design and is more susceptible to failure.

c. Comparison of disassembled old and new design plugs indicates that the pins and sockets in the old type block have sufficient flexibility without being nearly as loose as the pins and sockets in the new type block. The loose fit in the new block permits potting compound to leak through and wedge the spring loaded contact (in the socket), thus permitting it to be bent out of shape when the pin is inserted. The potting compound (76% Electron, 22% Talc and 2% Laperco ATC) forms a rigid backing for the cable where it enters the connector, sealing the connector and preventing cable flexing at the solder joints. It has the disadvantage of firmly setting the pins and sockets and permitting any pair which are out of line to be sprung. It is understood that project Meteor used a potting compound which, while providing overall support to the cable, permits flexing of the individual pins.

6. Recommendations:

It is recommended that the WADC Project office refer the general problems of connectors and potting compounds to appropriate WADC agencies for further investigation.

For JOHN E. RICHARDS
Captain, USAF
XGAM-63 Project Officer

JOHN C. HEMANS
Lt. Col, USAF
Director of Test and Evaluation

The reason for the overall SECRET classification of this report is that [illegible] guidance and control details are SECRET. (Unclassified)

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM-63, System No. 112A, Project Priority 1-A, Precedence Rating II-3 For Week Ending 27 March 1955. Program Stage No. 4. Program Objectives: To obtain aerodynamic data, to test the propulsion system, the servo system and Model III X-Band guidance system, and to test the components of the war head fuzing system. Preliminary Reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Assembly and Check-out Operations:

a. XGAM-63 No. 33D: Preflight and pit checks were accomplished on this missile without incident prior to its scheduled launching on 23 March 1955.

(1) During pre-launch checks on 23 March, the Dv servo in the mid-course guidance (MCG) computer apparently malfunctioned. No L-band tracking could be accomplished. The mission was cancelled primarily because of the first malfunction. Ground checks revealed a bad connector plug in the MCG system. Replacement of the plug cleared up the trouble. A spare L-band beacon was substituted for the original. To date no fix has been placed on the defective beacon.

(2) Excessive servo noise was encountered during the pre-launch checks on 24 March. The decision was made to continue with the count-down and to check again for servo noise after turbine fire. If noise was still present after turbine fire, the flight would be cancelled.

(3) At X minus 90 seconds, the turbine ready light was on and the turbine running light came on momentarily. The turbine malfunction light came on immediately and the panel operator jettisoned tank pressure. The mission was cancelled.

(4) Ground checks revealed that the secondary injectors and the primary oxidizer injector in the gas generator start chamber were wet. However the primary fuel injector, which impinges on the glow plug, was dry indicating that this injector was clogged. Examination of the injector revealed no clogging material and it was presumed that whatever was causing the stoppage had dissolved or at least been softened by contact with the fuel. The mission was rescheduled for 25 March.

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(5) During preliminary pre-launch checks on 25 March servo noise was again encountered. It was assumed that the servo noise was being caused by the 400 cycle power source - namely, the B-50 alternator. The speed of the alternator was varied thru its operating range in order to confirm that this was the cause of the servo noise. During this check the alternator failed. Almost simultaneously with this failure, it was found that the missile relay antenna could not be moved or commanded from an extreme down position. It was found also that the MCG antenna was oscillating thru a 7° arc. The mission was cancelled.

(6) Ground checks revealed that the exciter on the right hand alternator had failed: the exciter was replaced. A broken linkage was found on the relay antenna; the linkage was replaced.

(7) Examination of the MCG antenna revealed nothing except an intermittent indicator assembly. This malfunction was corrected and this system worked satisfactorily.

(8) The mission has been tentatively rescheduled for Monday, 28 March. Two high pressure jettison O rings have been replaced to date in pressurizing the missile for these missions. (Secret)

b. XGAM-63 No. 48F: Normal maintenance and servicing were accomplished on this missile. (Unclassified)

c. XGAM-63 No. 49F: All modifications have been added to this missile. The autopilot and inertial guidance pre-flight checks were accomplished with no major discrepancies. A little difficulty was experienced with the blueprints on this missile. In many instances the prints were inaccurate. This can be attributed to all the modifications and changes incorporated in the missile at the Bell plant prior to delivery at HADC. It would be expected that these discrepancies would become less frequent on the later missiles after all the changes become incorporated in the manufacturing prints. (Secret)

d. F-80 No. 45-8484: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

e. B-50 No. 48-075: This aircraft is still in a standby status. (Unclassified)

f. B-50 No. 48-111: The accumulator on the hydraulic pump which supplies external servo actuating pressure to the missile was changed. (Unclassified)

g. B-47 No. 51-5220: It had been planned to use this aircraft to

track missile 33D on its flight on 24 March 1955. The aircraft took off in preparation for this tracking but as the launching was cancelled it returned to base. (Unclassified)

h. B-36 No. 51-5710: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

i. B-36 No. 51-5706: Further work was accomplished on the outfitting of this aircraft for director aircraft duty with the "F" series missiles. (Unclassified)

2. Test Operations:

a. No successful test operations were accomplished during this period.

b. Schedule of Test Operations for following week:

(1) XGAM-63 No 33D Hot Launch: 29 March 1955.

(2) B-47/XGAM-63 Captive Flight: 30 March 1955.

(3) B-47/XGAM-63 Captive Flight: 1 April 1955.

3. General: (Unclassified)

a. Aircraft used and hours flown:

B-47	#51-5220	2 hours
B-50	#48-075	1 hours, 30 minutes
B-50	#48-111	5 hours, 30 minutes
F-80	#45-8484	30 minutes

b. Contractor personnel assigned: 169 permanent, 55 temporary.

c. Project personnel assigned: 5 officers, 1 airman.

d. Number of visitors (not assigned to HADC) 3 military, 4 civilians.

The reason for the overall SECRET classification of this report is the XGAM-63 guidance and control details are SECRET. (Unclassified)

4. Conclusions and Recommendations: None

John E Richards

JOHN E. RICHARDS
Captain, USAF
Chief, XGAM-63 Project Officer

for Al W Kenney Major USAF

JOHN G. HEMANS
Lt. Col. USAF
Director of Test and Evaluation

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM-63, System No. 112A, Project Priority 1-A. Precedence Rating 11-3, For Week Ending 20 March 1955. Program Stage No. 4. Program Objectives: To obtain aerodynamic data; to test the propulsion system, the servo system and Model III X-Band guidance system; and to test the components of the warhead fuzing system. Preliminary Reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Assembly and Check-out Operations:

a. XGAM-63 No. 33D: Command calibrations and the weapon system check were accomplished on this missile without incident prior to its scheduled launching on 23 March 1955. The following items were replaced on the power pack: low pressure jettison valves; main propellant valve in the gas generator; and the O rings in the boost and cruise three-way valves. A detailed report on the pressure leaks in the power plant was submitted to the Bell Wheatfield Plant. (Secret)

b. XGAM-63 No. 48F: Normal maintenance and servicing were accomplished on this missile. (Unclassified)

c. XGAM-63 No. 49F: This missile arrived at HADC on 17 March 1955. Receiving inspections have been accomplished and minor modification kits (shock mounts, brackets, etc) are in the process of being installed. (Unclassified)

d. B-50 No. 45-8484: A hydraulic shutoff valve malfunctioned during an attempted guidance check flight on 17 March 1955. The valve was replaced with a different type valve which uses a more reliable operating principle. (Unclassified)

e. B-50 No. 48-075: This aircraft is in a standby status. It is not planned to use this aircraft for any further missile launchings. (Unclassified)

f. B-50 No. 48-111: Pre-flight checks were accomplished on this aircraft without incident prior to its flight as director aircraft for the launchings of XGAM-63 No. 33D on 23 March 1955. (Unclassified)

g. B-47 No. 51-5220: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

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h. B-36 No. 51-5710: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

i. B-36 No. 51-5706: Further work was accomplished on the outfitting of this aircraft for director aircraft duty with the "F" series missiles. (Unclassified)

2. Test Operations:

a. XGAM-63 Captive Flight:

(1) Date of Test: 18 March 1955.

(2) Aircraft Involved: DB-36 No. 51-5710 and XGAM-48F.

(3) Purpose of Test:

(a) Primary Purpose: To perform an airborne operational check of all electrical and electronic systems of XGAM-63 No. 48F and director DB-36 No. 51-5710 during a simulated launch.

(b) Secondary Purpose: To increase the proficiency of flight and ground personnel in preparation for the launching of single axis inertial guidance missiles. (Unclassified)

(4) Description of Test: The B-36 climbed to 40,000 feet and made several simulated runs to check out the K-System, USR and associated equipment. The aircraft then dropped to 25,000 feet where several inertial guidance problems were run. (Secret)

(5) Results of Test: All systems worked exceptionally well. This is the fourth consecutive flight wherein the automatic altitude tracking system was completely satisfactory. (Secret)

b. Schedule of Test Operations for Following Week:

(1) B-50/F-80 Guidance Check Flight: 21 March 1955.

(2) B-47/XGAM-63 Captive Flight: 22 March 1955.

(3) XGAM-63 No. 33D Hot Launch: 23 March 1955.

(4) B-36/XGAM-63 Captive Flight: 25 March 1955.

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Weekly Test Status Report, XGAM-63, 20 March 1955.

