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AFR 110-14 USAF AIRCRAFT ACCIDENT INVESTIGATION REPORT

1 SEPTEMBER 92
GOLDWATER RANGE, AZ

F-16C
AIRCRAFT
S/N
83-1139

58 FW
314 FS

INVESTIGATION OFFICER
MICHAEL W. BODENHEIMER, LT COL, USAF

HQ
12th AIR FORCE PFS Exh. 141

COPY NUMBER 11 OF 11

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NUCLEAR REGULATORY COMMISSION

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DEPARTMENT OF THE AIR FORCE

HEADQUARTERS TWELFTH AIR FORCE (ACC)

BERGSTROM AIR FORCE BASE TEXAS

FROM: CC

SUBJ: Aircraft Accident Investigation: F-16C, SN83-1139,
1 September 1992, 58 FW (314 FS), Luke AFB AZ

TO: JA

Subject aircraft accident investigation is approved.

THOMAS A. BAKER
Lieutenant General, USAF
Commander

Global Power for America

57466

CERTIFICATION

I certify the documents contained in this report are true copies of the originals.



MICHAEL W. BODENHEIMER, Lt Col, USAF
Investigating Officer

AFR 110-14

AIRCRAFT ACCIDENT INVESTIGATION
FORMAL REPORT OF INVESTIGATION

1. AUTHORITY AND PURPOSE:

a. The Commander, Twelfth Air Force (ACC), appointed Lieutenant Colonel Michael W. Bodenheimer, under Air Force Regulation 110-14, to investigate and determine the facts and circumstances surrounding the aircraft accident involving F-16 aircraft, S/N 83-1139. Major Howard D. Wilcox, 58th Medical Group, Luke AFB, AZ, provided medical technical advice; Captain Ivan Mieth, 311 Fighter Squadron, Luke AFB, AZ, provided operations technical advice; First Lieutenant Bruce Ploeser, 311 Fighter Squadron, Luke AFB, AZ, provided maintenance and life support technical advice. Letters of appointment are located at Tab Y.

b. The purpose of the investigation is to obtain and preserve available evidence for claims, litigation, disciplinary, and administrative actions, and for all other purposes deemed appropriate by competent authority. The accident occurred at 1322 Mountain Standard Time (MST), on 1 September 1992. The aircraft impacted on Arizona's Barry Goldwater Range Complex and was destroyed. The pilot, Captain Edward J. Moran II, USMC, successfully ejected and received only minor injuries.

2. Summary of Facts:

a. History of Flight: Irate 03, number three in a flight of three F-16C/Ds, departed Luke at approximately 1255 hours on 1 September 1992 for a defensive air combat maneuvering (ACM) upgrade mission. Irate 01 was conducting an ACM-1 syllabus mission with the upgrading instructor in the rear cockpit. Irate 02 was conducting an ACM syllabus direct support mission. Irate 03 was the aggressor aircraft (bandit) for Irate 01 and 02. The flight accomplished weapons checks enroute to restricted area R-2301E (air-to-air training area), the working area. Two ACM setups were accomplished with Irate 03 acting as the bandit with pre-briefed parameters. The first two setups were terminated when the planned objectives were achieved. The mishap occurred during the setup for the third engagement. While maneuvering for the third setup, Irate 03 experienced an afterburner stall and subsequent engine stagnation. Irate 03 attempted three airstarts without success and subsequently ejected. The aircraft impacted the ground on Range 4. Captain Moran successfully ejected and received only minor injuries. News releases were provided to the public by the 58 Fighter Wing Public Affairs Office, Luke AFB, AZ (TAB AA-9).

b. Mission: The mission was an ACM-1 syllabus mission for Irate 01. Irate 01 was flown by Captain Ellison in the front cockpit and Captain Semmel in the rear cockpit. Captain Ellison was an ACM qualified instructor pilot. Captain Semmel was receiving an ACM-1 (observer only) instructor pilot upgrade. Irate 02 was flown solo by Captain Middleton who was conducting an ACM syllabus direct support mission. Irate 03 was flown solo by Captain Moran who was conducting an ACM syllabus direct support mission. The mission was tailored towards instructor pilot upgrade IAW F-16COIOPL/M syllabus. (TABS AA-4, V-2, V-3)

c. Briefing and Preflight:

(1) Testimony from all flight members indicates that crew rest was adequate for all pilots (TABS V-2, V-3, V-5, V-6).

(2) Mission planning was accomplished on the day prior and the day of the mishap. Irate 03's participation in mission planning was minimal (TAB V-2), which is normal for this type of flight. The briefing began on time (two hours prior to takeoff) in the 314 Fighter Squadron. Captain Ellison briefed all required information using ACCR 55-116 briefing guides (TAB AA-5). All training rules were covered adequately, and special emphasis was given to use of afterburner during the ACM engagements (TABS V-2, V-3, V-5, V-6). The briefing ended 10-12 minutes before the briefed time to depart the building for the aircraft. Preflight was normal for all aircraft (TABS V-2, V-3, V-5, V-6).