3. General: (Unclassified)

a. Aircraft used and hours flown:

B-36	#51-5706	4 hours, 5 minutes
B-36	#51-5710	4 hours, 5 minutes
B-50	#48-111	1 hour, 20 minutes
F-80	#45-8184	1 hour, 45 minutes

b. Contractor personnel assigned: 169 permanent, 53 temporary.

c. Project personnel assigned: 5 Officers, 1 Airman.

d. Number of visitors (not assigned to HADC) 8 military.

4. Conclusions and Recommendations: None.

The reason for the overall SECRET classification of this report is the XGAM-63 guidance and control details are SECRET. (Unclassified)

for Robert A. Armstrong, 1st/Lt
JOHN E. RICHARDS
Capt., USAF
Chief, XGAM-63 Project Office

John G. Hemans
JOHN G. HEMANS
Lt. Col., USAF
Director of Test and Evaluation

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM-63, System No. 112A, Project Priority 1-A. Precedence Rating II-3 For Week Ending 13 March 1955. Program Stage No. 4. Program Objectives: To obtain aerodynamic data; to test the propulsion system, the servo system and the Model III X-Band guidance system; and to test the components of the warhead fuzing system. Preliminary Reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Assembly and Check-out Operations:

a. XGAM-63 No. 33D: Missile arrived at HADC on 8 March. Receiving inspections were accomplished. Unattended Search Radar (USR) and autopilot pre-flight checks were accomplished without incident. Power plant high pressure checks were accomplished and low pressure checks were started during the past week. No major discrepancies were noted. (Secret)

b. XGAM-63 No. 48F: Normal maintenance and servicing were accomplished on this missile. A loading and fit check was accomplished in conjunction with DB-47 No. 51-5220 on 8 March. The B-47 was set on 14 inch ramps to simulate the lowered bed of the redesigned carriage. Loading was accomplished without incident. (Unclassified)

c. F-80 No. 45-8484: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

d. B-50 No. 48-075: This aircraft is in a standby status. It is not planned to use this aircraft for any further missile launchings. (Unclassified)

e. B-50 No. 48-111: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

f. B-47 No. 51-5220: A systems check was accomplished on this aircraft in conjunction with XGAM-63 No. 48F prior to a captive flight on 12 March. (Unclassified)

g. B-36 No. 51-5710: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

h. B-36 No. 51-5706: Work has progressed on outfitting checking in preparation for director aircraft duty with the F series missiles. (Confidential)

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2. Test Operations:

a. XGAM-63 Captive Flight:

(1) Date of Test: 8 March 1955. (Unclassified)

(2) Aircraft Involved: DB-36 No. 51-5710 and XGAM-63 No. 48F. (Unclassified)

(3) Purpose of Test:

(a) Primary Purpose: To perform an airborne operational check of all electrical and electronic systems of XGAM-63 No. 48F and director DB-36 No. 51-5710 during a simulated launch. (Unclassified)

(b) Secondary Purpose: To increase the proficiency of flight and ground personnel in preparation for the launching of single axis inertial guidance missiles. (Unclassified)

(4) Description of Test: A last minute engine repair delayed takeoff approximately two hours. Consequently, it was not possible to accomplish a full countdown and still land before dark. The B-36 climbed to 40,000 feet where as many checks as possible on the K-system and the USR were made in the time remaining. (Secret)

(5) Results of Test: All the systems checked were working satisfactorily. (Secret)

b. XGAM-63 Captive Flight:

(1) Date of Test: 12 March 1955.

(2) Aircraft Involved: DB-47 No. 51-5220 and XGAM-63 No. 48F.

(3) Purpose of Test:

(a) Primary Purpose: To perform an airborne operational check of all electrical and electronic systems of XGAM-63 No. 48F and director DB-47 No. 51-5220 during a simulated launch. (Unclassified)

(b) Secondary Purpose: To increase the proficiency of flight and ground personnel in preparation for the launching of single axis inertial guidance missiles. (Unclassified)

(4) Description of Test: The B-47 climbed to 37,000 feet and proceeded to fly several simulated launch runs on NIP while the K-system, USR, and associated equipment were checked out. (Secret)

(5) Results of Test: The relay and command antenna could not be extended during the flight and consequently the relay signal strength was below normal. However, no other major discrepancies occurred and the countdown was accomplished satisfactorily. (Secret)

3. General: (Unclassified)

a. Aircraft used and hours flown:

B-36	#51-5710	4 hours, 5 minutes
B-47	#51-5220	2 hours, 30 minutes
B-36	#51-5710	2 hours, 45 minutes

b. Contractor personnel assigned: 170 permanent, 43 temporary.

c. Project personnel assigned: 5 Officers, 1 Airman.

d. Number of visitors (not assigned to HADC) 3 military, 1 civilian

The reason for the overall Secret classification of this report is the XGAM-63 guidance and control details are Secret. (Unclassified)

for Thomas E Sledge Jr Maj USAF
JOHN E. RICHARDS
Capt., USAF
Chief, XGAM-63 Project Office

for A W Lemming Major USAF
JOHN G. HEMANS
Lt. Col. USAF
Director of Test and Evaluation

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM-63, Project Priority 1-A. Precedence Rating II-3, For Week Ending 6 March 1955. Program Stage No. 4. Program Objectives: To obtain aerodynamic data; to test the propulsion system, the servo system and the Model III X-Band guidance system; and to test the components of the warhead fuzing system. Preliminary Reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Assembly and Check-out Operations:

a. XGAM-63 No. 34D: The relay magnetron failed during pre-flight pit checks prior to a hot launch on 1 March 1955. The magnetron was replaced. All other systems checked out satisfactorily. (Secret)

b. XGAM-63 No. 48F: Normal maintenance and servicing were accomplished on this missile. (Unclassified)

c. F-80 No. 45-8484: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

d. B-50 No. 48-075: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

e. B-50 No. 48-111: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

f. B-47 No. 51-5220: This aircraft is in the final stages of being checked out and outfitted for director aircraft duty with the F-series missiles. (Unclassified)

g. B-36 No. 51-5710: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

h. B-36 No. 51-5706: This aircraft is in the final stages of being outfitted and checked out in preparation for director aircraft duty with the F series missiles. (Unclassified)

2. Test Operations:

a. XGAM-Test Flight:

(1) Date of Test: 2 March 1955.

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Weekly Test Status Report, XGAM-63, 6 March 1955.

(2) Aircraft Involved: DB-50 No. 48-075 and XGAM-63 No. 34D.

(3) Purpose of Test:

(a) Primary Purposes: To obtain structural flight load data. Special instrumentation, consisting of strain gages and direct recording oscillographs, has been installed in this PFB for measurement and recording of in flight airload distribution. The pressure sensing system intended for use in the warhead fuzing system was to be tested. (Secret)

(b) Secondary Purposes: To test the "dual operator" relay-command guidance system and to obtain airframe/servo-pilot response data from pitch and yaw maneuvers. (Secret)

(4) Description of Flight: The missile experienced a normal launch and underwent a standard programmed climb to approximately 48,000 feet. Several commands were sent by the mid-course guidance (MCG) operator during the mid-course phase of the flight. Terminal dive was initiated by the Terminal Guidance (TG) operator at approximately X + 130 seconds. Ten seconds after dive initiation, all video contact was lost from the missile and simultaneously the L-band beacon was lost. The missile then entered a steep, near vertical dive. No destruct signal was sent from the ground, but it is believed that destruction was initiated at approximately 18,000 feet by the aneroid destruct system. The parachute apparently came out but streamered because of the great velocity of the missile. (Secret)

(5) Results of Test: Because of an internal power failure experienced just after dive, the primary purposes were not accomplished. The secondary purposes were only partially accomplished. Telemetry data show that the missile alternator failed at approximately the time that video and the L-band beacon failed. As the alternator voltage dropped, the rocket propellant valves closed and consequently a complete power plant shutdown resulted. Examination of the recovered alternator and its associated gears showed that the alternator gear box between the turbine and the alternator had completely stripped gears. These gears have been shipped back to the Bell plant in order to determine the sequence of the gear failures which in turn may indicate the prime cause for such malfunction. (Secret)

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b. XGAM-63 Captive Flights:

(1) Date of Tests: 1 and 4 March 1955.

(2) Aircraft Involved: DB-36 No. 51-5710 and XGAM-63 No. 48F.

(3) Purpose of Test:

(a) Primary Purpose: To perform an airborne operational check of all electrical and electronic systems of XGAM-63 No. 48F and director DB-36 No. 51-5710 during a simulated launch. (Confidential)

(b) Secondary Purpose: To increase the proficiency of flight and ground personnel in preparation for the launching of inertial guidance missiles. (Secret)

(4) Description of Tests: The B-36 climbed to 40,000 feet and made several simulated launch runs to check out the K-system, USR and associated equipment. The aircraft then dropped to 25,000 feet where several inertial guidance problems were run. (Secret)

(5) Results of Test: To date, these two flights have been the best captive flights accomplished with the B-36 and XGAM-63 No. 48F. All systems worked most satisfactorily including the Autoatic Altitude Tracking. On the 4 March flight a simulated launch countdown was accomplished for the first time. (Secret)

3. General: (Unclassified)

a. Aircraft used and hours flown:

B-36	#51-5710	8 hours
[illegible]	#51-5220	6 hours
B-50	#48-075	2 hours, 30 minutes
B-50	#48-111	3 hours, 15 minutes
F-80	#45-8484	45 minutes.

b. Contractor personnel assigned: 170 permanent, 53 temporary.

c. Project personnel assigned: 5 Officers, 1 Airman.

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Weekly Test Status Report, XGAM-63, 6 March 1955.

d. Number of visitors (not assigned to HADC) 9 Military, 6 Civilian.

The reason for the overall Secret classification of this report is the XGAM-63 guidance and control details are Secret. (Unclassified)

for Robert A. Armstrong, Jr.
John E. Richards
Captain, USAF
Chief, XGAM-63 Project Office

John G. Hemans
Lt. Col. USAF
Director of Test and Evaluation

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM-63, Project Priority 1-A. Precedence Rating II-3 For Week Ending 27 February 1955. Program Stage No. 4. Program Objectives: To obtain aerodynamic data: to test the propulsion system, the servo system and the Model III X-Band guidance system: and to test the components of the warhead fuzing system. Preliminary Reports issure during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Assembly and Check-out Operations:

a. XGAM-63 No. 34D: The weapon system check-out was accomplished on this missile without incident. The missile was fueled on 27 February prior to a launching scheduled for 1 March. (CONFIDENTIAL)

b. XGAM-63 No. 48F: Normal maintenance and servicing were accomplished on this missile. (UNCLASSIFIED)

c. F-80 No. 45-8484: Normal maintenance and servicing were accomplished on this aircraft. (UNCLASSIFIED)

d. B-50 No. 48-111: During the weapon system check with missile No. 34D, the command and relay R-T unit failed in this aircraft. A new R-T unit was substituted which necessitated the retuning of the duplexer in the missile. (SECRET)

e. B-50 No. 48-075: Normal maintenance and servicing were accomplished on this aircraft. (UNCLASSIFIED)

f. B-36 No. 51-5710: Normal maintenance and servicing were accomplished on this aircraft. (UNCLASSIFIED)

g. B-36 No. 51-5706: Normal maintenance and servicing were accomplished on this aircraft. (UNCLASSIFIED)

h. B-47 No. 51-5220: Normal maintenance and servicing were accomplished on this aircraft. (UNCLASSIFIED)

2. Test Operations:

a. F-80/B-50 Guidance Check Flight.

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Weekly Test Status Report, XGAM-63, 27 February 1955.

(1) Date of Test: 21 February 1955.

(2) Aircraft Involved: B-50 No. 48-075 and F-80 No. 45-8484.

(3) Purpose of Test: To train a guidance operator in the procedures involved for a launching of a XGAM-63, (SECRET)

(4) Description of Flight: The F-80 and B-50 were to rendezvous at 25,000 feet and fly a normal launch pattern. At a simulated launch time the F-80 was to accelerate and fly toward the target while the guidance operator in the B-50 commanded it. (SECRET)

(5) Results of Test: This flight was very successful with all systems operating satisfactorily and the purpose of test was accomplished.(CONFIDENTIAL)

b. XGAM-63 Captive Flight:

(1) Date of Tests: 22 and 23 February 1955.

(2) Aircraft Involved: DB-36 No. 51-5710 and XGAM-63 No. 48F.

(3) Purpose of Test:

(a) Primary Purpose: To perform an airborne operational check of all electrical and electronic systems of XGAM-63 No. 48F and director B-36 No. 51-5710 during a simulated launch. (CONFIDENTIAL)

(b) Secondary Purpose: To increase the proficiency of flight and ground personnel in preparation for the launching of inertial guidance missiles. (SECRET)

(4) Description of Test: The B-36 was to climb to 40,000 feet MSL and make several simulated launch runs to check out the K-systems, USR and associated equipment. The aircraft was then to drop to 25,000 feet MSL where several inertial guidance (IG) problems were to be run. (SECRET)

(5) Results of Test: On the 22 February flight, the low-voltage power supply in the USR (Unattended Search Radar) failed which precluded the video checks being made. The IG problems were run satisfactorily. On the 23 February flight all systems operated satisfactorily and the purposes were accomplished without incident. (SECRET)

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Weekly Test Status Report, XGAM-63, 27 February 1955.

3. General: (UNCLASSIFIED)

a. Aircraft used and hours flown:

B-36	#51-5710	6 hours, 40 minutes
B-50	#48-075	1 hour
B-50	#48-111	2 hours, 30 minutes
F-80	#45-8484	1 hour

b. Contractor personnel assigned: 169 permanent, 53 temporary.

c. Project personnel assigned: 5 Officers, 1 Airman.

d. Number of visitors (not assigned to HADC) 6.

The reason for the overall Secret classification of this report is the XGAM-63 guidance and control details are Secret. (UNCLASSIFIED)

John E. Richards
Capt. USAF
Chief, XGAM-63 Project Office

John G. Hemans
Lt. Col. USAF
Director of Test and Evaluation

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Declassified 3 July 69 AB

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM-63, Project Priority 1-A, Precedence Rating II-3, For Week Ending 20 February 1955, Program Stage No. 4, Program Objectives: To obtain aerodynamic data; to test the propulsion system, the servo system and the Model III X-Band guidance system; and to test the components of the warhead fuzing system. Preliminary Reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Assembly and Check-out Operations:

a. XGAM-63 No. 35D: Pit checks, fueling and pressurization were accomplished without incident prior to its scheduled launch on 16 February. (Unclassified)

b. XGAM-63 No. 34D: Autopilot preflight checks and command calibrations were completed without discrepancy. During the Unattended Search Radar (USR) preflight check, the USR magnetron failed to oscillate on high PRF. A new magnetron was substituted. Power plant high pressure checks and sequence checks have been completed. (Secret)

c. XGAM-63 No. 48F: Normal maintenance and servicing were accomplished on this missile. (Unclassified)

d. F-80 No. 45-8484: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

e. B-50 No. 46-111: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

f. B-50 No. 46-075: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

g. B-36 No. 51-5710: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

h. B-36 No. 51-5706: This aircraft is still in the process of being outfitted and checked out in preparation for director aircraft duty with the F series missiles. (Unclassified)

i. B-47 No. 51-5220: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

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Weekly Test Status Report, XGAM-63, 20 February 1955.

2. Test Operations:

a. XGAM-63 Test Flight:

(1) Date of Test: 16 February 1955.

(2) Aircraft Involved: DB-50 No. 48-111 and XGAM-63 No. 35D.

(3) Purpose of Test:

(a) Primary Purpose: To test the operation of the "dual operator" relay-command guidance system. The PPB was to be guidance controlled during both the mid-course and terminal phases of flight. In addition, the USR system was to be turned on at launch and the video presentation on the TG indicators monitored during the mid-course phase of flight. The pressure sensing system, the barometric pressure switches, and the impact fuzes which are intended for use in the warhead fuzing system were to be tested. (Secret)

(b) Secondary Purpose: To obtain airframe/servo-pilot response to commands introduced through the relay link. (Secret)

(4) Description of Flight: The missile experienced a normal launch and underwent a standard programmed climb to approximately 47,000 feet. However, at X +106 seconds the power plant experienced a premature shut-down and the missile entered a vertical dive. Destruct was commanded at 16,000 feet and recovery of the nose section was successful. (Confidential)

(5) Results of Test:

(a) Due to the premature power plant shutdown neither the primary nor the secondary purposes were accomplished. To date, no fix has been placed on the reason for the power plant failure. In flight, motion pictures and telemetered acceleration data as available at HADC indicate that there were no maneuvers violent enough to cause the propellant intakes to lose contact with the propellant. This is further confirmed by the fact that propellant pump inlet pressures remained normal until shutdown. Telemetry also indicates that the turbine pump gas generator led the shutdown and that the rocket propellant valves remained open until the

turbine-maintained voltage dropped to below 10 volts. Rocket chamber pressure declined in proportion to the dropping propellant pressures until flame-out occurred.

(b) Motion pictures indicate that on separation of the engine section from the tanks a very large and hot fire was released. Whether this fire occurred due to separation of the main propellant lines or was already present and remained to be released by separation of the sections can not be determined for lack of instrumentation. The fire was of such intensity that several aluminum lines were melted and some of the lines indicated internal burning. Motion pictures taken by one of the chase planes indicate a slight smoke streamer from the left side of the missile commencing immediately after launch.

(c) Telemetered data indicate that the back pressure control valve nitrogen pressure, which comes from the same source as that of the gas generator propellant valve, was 610 psi prior to turbine fire, and was erratic around a median 675 psi until a telemetering failure after 27 seconds of operation after turbine fire. Due to the telemetering failure it can not be definitely determined if failure of this pressure supply closed the gas generator propellant valve. However, since telemetered propellant discharge pressures remained normal it can be assumed that the back pressure control valve was operating with approximately correct regulated pressure up to the point of shutdown. Actual operation of the recovered duplex pilot valve (which supplies this pressure to actuate the gas generator propellant valve) eliminates mechanical failure of this piece of equipment. The recovered gas generator propellant valve was found in the closed and sealed position. Both fuel and oxidizer pintles were bent so as to preclude actuation of the valve after recovery.

(d) It is the belief of the project office that failure was caused by the closing of the gas generator valve due to electrical means rather than due to loss of valve actuating pressure. It is further suspected that power plant fire from unknown sources caused the shutdown but due to lack of instrumentation there is no good foundation for this suspicion. (Confidential)

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Weekly Test Status Report, XGAM-63, 20 February 1955.

b. F-80-to-Lab Guidance Check Flight:

(1) Date of Test: 14 February 1955.

(2) Aircraft Involved: F-80 No. 45-8484.

(3) Purpose of Test: To check out the equipment in the F-80 for further use as a simulated missile.

(4) Description of Flight: The F-80 flew several simulated flights on NIP, each time being guided into the target from a ground station.