(3) Irate 03 ground aborted the scheduled aircraft due to a jet fuel starter (JFS) malfunction. Adequate time was given for Irate 03 to proceed to the spare (mishap) aircraft and complete normal preflight and ground operations (V-2).

d. Flight Activity:

(1) Irate 01 flight was filed and cleared for the AZAR-ARSON 2 stereo flight plan which included entry and exit times for R-2301E, and an instrument flight rules (IFR) pickup and recovery to Luke AFB. The three-ship taxied to the arming area for pre-takeoff quick check in accordance with local directives with no abnormalities or delays. Irate 01 flight took off at approximately 1255 hours, and the flight profile was flown without incident through R-2301E entry (TABS V-2, V-3).

(2) Irate 01 and 02 accomplished a formation military power takeoff with Irate 03 making a single ship takeoff 15 seconds behind 01 and 02. Irate 03 joined to a one mile trail and accomplished an air-to-air weapons check as briefed. Irate 01 and 02 moved to a tactical formation with Irate 02 in a 1 mile line abreast formation. Irate 03 began a defensive ranging exercise by flying between Irate 01 and 02. Irate 03 took the navigational lead while 01 and 02 accomplished a weapons check

and offensive ranging exercise on Irate 03 (TABS V-2, V-3, V-5).

(3) Irate flight proceeded enroute to R-2301E following Standard Instrument Departure procedures. Captain Ellison (Irate 01) checked the flight in with Gila Bend Range Operations and initiated an operations check in accordance with local procedures. Once established in the area a "G" awareness maneuver was conducted in accordance with local procedures (TABS V-2, V-3).

(4) Irate flight successfully completed two defensive ACM engagements with Irate 03 acting as the bandit using briefed set up parameters with terminations after achieving pre-briefed objectives (TABS V-2, V-3, V-5).

(5) During a military power climb setting up for the third engagement, Irate 03 selected full afterburner (AB) in order to close on Irate 01 and 02. After several seconds in AB, at 460 knots, 19000 feet above sea level (MSL), and wings level flight, the mishap pilot heard a loud bang and felt the aircraft rumble. The mishap pilot canceled AB by returning the throttle to military power. He then transmitted "knock-it-off" on the UHF area frequency and maneuvered the aircraft in a slightly descending right-hand turn to the north/northeast (TAB V-2). Irate 02 transmitted on the radio to Irate 03 that the aircraft was on fire (TABS V-2, V-5, N-5). Captain Moran retarded the throttle to idle and noticed the RPM decreasing through 60% and realized the engine had stagnated (TAB V-2). Irate 01 transmitted the fire was out and to apply the Critical Action Procedures (CAPS) (TABS V-3, N-5).

(6) Captain Moran accomplished the CAPS which included moving the throttle to the cutoff position and moving the JFS switch to start two. The fan turbine inlet temperature (FTIT) decreased into airstart parameters as did the RPM and the throttle was moved to the idle position. The first start attempt was made using the unified fuel control (UFC) at 19000 MSL. Captain Moran noted the FTIT began rising, but the RPM continued to decrease. At this time, Captain Moran noted that the JFS had not started. The FTIT continued to climb and the throttle was moved to cut-off as maximum airstart temperature was reached (TAB V-2).

(7) Captain Moran maneuvered the aircraft towards an emergency landing field while preparing for the next airstart attempt. The second airstart was attempted using the back-up fuel control (BUC). Captain Moran increased airspeed and at approximately 300 knots, 15,000 MSL, 25% RPM and FTIT below 700 degrees attempted the first BUC airstart. The FTIT and RPM both began to increase, and Captain Moran radioed to the flight that he may get the engine restarted (TAB V-2). The RPM increased to over 30%, but as the aircraft was leveled off at approximately 12000 MSL, the RPM began to decrease and the FTIT continued to rise. The throttle was moved forward slightly without any effect on RPM. The BUC idle position was not reached with the throttle.

The throttle was moved to cutoff again after the FTIT exceeded the maximum. Captain Moran determined he could not glide to the emergency landing field and elected to perform another BUC air-start (TABS V-2, V-3, V-5, N-3).

(8) The third airstart attempt began at 12000 MSL, RPM less than 15%, FTIT in limits, and airspeed less than 300 knots. Captain Moran lowered the nose and accelerated above 300 knots. The throttle was moved to idle again when the RPM rose above 15% with the FTIT in limits. Once again the FTIT began to rise past 800 degrees with no RPM increase. Captain Moran does not recall if he moved the throttle to off after this attempt (TAB V-2).

e. Impact:

After three unsuccessful airstart attempts and altitude approaching 2000 feet above ground level, Captain Moran began to prepare for ejection (TAB V-2). Captain Ellison (Irate 01) informed him Range 4 was on his nose and that he should come right and zoom the aircraft (TAB V-3, N-8). Captain Moran turned right slightly, zoomed, and successfully ejected from the aircraft. The aircraft continued to climb slightly, then descended to its impact with the ground on Range 4 (TABS V-2, V-3).

f. Ejection: The ejection seat in aircraft 83-1139 sequence was initiated within the performance envelope (TAB C). Captain Moran's parachute opened normally, and he completed the four-line jettison (TAB V-2).

g. Personal and survival Equipment:

(1) Captain Moran's parachute landing fall (PLF) was very hard, but he received no significant injuries (TAB V-2). He did not turn off his personal locator beacon (PLB) as he thought it was located in the aircraft wreckage instead of the seat kit. Initial contact with Irate 01 was made using his survival radio and by talking over the beacon that was transmitting on guard. Captain Moran switch to 282.8 for the remainder of the search and rescue (TABS V-2, V-3, V-5).