(5) Results of Test: This test was most successful with all systems operating satisfactorily. (Confidential)

3. General: (Unclassified)

a. Aircraft used and hours flown:

B-36	#51-5706	2 hours, 30 minutes
B-50	#48-075	1 hour
B-50	#48-111	2 hours, 30 minutes
F-80	#45-8484	2 hours, 05 minutes

b. Contractor personnel assigned: 169 Permanent, 55 Temporary.

c. Project personnel assigned: 5 Officers, 1 Airman.

d. Number of visitors (not assigned to HADC): 30.

4. Conclusions and Recommendations: None.

for Shelton G. Spear Capt USAF
JOHN E. RICHARDS
Captain, USAF
Chief, XGAM-63 Project Office

for A W Kenney, Maj USAF
JOHN C. HEMANS
Lt. Col., USAF
Director of Test and Evaluation

NOTE: The reason for the overall Secret classification of this report is the XGAM-63 guidance and control details are Secret. (Unclassified)

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM-63, Project Priority 1-A. Precedence Rating II-3, For Week Ending 13 February 1955. Program Stage No. 4. Program Objectives: To obtain aerodynamic data: to test the propulsion system, the servo system and the Model III X-Band guidance system: and to test the components of the warhead fuzing system. Preliminary Reports issued during period: None. Agency conducting Tests: Bell Aircraft Corporation. (Confidential)

1. Assembly and Check-out Operations:

a. XGAM-63 No. 30D: This missile was in standby status prior to its launching on 12 February 1955. (Unclassified)

b. XGAM-63 No. 34D: This missile arrived at HADC on 11 February 1955. Receiving inspections have been accomplished. (Unclassified)

c. XGAM-63 No. 35D: Command calibrations and weapon system checks were accomplished without incident. Power plant preflight checks indicated a requirement for replacement of the main oxidizer line. (Confidential)

d. XGAM-63 No. 48F: This missile underwent complete servicing and check-out in preparation for further captive flights with the B-36 and B-47. (Unclassified)

e. F-80 No. 45-8481: Troubleshooting of the azimuth computer from this aircraft was accomplished to correct the search antenna going out of synchronization quite frequently during a flight on 7 February. The troubleshooting revealed a few out-of-value resistors that were replaced. (Secret)

f. B-50 No. 48-075: An attempted launch on 9 February was cancelled after the automatic boost control on number four engine supercharger failed and prohibited climbing to the launch altitude. The flight was rescheduled for 10 February but loss of Askania coverage (due to a dust storm) caused cancellation of the mission. On 11 February the right alternator bearing seized and the load was transferred to the left hand alternator. Next the main inverter failed and the spare inverter was turned on. This resulted in the current limiter burning out, and loss of both the spare and the missile inverters. Ground checks indicated the failure of the inverters was due to two additional oscilliscopes being added to the load. The simultaneous failure of both the spare and the missile inverter was traced to the fact that both loads passed through the same current limiter. Launching on 12 February was accomplished without incident. (Unclassified)

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Weekly Test Status Report, XGAM-63, 13 February 1955.

g. B-50 No. 48-111: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

h. B-36 No. 51-5710: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

i. B-36 No. 51-5706: Normal Maintenance and servicing were accomplished on this aircraft. (Unclassified)

j. B-47 No. 51-5220: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

k. Relocation of the thrust chamber pressure transducers has eliminated the vibration problem. However, the overall accuracy and reliability of the Giannini transducers remains a factor which should be impartially surveyed. In view of the overall cost of expending a missile the price of the telemetering transducers should be relatively inconsequential as compared with the telemetered results of the flight. (Unclassified)

2. Test Operations:

a. XGAM-63 Test Flight:

(1) Date of Test: 12 February 1955.

(2) Aircraft Involved: DB-50 No. 48-075 and XGAM-63 No. 30D.

(3) Purpose of Test:

(a) Primary Purpose: To test the operation of the "dual operator" relay-command guidance system. The PPB was to be guidance controlled during both the mid-course and terminal phases of flight. In addition, the USR system was to be turned on at launch and the video presentation on the TG indications monitored during the mid-course phase of flight. The pressure sensing system and barometric switches of the warhead fuzing system were to be tested. (Secret)

(b) Secondary Purposes: To obtain airframe/servo pilot response to commands introduced through the relay link and to obtain enviromental data during flight. (Secret)

(4) Description of Flight: The missile experienced a normal launch and climbed to approximately 46,000 feet. All systems operated quite satisfactorily during the mid-course flight. Dive was initiated about 2 miles late by the terminal guidance operator, and the missile was then commanded into the target. The miss distance was approximately 1100 feet at 11 o'clock. (Secret)

(5) Results of Flight: This flight was accomplished with success. The guidance operators experienced no difficulty in tracking and guiding the missile into impact. Telemetry calibration was erroneous and consequently invalidated most of the instrumentation data. However Sandia telemetery and fuze component data were satisfactory. (Secret)

b. F-80-to-Lab Guidance Check Flight:

(1) Date of Test: 7 February 1955.

(2) Aircraft Involved: F-80 No. 45-8484.

(3) Purpose of Test: To check out the equipment in the F-80 for further use as a simulated missile. (Unclassified)

(4) Description of Flight: The F-80 climbed to altitude but found it necessary to return to base when its search antenna would not stay in synchronization. (Secret)

(5) Results of Flight: The flight was unsuccessful and resulted in further troubleshooting of the aircraft. (Unclassified)

3. General: (Unclassified)

a. Aircraft used and hours flown:

B-47	#51-5220	3 hours
B-50	#48-075	6 hours, 15 minutes
F-80	#45-8484	1 hour, 40 minutes

b. Contractor personnel Assigned: 169 permanent, 54 temporary.

c. Project Personnel Assigned: 5 Officers, 1 Airman.

d. Number of Visitors: (not assigned to HADC) 12.

4. Conclusions and Recommendations: An excessive number of power plant pressure leaks were experienced on missile No. 30D. A routine number have been experienced on every missile. Since a reasonable doubt exists as to whether these leaks are the result of mating the engine to the missile after test firing or as the result of the vibration of the airborne ferry trip from Buffalo New York, to Holloman AFB, it is recommended that before the missile reaches the OST stage, this problem be investigated to determine that the missile is capable of being transported by air without developing pressure leaks due to vibration. It is proposed that missiles be pressure checked at the Bell Aircraft plant and rechecked at Holloman AFB. Should positive results be obtained it is recommended that the

tanks be filled, possibly with a dye, and the missile be pressurized to simulate a mission. The results to be obtained are likely to have a strong bearing on the operational suitability of the missile. (Confidential)

The reason for the overall Secret classification of this report is the XGAM-63 guidance and control details are Secret. (Unclassified)

for Thomas E Sledge Jr Maj USAF

John E. Richards
Capt. USAF
Chief, XGAM-63 Project Office

John G. Hemans
Lt. Col. USAF
Director of Test and Evaluation

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(c) [illegible] "Regal" XB-63

a. Accomplishments and Deficiencies:

(1) The last six months of 1954 marked the most intensive flight testing of the XB-63 to date. Twelve XB-63 launchings were accomplished with ten of them occurring in the last three months. For the first time it was demonstrated that the MALC facilities and the Bell Test Crew are adequate to maintain an XB-63 launching schedule of one per week. In fact, it is considered that the XB-63 testing facilities at MALC are practically complete. (CONFIDENTIAL)

(2) A building was completed to house Sandia Corporation in support of their tests in conjunction with the XB-63. Tests of the first Sandia Corporation instrumentation were successfully carried out on three of the XB-63 launchings. (CONFIDENTIAL)

(3) The first XB-36 and XB-47 arrived at MALC for incorporation into the program. Facilities were established for maintaining these aircraft plus one additional XB-36 and XB-47 to arrive during the first six months of 1955. Initial checkout of the XB-36 and XB-47 has been successfully accomplished and captive flights are being conducted utilizing missile number 287. (CONFIDENTIAL)

(4) With the increased testing many technical accomplishments were realized. For the first time it was demonstrated that the missile Unattended Search Radar would successfully operate at 60,000 feet. A series of modifications to the servo system resulted in improved performance. The missile propulsion system safety circuitry caused two test failures. This circuitry was removed and a lanyard launching procedure adopted to provide crew safety. This transition was accomplished without incident, and propulsion system reliability appears to have been greatly improved. For the first time an XB-63 was guided all the way from launch to impact, thus demonstrating that the missile is at least capable of performing its mission. Missile 265 was guided to impact within 300 feet of the target (well within the design CEP of 1500 feet). (SECRET)

(5) The greatest deficiency, in the opinion of this writer, is missile reliability. The XB-63 is an extremely complex system, and it is yet to be demonstrated that the system is reliable enough to be operationally practical. Test and continuing improvements in reliability are encouraging, and the next year of testing should solve the reliability question one way or the other. (CONFIDENTIAL)

b. Resolved and Unresolved Problem Areas: The only known significant problem area is one of inadequate firing range at AMC for the longer range missiles to be launched from the XB-36 and XB-47 aircraft. It is desirable, if not practically mandatory, to fly over the Fort Bliss anti-Aircraft firing ranges with these missiles. This problem has been presented in the form of a request to WSEG to arrange for use of the Fort Bliss ranges for XB-63 firings. At the present time no commitment, satisfactory to the requirements of this project, has been obtained from Fort Bliss. (UNCLASSIFIED)

c. Funding, Personnel, and Facilities:

(1) For the first time in the history of this project at AMC, USAF officer personnel have been assigned for the specific purpose of evaluating XB-63 test results. Three officers are presently assigned. One monitors the guidance and servo systems; one monitors the warhead; and one monitors the propulsion system and all ground handling equipment. These officers are becoming familiar with the project; and for the first time it is believed that adequate reporting of test results and project progress can presently be accomplished. (UNCLASSIFIED)

(2) As previously stated facilities at AMC for testing the XB-63 are practically complete, and the maximum planned firing schedule of one missile launching per week can be supported with presently assigned facilities and personnel. (CONFIDENTIAL)

d. Future Plans and Programs: Present plans call for the launching of 39 XB-63's during calendar 1955. This will complete the R&D program for Objectives I and II, which are the XB-47/B-63 and XB-36/B-63 weapons systems respectively. No further firings of XB-63's at AMC are definitely established except for the Operational Suitability Test Firings. 32 OST missiles are to be launched during calendar 1956, and OST is to be completed by 1 January 1957. (CONFIDENTIAL)

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM-63; Project Priority 1-A. Precedence Rating II-3, For Week Ending 6 February 1955. Program Stage No. 4. Program Objectives: To obtain aerodynamic data: to test the propulsion system, the servo system and the Model III X-Band guidance system: and to test the components of the warhead fusing system. Preliminary Reports issued during period: None. Agency conducting tests: Bell-Aircraft Corporation. (CONFIDENTIAL)

1. Assembly and Check-out Operations:

a. XGAM-63 No. 30D: This missile is in standby status ready for launching. Propellants have been unloaded awaiting a shipment of satisfactory oxidizer. A weapon system change authorization has been approved to seperate the aft section of the missile from the tanks. It is hoped that, although no recovery parachute can be used, recovery of the power plant may be faciliated should destruction be necessary. (CONFIDENTIAL)

b. XGAM-63 No. 35D: Unattended Search Radar (USR) and autopilot preflight checks were accomplished without discrepancy. Power plant preflight checks have been started with a usual number of leaking lines. The K-23 timer was removed, bench checked, and reset to within specifications. (SECRET)

c. XGAM-63 No. 48 F: Normal maintenance and servicing were accomplished on this missile. (UNCLASSIFIED)

d. F-80 No. 45-8484: Troubleshooting was accomplished to determine the source of false commands experienced during recent F-80/B-50 flights. The trouble was traced to a noisy relay magnetron which was replaced. (SECRET)

e. B-50 No. 48-075; Normal maintenance and servicing were accomplished on this aircraft. (UNCLASSIFIED)

f. B-50 No. 48-111: Normal maintenance and servicing were accomplished on this aircraft.

g. B-36 No. 51-5710: Normal maintenance and servicing were accomplished on this aircraft. (UNCLASSIFIED)

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h. B-36 No. 51-5706: This aircraft is still in the process of being outfitted for director aircraft duty in conjunction with the inertial guidance missiles. (SECRET)

i. B-47 No. 51-5220: Normal maintenance and servicing were accomplished on this aircraft. (UNCLASSIFIED)

2. Test Operations:

a. F-80/B-50 Guidance Check Flight:

(1) Dates of Tests: 1 and 3 February 1955.

(2) Aircraft Involved: B-50 No. 48-111, F-80 No. 45-8484.

(3) Purpose of Test: To train a guidance operator in the procedures involved for a launching of a XGAM-63. (SECRET)

(4) Description of Flight: The F-80 and B-50 were to rendezvous at 25,000 feet and fly a normal launch pattern. At a simulated launch time the F-80 was to accelerate and fly toward the target while the guidance operator in the B-50 commanded it. (SECRET)

(5) Results of Test: During both flights, false commands and autopilot malfunctions occurred which precluded the possibility of accomplishing the purpose of the test flight. (SECRET)

b. XGAM-63 Test Flight:

(1) Date of Test: Captive Flight, 2 February 1955.

(2) Aircraft Involved: B-36 No. 51-5710 and XGAM-63 No. 48F.

(3) Purpose of Test:

(a) Primary Purpose: To perform an airborne operational check of all electrical and electronic systems of XGAM-63 No. 48F and director B-36 No. 51-5710 during a simulated launch.

(b) Secondary Purpose: To increase the proficiency of flight and ground personnel in preparation for the launching of inertial guidance missiles. (CONFIDENTIAL)

(4) Description of Flight: The B-36 climbed to 40,000 feet and made several runs on NIP. (CONFIDENTIAL)

(5) Results of Test: Except for a few minor discrepancies all checks were accomplished on this flight with success. (Confidential)

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Weekly Test Status Report, XGAM-63, 6 February 1955

3. General: (UNCLASSIFIED)

a. Aircraft used and hours flown:

B-36	#51-5710	4 hours, 20 minutes
B-50	#48-111	7 hours, 10 minutes
F-80	#48-848	2 hours, 45 minutes

b. Contractor Personnel Assigned: 170 permanent, 47 temporary.

c. Project Office Personnel Assigned: 5 Officers, 1 Airman.

d. Number of Visitors: (not assigned to HADC) None.

4. Conclusions and Recommendations: None.

The reason for the overall Secret classification of this report is the XGAM-63 guidance and control details are Secret. (UNCLASSIFIED)

for Robert A. Armstrong 1ST/LT

Everett H. Alford
2nd. Lt. USAF
Asst. Chief, XGAM-63 Project Office

John G. Hemans
Lt. Col. USAF
Director of Test and Evaluation

HADC 55-678

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3 July 69
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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM-63, Project Priority 1-A, Precedence Rating III-23, for week ending 30 January 1955, Program Stage No. 4, Program Objectives: To obtain aerodynamic data; to test the propulsion system, the servo system and the Model III A-band guidance system; and to test the components of the warhead fusing system. Preliminary Reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Assembly and Check-out Operations:

a. XGAM-63 No. 30D: Command calibrations and weapon system check were accomplished without incident. Power plant preflight checks indicated the replacement of a K-23 timer because of a malfunction which could not be reproduced when bench checked. The missile is now ready for a scheduled launch on 3 February 1955. (Confidential)

b. XGAM-63 No. 32D: During pre-launch checks prior to the first launch attempt on 26 January no command contact could be established between the director aircraft and the missile. Although the malfunction was not reproduceable on the ground, the director command transmitter was replaced and the mission was rescheduled for that afternoon. On the second try the mission was cancelled for lack of hydraulic power in the servo pilot system. A defective feedback potentiometer in the yaw gyro and the hydraulic pump were replaced. The turbine pump was operated for approximately 90 seconds prior to shutdown. Difficulty was experienced in replacing approximately eight gallons of oxidizer through the inlet screen but this difficulty was attributed to pump operation. The only major maintenance accomplished on power plant checks was the removal of the nitrogen pressure regulator pack for check and the replacement of the nitrogen filter which was clogged. (Confidential)

c. XGAM-63 No. 40F: Normal maintenance and servicing were done on this missile. (Unclassified)

d. F-80 No. 45-6484: Normal maintenance and servicing were accomplished on this simulated missile. (Unclassified)

e. B-50 No. 46-111: The command transmitter on this aircraft was replaced after the first attempt to launch XGAM-63 No. 32D. (Confidential)

f. B-50 No. 46-075: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

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Weekly Test Status Report, XGAM-63, 30 January 1955.

g. B-36 No. 51-5710: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

h. B-36 No. 51-5706: This aircraft is still at Convair, Fort Worth, having an engine changed. (Unclassified)

i. B-47 No. 51-5220: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

2. Test Operations:

a. XGAM-63 Test Flight:

(1) Date of test: 28 January 1955. (Confidential)

(2) Aircraft Involved: DB-50 No. 48-111 and XGAM-63 No. 32D. (Unclassified)

(3) Purpose of test:

(a) Primary Purpose: To test the operation of the "dual operator" relay-command guidance system. The PPB was to be guidance controlled during both the mid-course and terminal phases of flight. In addition, the USR system was to be turned on at launch and the video presentation on the TG indicators monitored during the mid-course phase of flight. The pressure sensing system and barometric switch of the warhead fuzing system were to be tested. (Secret)

(b) Secondary Purpose: To obtain airframe/servo-pilot response to commands introduced through the relay link and to obtain enviromental data in flight. (Secret)

(4) Description of Flight: This PPB was to be guidance controlled from launch until impact. The flight was to consist of a free drop launch at 30,000 feet altitude, a climb to approximately 47,000 feet, and a 30 degree dive on NIP. The missile climbed as programmed until approximately X +97 seconds. At an altitude of approximately 41,000 feet MSL, power plant failure occurred and the missile entered a vertical dive. Recovery was effected at approximately 16,000 feet. (Confidential)

(5) Results of flight: Telemetered data indicate that pump inlet pressure gradually decreased from tank pressure (50 PSI) to zero, indicating a throttling in the oxidizer line. Cavi-

tation of the pump and shutdown normally occurs in the range from 12 to 10 PSI. It was known upon loading the acid that the samples checked were somewhat milky, but chemical analysis indicates the total solids both dissolved and suspended to be of the order of .020% ±.003%. Bell Aircraft personnel, upon a qualitative estimate of the color of the acid, feel that the suspended solids were sufficient to clog the main oxidizer screen. Until the screen can be recovered and definite proof of the cause of the malfunction can be obtained, two less likely possibilities remain. One is that, since some modification to the tank was made to adapt the old type acid line to it, there is a possibility that some foreign object could have entered the line. The other is a possible collapse of the screen itself with a subsequent clogging down stream. (Confidential)

b. XGAM-63 Captive Flight:

(1) Date of test: 28 January 1955. (Unclassified)

(2) Aircraft Involved: DB-36 No. 51-5710 and XGAM-63 No. 48F. (Unclassified)

(3) Purpose of test: Airborne check-out of D series Missile. (Unclassified)

(4) Results of test: All checks were accomplished without incident. A malfunction occurred in the telemetry calibration circuitry which made telemetry results unreliable. (Unclassified)

3. General: (Unclassified)

a. Aircraft used and hours flown:

B-36	#51-5710	5 hours, 10 minutes
B-50	#48-111	8 hours
F-80	#45-8484	50 minutes

b. Contractor Personnel Assigned: 169 Permanent, 40 Temporary

c. Project Office Personnel Assigned: 5 Officers, 1 Airman

d. Number of Visitors (Not assigned to HADC): 5

Weekly Test Status Report, XGAM-63, 30 January 1955.

4. Conclusions and Recommendations: None.

Robert A. Armstrong 1ST LT.
for JOHN E. RICHARDS
Captain, USAF
Chief, XGAM-63 Project Office

John G. Hemans
JOHN G. HEMANS
Lt. Col., USAF
Director of Test and Evaluation

NOTE: The reason for the overall Secret classification of this report is the XGAM-63 guidance and control details are Secret.

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM-63, Project Priority 1-A, Precedence Rating III-23 for Week Ending 23 January 1955. Program Stage No. 4, Program Objectives: To obtain aerodynamic data; to test the propulsion system, the servo system and the Model III X-Band guidance system; and to test the components of the warhead fuzing system. Preliminary Reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Assembly and Check-out Operations:

a. XGAM-63 No. 30D: This missile arrived at HADC on 19 January 1955. Receiving inspections were accomplished. The unattended search radar receiver was found to be low in sensitivity and malfunctioning in automatic frequency control (AFC). The receiver-transmitter unit was removed for bench checking where it was found that the AFC search potentiometer was slightly out of adjustment. No cause for the low receiver sensitivity has as yet been found. Power plant functional and pressure checks have been started. Sandia instrumentation has been installed. Telemetry interference previously encountered on missile 31D, is to be eliminated if possible by shielding both offending motors. (Secret)

b. XGAM-63 No. 32D: Installation of a new vertical gyro and stable platform was accomplished and checked out satisfactorily. Command calibrations were accomplished without discrepancy. The weapon system check was initiated on 21 January 1955 in preparation for launching on 26 January 1955. An exceptionally large number of low pressure system leaks were corrected during power plant checks. Sandia telemetering interference has been eliminated by shielding the Carter "Magnatron" Converter and by replacing the ASCOP commutator motor by a vibrating relay. (Secret)

c. XGAM-63 No. 48F: Normal maintenance and servicing were accomplished on this missile. (Unclassified)

d. F-80 Simulated Missile No. 45-8464: Extensive troubleshooting was performed on this aircraft in an attempt to locate an autopilot malfunction experienced on F-80-to-lab flights on 18 and 19 January. Checks revealed no discrepancies and the autopilot system worked satisfactorily on the ground. The autopilot also worked satisfactorily on a B-50/F-80 mission on 20 January 1955; the malfunction apparently has corrected itself. (Unclassified)

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e. B-50 No. 46-075: Normal servicing and maintenance were accomplished on this aircraft. (Unclassified)

f. B-50 No. 48-111: Normal servicing and maintenance were accomplished on this aircraft. (Unclassified)

g. B-47 No. 51-5220: Normal servicing and maintenance were accomplished on this aircraft. (Unclassified)

h. B-36 No. 51-5710: Normal servicing and maintenance were accomplished on this aircraft. (Unclassified)

i. B-36 No. 51-5706: This aircraft was flown back to Convair-Ft. Worth, for an engine change. (Unclassified)

2. Test Operations:

a. F-80-to-Lab Guidance Check Flights:

(1) Dates of Tests: 18 and 19 January 1955. (Unclassified)

(2) Aircraft Involved: F-80 No. 45-8484. (Unclassified)

(3) Purpose of Test: To check out the guidance and autopilot systems of this aircraft under airborne conditions. (Unclassified)

(4) Results of Test: During both flights a severe drift was experienced in the yaw autopilot system. The symptoms were that either no signal was coming from the yaw gyro syncro or the yaw gyro itself was malfunctioning. All other systems worked satisfactorily. (Secret)

b. F-80/B-50 Guidance Check Flight:

(1) Date of Test: 20 January 1955. (Unclassified)

(2) Aircraft Involved: F-80 No. 45-8484 and B-50 No. 51-075. (Unclassified)

(3) Purpose of Test: To train a guidance operator in the procedures involved for a launching of a XGAM-63. (Secret)

(4) Results of Test: These runs went off exceptionally well and provided the much needed training for the student Terminal Guidance operator. (Secret)

c. XGAM-63 Test Flight:

(1) Date of Test: Captive Flight, 20 January 1955. (Unclassified)

(2) Date of Next Test: 25 January 1955. (Unclassified)

(3) Aircraft Involved: B-36 No. 51-5710 and XGAM-63 No. 46F. (Unclassified)

(4) Purpose of Test:

(a) Primary Purpose: To perform an airborne operational check of all electrical and electronic systems of XGAM-63 No. 46F and director B-36 No. 51-5710 during a simulated launch. (Confidential)

(b) Secondary Purpose: To increase the proficiency of flight and ground personnel in preparation for the launching of inertial guidance missiles. (Secret)

(5) Description of Test: The B-36 climbed to 40,000 feet and made several runs on NEP. (Unclassified)

(6) Results of Test: Loss of hydraulic power in the missile precluded some checks but all others were accomplished satisfactorily. The cause of hydraulic failure has as yet not been determined. (Confidential)

3. General: (Unclassified)

a. Aircraft used and hours flown:

B-36 #51-5706 2 hours

B-36 #51-5710 6 hours, 10 minutes

B-47 #51-5220 1 hour, 55 minutes

B-50 #48-075 4 hours

B-50 #48-111 2 hours, 20 minutes

F-80 #45-8484 4 hours, 10 minutes

b. Contractor Personnel Assigned: 169 Permanent, 43 Temporary.

c. Number of Visitors: (not assigned to HADC): 1.

Weekly Test Status Report, XGAM-63, 23 January 1955.

4. Conclusions and Recommendations: None.

JOHN E. RICHARDS
Captain, USAF
Chief, XGAM-63 Project Office

JOHN G. HEMANS
Lt. Col., USAF
Director, Test and Evaluation

NOTE: The reason for the overall Secret classification of this report is the XGAM-63 guidance and control details are Secret. (Unclassified)

Declass filed 3 July 69 aB

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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XGAM 63 Project Priority 1-A Precedence Rating III-33 For Week Ending 16 January 1955. Program Stage No. 4. Program Objectives: To obtain aerodynamic data; to test the propulsion system, the servo system and the Model III X Band guidance system; and to test the components of the warhead fuzing system. Preliminary Reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Assembly and Check-out Operations:

a. XGAM-63 No. 31D: Interference between the Sandia telemetry equipment and the L-Band beacon was experienced during the pre-launch checks on 12 January 1955. This interference was cleared up by the addition of R F Filters in the input and output of the Sandia equipment. (Confidential)

b. XGAM-63 No. 32D: Considerable noise emanated from the servo pilot stable platform during the initiation of a final autopilot pre-flight check. The platform was removed and checks revealed that the vertical gyro was producing the noise. A new gyro was installed resulting in exceptionally quiet operation. The power plant nitrogen regulator pack was removed for a check on an erratic first stage regulator. No apparent cause of the trouble has been found. (Secret)

c. XGAM-63 No. 46F: Normal servicing and maintenance were accomplished on this missile as was required to carry out the captive flights with the B-47 and B-36 director aircraft. (Unclassified)

d. F-80 No. 45-8484: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

e. B-50 No. 48-075: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

f. B-50 No. 48-111: Normal maintenance and servicing were accomplished on this aircraft. (Unclassified)

g. B-47 No. 51-5220: During a captive flight on 12 January 1955 with missile #46F, the command receiver in this aircraft failed to operate in so much as no output was obtained. This condition could not be duplicated on the ground. However, to be on the safe side another receiver transmitter assembly was substituted in preparation for another captive on 17 January 1955. (Confidential)

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Weekly Test Status Report No. 03 16 January 1955

b. B-36 No. 51-5710: This aircraft is at Convair Ft. Worth, Texas receiving a major inspection. (Unclassified)

c. B-36 No. 51-5706: This aircraft is in process of being outfitted for launchings of inertial guidance missiles. (Secret)

2. Test Operations: XGAM 63 Test Flight. (Secret)

a. Date of Test: 13 January 1955.

b. Aircraft Involved: DB-50 No. 48 111 and XGAM 63 No. 31D.

c. Purpose of Test:

(1) Primary Purpose: To test the operation of the "dual operator" relay command guidance system. The Guided Aircraft Missile (GAM) was to be guidance controlled during both the mid-course and terminal phases of flight. In addition, the USR system was to be turned on at launch and the video presentation on the TG indicators monitored during the mid course phase of flight. The pressure sensing system and barometric switches of the warhead fuzing system were to be tested.

(2) Secondary Purpose: To obtain airframe/servo pilot response to commands introduced through the relay link and to obtain environmental data in flight.

d. Description of Test as Scheduled:

(1) Take-off Time: 0700 hours

(2) True Airspeed at Launch: 234 knots

(3) Launch Time: 0924 hours

(4) Range: 38.1 nautical miles

(5) Mach Number: 1.85 maximum

(6) Duration of Flight: 195 seconds

e. Description of Flight as Scheduled: This GAM was to be guidance controlled from launch until impact. The flight was to consist of a free drop launch at 30,000 feet altitude, a climb to approximately 47,000 feet, and a 30 degree dive on MIP.

f. Description of flight: The flight was successfully performed, with a strike less than one hundred yards from target. Launch was normal and the missile climbed to 41,500 feet (programmed 47,000 feet). The missile entered cruise phase with the cruise chamber pressure approximately 75% design pressure. Two commands in azimuth were made during the mid-course phase of flight and one more after the missile entered terminal dive. False commands in azimuth were received during the flight. The missile entered dive at X + 141 seconds and video contact was lost 4.7 seconds later. Impact occurred at 196.8 seconds.

g. Results of flight: The purposes of the flight were successfully accomplished with the following two exceptions: Sandia compartment temperature telemetering had to be removed because of radio frequency interference and operation of the firing contacts of the group I barometric switches is not conclusive because of telemetering difficulties.

3. General: (Unclassified)

a. Aircraft used and hours flown:

B-47	#51-5220	4 hours, 50 minutes
B-50	#48-111	6 hours, 35 minutes
F-80	#49-8484	55 minutes

b. Contractor Personnel Assigned: 166 permanent, 52 temporary

c. Project Office Personnel: 5 Officers, 1 Airman

d. Number of Visitors: (Not assigned to HADC) 15

4. Conclusions and Recommendations: None.

for Shelton G. Spear, Capt. USAF
JOHN E. RICHARDS
Captain, USAF
Chief, XGAM-63 Project Office

JOHN G. HEMANS
Lt. Col., USAF
Director, Test and Evaluation

NOTE: The reason for the overall Secret classification of this report is the XGAM-63 guidance and control details are Secret. (Unclassified)

Perlas Field
3 July 69
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HOLLOMAN AIR DEVELOPMENT CENTER
Holloman Air Force Base
New Mexico

WEEKLY TEST STATUS REPORT

Report on XB-63 Project Priority 1-A, Precedence Rating III-23, For Period 20 December 1954 thru 9 January 1955. Program Objectives: To obtain aero-dynamic data; to test the propulsion system, the servo system and the Model III X-Band guidance system; and to test the components of the warhead fuzing system. Preliminary Reports issued during period: None. Agency conducting tests: Bell Aircraft Corporation. (Confidential)

1. Assembly and Check-out Operations:

a. XB-63 No. 31D: Following a captive flight (without power plant) on 22 December, pit checks indicated that a failure to respond in command was due to a loose pin in the dive relay circuit and an intermittently sticking crystal shutter. Further examination on external power indicated that the female plug on the servo amplifier junction box (P-31) had approximately 19 loose pins. The available length of cable dictated the replacement of the entire junction box. Further checks indicated that servo noise was sensitive to platform pitch potentiometer vibration. Since there was some doubt as to the degree of reliability of this potentiometer (or some part of the system with identical symptoms), it was replaced and the sensitivity to vibration was eliminated. Power plant Serial No. D-5 has been installed and checked out with minimum of difficulty with the exception of replacing the main acid line. As a result of a captive flight with PPB No. 32D, the fiberglas insulation has been replaced in the upper shell, although not in the boat tail. Sandia instrumentation has been successfully installed and checked out. All individual pre-flight preparations have been satisfactorily completed prior to a scheduled firing on 12 January. (Secret)

b. XB-63 No. 32D: Check-outs prior to a captive flight on 6 January were accomplished with a minimum amount of problems. Power plant No. D-3 was installed. As a result of the captive flight, it is possible that the power plant may have to be removed to provide access to a defective roll pitch gyro. Sandia instrumentation has been installed and checked out. The insulation is to be replaced in the upper shell. (Confidential)

c. XB-63 No. 48F: As a result of failure to locate the trouble in the USR (Unattended Search Radar) the objective of a captive flight, scheduled for 5 January, was changed to a check of the inertial guidance system. Since the IG system had not been completely checked out, take-off was delayed for a little more than an hour while troubleshooting for a loose connection and the mission was cancelled by the range control office. (Secret)

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Weekly Test Status Report, B-63, For Period 20 Dec 54 thru 9 Jan 55.

d. DB-50 No. 48-075: Periodic inspection has been completed with the exception of an engineering check flight. The aircraft is AOCP for two hydraulic accumulators. Two Bell Aircraft modification kits were installed to adapt the carrier to the D series missiles. (Unclassified)

e. DB-50 No. 48-111: Two captive flights were accomplished in conjunction with PPB's No. 31 and No. 32, and one F-80 flight was flown. Two modification kits have been installed to adapt the carrier to the D series missiles. (Unclassified)

f. DB-36 No. 51-5220: Periodic inspection is being conducted at Convair, Fort Worth, Texas. (Unclassified)

g. DB-36 No. 51-5706: This aircraft was received 22 December. Form 263 Equipment Inspections has been accomplished. An engineering flight was made on 7 January.

h. DB-47 No. 51-5220: A captive flight was made on 23 December. (Unclassified)

i. F-80 No. 45-8484: An engineering flight was made to check out the landing gear; one pilot check-out flight and one missile flight were made. (Confidential)

j. General: The transition from the B series bomber to the D series has entailed very few difficulties. (Unclassified)

2. Test Operations:

a. XB-63 Captive Flight: (Unclassified)

(1) Date of test: 22 December 1954. (Unclassified)

(2) Aircraft Involved: DB-50 No. 48-111 and B-63 No. 31D. (Unclassified)

(3) Purpose of Test: Airborne check-out of D series missile. (Unclassified)

(4) Results of Test: Extreme servo noise, failure to respond in command, and false commands were encountered during flight. The trouble was traced to a sprung cannon plug (see check-out and assembly, 1.a.). (Secret)

b. B-47 Captive Flight: (Unclassified)

(1) Date of Test: 23 December 1954. (Unclassified)

(2) Aircraft Involved: DB-47 No. 5220 and XB-63 No. 40F. (Unclassified)

(3) Purpose of Test: To familiarize the pilots with the aerodynamic characteristics of the aircraft with the off-center loaded missile. (Confidential)

(4) Results of Test: It was determined that approximately 1° of trim was required on takeoff and that the aircraft oscillated within pitch and yaw on extension of the missile fin. (Confidential)

c. F-80 Simulated Missile: (Unclassified)

(1) Date of Test: 30 December 1954. (Unclassified)

(2) Aircraft Involved: DB-50 No. 46-111 and F-80 No. 45-8484. (Unclassified)

(3) Purpose of Test: Operator training. (Unclassified)

(4) Results of Test: Although the USR gain was too high for good video reception, the mission was sufficiently successful to provide the desired guidance operator training. (Secret)

d. XB-63 Captive Flight: (Unclassified)

(1) Date of Test: 6 January 1955. (Unclassified)

(2) Date of Next Test: Launching, 12 January 1955. (Unclassified)

(3) Aircraft Involved: DB-50 No. 46-111 and XB-63 No. 32D. (Unclassified)

(4) Purpose of Test: Airborne check-out of D series missile. (Unclassified)

(5) Results of Test: The only major discrepancy encountered was the failure of the power plant timer to make the transition out of boost. It was noted that the temperature was -45°F and that the boat tail heaters were marginal. Upon completion of the flight the missile was removed from the carrier and the difficulty was not reproducable. After a two-hour soak, at a temperature of -40°F, the timer functioned perfectly. Even so, it was decided to replace the fiberglas insulation (which can collect hydraulic oil when the external hydraulic probe is pulled loose) in the upper shell. It is to be noted had the timer failed to run because of an electrical malfunction, the results would have been identical and that reproducability of the condition would have been impossible after removal of the missile from the carrier. An airborne power

plant sequence check was successfully run on 8 January 1955 without any indication of the previous malfunction. (Confidential)

3. General: (Unclassified)

a. Aircraft used and hours flown:

F-80	#45-0484	3 hours, 5 minutes
B-50	#48-111	6 hours, 30 minutes
B-50	#48-075	Inspection
B-36	#52-5706	5 hours, 30 minutes
B-36	#51-5710	Inspection
B-47	#51-5220	2 hours

b. Contractor Personnel Assigned: 165 permanent, 25 temporary.

c. Project Office Personnel: 5 Officers, 1 Airman.

d. Number of Visitors (not assigned to HADC): 12.

4. Conclusions and Recommendations: None.

PREPARED BY THE 6580TH TEST GROUP

John E. Richards

JOHN E. RICHARDS
Captain, USAF
Chief, B-63 Project

for John C. Hemans

JOHN C. HEMANS
Lt. Col., USAF
Commander

NOTE: The reason for the overall Secret classification of this report is the XB-63 guidance and control details are Secret.

Declassified
3 July 63

DISPOSITION FORM

SECURITY CLASSIFICATION (if any)

[redacted]

FILE NO.	SUBJECT
	HADC Semi-Annual Progress Report

TO	FROM	DATE	COMMENT NO. 1
[redacted] HDTM	HDTMR (B-63)	4 JAN 55 Capt Richards/dgf/5041	

1. Submitted herewith is the XB-63 Project information requested for the HADC Semi-Annual Progress Report:

a. Accomplishments and Deficiencies:

(1) The last six months of 1954 marked the most intensive flight testing of the XB-63 to date. Twelve XB-63 launchings were accomplished with ten of them occurring in the last three months. For the first time it was demonstrated that the HADC facilities and the Bell Test Crew are adequate to maintain an XB-63 launching schedule of one per week. In fact, it is considered that the XB-63 testing facilities at HADC are practically complete. (CONFIDENTIAL)

(2) A building was completed to house Sandia Corporation in support of their tests in conjunction with the XB-63. Tests of the first Sandia Corporation instrumentation were successfully carried out on three of the XB-63 launchings. (CONFIDENTIAL)

(3) The first DB-36 and DB-47 arrived at HADC for incorporation into the program. Facilities were established for maintaining these aircraft plus one additional DB-36 and DB-47 to arrive during the first six months of 1955. Initial checkout of the DB-36 and DB-47 has been successfully accomplished and captive flights are being conducted utilizing missile number 4SF. (CONFIDENTIAL)

(4) With the increased testing many technical accomplishments were realized. For the first time it was demonstrated that the missile Unattended Search Radar would successfully operate at 60,000 feet. A series of modifications to the servo system resulted in improved performance. The missile propulsion system safety circuitry caused two test failures. This circuitry was removed and a lanyard launching procedure adopted to provide crew safety. This transition was accomplished without incident, and propulsion system reliability appears to have been greatly improved. For the first time an XB-63 was guided all the way from launch to impact, thus demonstrating that the missile is at least capable of performing its mission. Missile 26S was guided to impact within 300 feet of the target (well within the design CEP of 1500 feet). (SECRET)

(5) The greatest deficiency, in the opinion of this writer, is missile reliability. The XB-63 is an extremely complex system, and it

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is yet to be demonstrated that the system is reliable enough to be operationally practical. Past and continuing improvements in reliability are encourging, and the next year of testing should solve the reliability question one way or the other. (CONFIDENTIAL)

b. Resolved and Unresolved Problem Areas: The only known significant problem area is one of inadequate firing range at HADC for the longer range missiles to be launched from the DB-36 and DB-47 aircraft. It is desirable, if not practically mandatory, to fly over the Fort Bliss Anti-Aircraft firing ranges with these missiles. This problem has been presented in the form of a request to WSPG to arrange for use of the Fort Bliss ranges for XB-63 firings. At the present time no committment, satisfactory to the requirements of this project, has been obtained from Fort Bliss. (UNCLASSIFIED)

c. Funding, personnel, and Facilities:

(1) For the first time in the history of this project at HADC, USAF officer personnel have been assigned for the specific purpose of evaluating XB-63 test results. Three officers are presently assigned. One monitors the guidance and servo systems; one monitors the warhead; and one monitors the propulsion system and all ground handling equipment. These officers are becoming familiar with the project; and for the first time it is believed that adequate reporting of test results and project progress can presently be accomplished. (UNCLASSIFIED)

(2) As previously stated facilities at HADC for testing the XB-63 are practically complete, and the maximum planned firing schedule of one missile launching per week can be supported with presently assigned facilities and personnel. (CONFIDENTIAL)

d. Future Plans and Programs: Present plans call for the launching of 39 XB-63's during calendar 1955. This will complete the R&D program for Objectives I and II, which are the DB-47/B-63 and DB-36/B-63 weapons systems respectively. No further firings of XB-63's at HADC are definitely established except for the Operational Suitability Test Firings. 32 OST missiles are to be launched during calendar 1956, and OST is to be completed by 1 January 1957. (CONFIDENTIAL)

2. The reason for the overall classification of SECRET for this report is the XB-63 guidance and control details are SECRET.

JOHN E. RICHARDS, Captain, USAF
Chief, B-63 Project Office

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Declassified
3 July 69
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Towards the close of World War II, the Army Air Force in the field of air defense had come the various results of experience in the air defense had come the various results of experience in the [illegible] desirable to profit further to attain.

This situation was recognized as critical and future advances in the development of air defense would make it even more so. To counter this situation, in April of 1946, the Air Material Command USAF, initiated the XB-69 (B&DCM) project for a study program for the connection of a supersonic air to surface (Interim Range) bomber carrying a substantial warhead. This study was later expanded to include a subsonic intercontinental range bomber eventually the subsonic jet bomber, el. In the spring of 1947, Air Materiel Command authorized Bell Aircraft to proceed with the detail design and construction of XB-[illegible].

In January 1948 Project MX-776 was divided into two separate phases: MX-776(A) CHRIS-A missile approximately 1/3 scale model of the future B&DCM.

MX-776(B) The XB-[illegible].

Approximately equal priority was given to both phases of the missile program until [illegible] when a major change in the [illegible] was announced.

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[illegible] the requirements set forth by the Army were [illegible] a supersonic, 20 meter [illegible] round warhead [illegible] aircraft. There were two main [illegible]

A. It was to serve as an [illegible] information would [illegible] larger than it, such as Radar, [illegible]

B. That it be optimally [illegible] tactical weapon.

The SHRIKE is a [illegible] meter [illegible] its aft and a [illegible] liquid rocket [illegible] servo motor. It is capable of carrying [illegible] meter warhead and is launched from altitudes between [illegible] feet. The [illegible] angles of 1.6 to 2.0 [illegible] homing and [illegible] designed [illegible] 4/

In January of 1957 the SHRIKE [illegible]

complete, that is it is [illegible] suitable for [illegible].

a. Any of the [illegible] systems, processes and techniques which have been developed and tested have been directly applicable to RAINAB in particular and to air-to-surface missiles in general.

b. The tactical weapon discussed was developed by Air Force personnel (Lt. [illegible] were present and [illegible] contract [illegible]) prior to completing the model bomb design. However, this mission was adequately [illegible] on a stand-up basis and SHRIKE was studied for various tactical applications as the requirements arose.

In 1961 actual work on the RAINAB [illegible] began. The Report is a rocket powered supersonic air to surface [illegible] vehicle bomber designed to carry a 7,000 pound warhead. Atomic warheads have the first priority, followed by [illegible] and biological warheads, at speeds ranging from about 1.5 to about 2.7 through all types of weather to a tactical or strategic target within a range of 20 [illegible] from the launch aircraft, a B-52 or B-47, with the B-52 being used as a carrier during Titles II and III testing. The principal dimensions are a length of 70 feet, a body diameter of 4 feet, and a maximum wing span of 17 feet. The engine weight is slightly over

of Pilots [illegible] have been [illegible] The objectives of these boys have been compared to [illegible] Service [illegible] Military Ballet [illegible] The objectives of the Ballet are [illegible] features.

Objective I.---The team, consisting of [illegible] would fly one XB-[illegible] Airforce version which, [illegible] XB-[illegible] and refueling between [illegible] Mediterranean [illegible].

Objective II.---The second part of the show would consist of [illegible] XB-[illegible] Airforce bomber, a DB-[illegible] fighter aircraft, a KB-[illegible] tanker, and refueling between [illegible] and [illegible] Mediterranean [illegible].

Objective III.---Modify the [illegible] to include armament and additional [illegible].

Objective IV.---The second [illegible] of a B-[illegible] would [illegible] for the [illegible] set of the entire XB-[illegible] mentioned under Objective I. The conversion of [illegible] aircraft [illegible] in the B-[illegible] bomber [illegible].

Objective IVa.---The second unit [illegible] with the more basic features of the preceding objectives but [illegible] objectives [illegible] to [illegible] reliability and accessibility of [illegible] Execution of [illegible] Objective IV, [illegible]

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[illegible] Objective X.--The statement of the objective [illegible] version would differ from the [illegible] version would be identical with the present [illegible] system will be developed which will provide [illegible] and permit an [illegible] flight capability.

A great deal of importance is placed on this project for this is the only [illegible] air to surface missile the Air Force is developing.

Until June 1954 progress on the project was entirely [illegible] a very low monthly launch rate. The latter, however was greatly increased during the 1 July to 31 December 1954 [illegible] period. It was during this period that for the first time a RACAL was called on the key [illegible] to increase [illegible] launch rate. This was accomplished by [illegible] only 200 feet away from the target. This [illegible] of a missile [illegible]. However, [illegible] conversion to [illegible] and [illegible] version is the [illegible] diversity. However, during this period of the 2 [illegible] launched, seven were [illegible] [illegible] a total rate of [illegible]

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only two could be considered satisfactory. Five [illegible] were [illegible] various [illegible] malfunctions, and [illegible] by a [illegible] rate gyro failure.[15]

The facilities at [illegible] for testing the XGAM-67 [illegible] which had no firing schedule of [illegible] launching [illegible] recently [illegible] facilities and personnel.

Present officials [illegible] call for the launching of 21 XGAM-67's during the remainder of calendar 1958. This according to Major Thomas [illegible] Jr., GAM-67 office chief is an unrealistic schedule and this program will undoubtedly slip at least 7 months beyond that date. The firing of these 21 missiles will complete the R and D program for objectives I and II."[16]

In conclusion I would like to use the words of Major Thomas [illegible] Jr., GAM-67 office chief, whose thoughts and comments on the subject I found to be reflected throughout my investigation of the project.[17]

"The greatest deficiency continues to be low missile reliability. Tests and attempted tests continue to fail because of various [illegible] component failures within the weapon system. Furthermore, there has been no significant improvement in reliability in the last six months. It appears extremely doubtful that there will be sufficient improvement in reliability

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MX –

2 – JHJ

3 – HADC Historical Report 1 July –

4 – MX 706 Patrol Plane [illegible]

5 – Strike Log [illegible]

5 – Strike X-9 Final Report [illegible]

6 – HADC Historical Report 1 July – 31 December 1954

7 – CHJ

8 – Radar Use of Meteorology Balloons

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