(2) The only problem with the survival equipment occurred when the life raft which inflated normally during the ejection was ruptured when Captain Moran inadvertently pulled it into a thorn bush. Additionally, all personal and survival equipment inspections were current (TAB AA-8).

h. Rescue:

(1) The mishap happened at 1322 hours 1 September 1992.

(2) The first ejection call was made on UHF 369.1 by Irate 01 at 1322 hours (TAB V-3). The Luke SOF acknowledged the ejection call on UHF (TAB V-7).

(3) The SOF activated the crash net (TAB V-7). Through coordination with Gila Bend tower and Gila Bend Range Control an Army Blackhawk helicopter on the field at Gila Bend was dispatched to the scene and recovery of the downed pilot was accomplished.

i. Crash Response:

(1) The 58FW SOF notified the Luke Command Post, Gila Bend tower, and Gila Bend Range Control via landline upon hearing of the mishap (TAB V-7). A US Army Blackhawk refueling at Gila Bend AFAF was dispatched to the scene.

(2) After ejection, Irate 03 found a good landing zone for the helicopter and waited nearby (TAB V-2). The helicopter flew directly over the aircraft wreckage at which time Irate 02 gave the helicopter bearing and range to the downed pilot via UHF radio (TAB V-5). Captain Moran used a smoke flare to identify the landing area for the helicopter (TAB V-2). The pilot was transported to the hospital at Gila Bend AFAF. The approximate time from ejection to rescue was 15 minutes.

j. Maintenance Documentation.

(1) Air Force Technical Order (AFTO) Forms 781 and Core Automated Maintenance System (CAMS) computer records were reviewed. AFTO 781 discrepancies notes since the last maintenance preflight inspection are listed in (TAB AA-1-1). The production superintendent cleared the exceptional release on the AFTO 781H prior to the mishap (TAB AA-1-1). No discrepancies were found relating to the mishap.

(2) No Time Compliance Technical Orders (TCTOs) were overdue. TAB H-7 accurately itemizes TCTOs not complied with and their grounding dates.

(3) Scheduled inspections were reviewed. None were overdue. A local 50 hour engine inspection was completed on 5 Aug 92. No major or pertinent discrepancies were noted.

(4) The pre-mishap Joint Oil Analysis (JOAP) records of the engine were reviewed (TAB AA-3). All readings were within normal limits and no adverse trends were noted.

(5) The aircraft's time change records were reviewed. No time change items were overdue.

(6) No items were overdue in the aircraft's events listing (EVL).

(7) There were two open RED DIAGONAL write-ups in the active AFTO 781A (TAB AA-1-8). Neither discrepancy would impede the safety of flight and were not uncommon. Additionally there

were 4 open RED DIAGONAL write-ups in the AFTO 781K (TAB AA-1-13). None were unusual or would pose a safety of flight problem.

(8) All maintenance procedures, practices, and performances were normal.

k. Maintenance Personnel and Supervision.

(1) Basic preflight and thru flight were correctly performed on the day prior to the mishap for F-16, S/N 83-1139. The dedicated crew chief did accomplish a walk around inspection prior to flight. The active AFTO Form 781H (TAB AA-1-1) indicates the thru flight was completed and signed off by the assigned dedicated crew chief at 1030 hours local on 1 Sep 92.

(2) A review of training records revealed the flight line personnel associated with F-16, S/N 83-1139 were qualified for their assigned tasks with the following exceptions.

(a) SSgt Anthony E. Smith's training record indicates that he had attained a 5-skill level. In the AFTO Form 781A dated 20 Aug 92 (TAB AA-2) Sergeant Smith completed and signed off a 7-level engine inspection prior to it's installation. Further investigation revealed that the AF Form 2096 and TAC Form 64 which upgraded Sergeant Smith to a 7-level were lost shortly after his arrival at Luke AFB. Subsequently the upgrade was never accomplished. A thorough review of Sergeant Smith's training record and testimony of the 314 FS Maintenance Superintendent, Chief Master Sergeant John L. Satre, strongly supports Sergeant Smith's technical competence to perform such an inspection (TAB V-11).

(b) Airman Darren K. Milliken's training record had no job skills signed off. Airman Milliken arrived in the 314 FS on 28 July 92 (his first duty assignment). Although Airman Milliken launched 83-1139 without any complications his records indicate that he was not yet qualified to launch the aircraft.

(3) The fuel flow proportioner light was confirmed bad during the first launch on 1 Sep 92 of the mishap aircraft. Staff Sergeant Carr had not yet changed the light bulb when aircraft 83-1139 was chosen as a spare for another aircraft which had ground aborted (TAB V-8). When Airman Milliken launched the mishap aircraft he noticed the burned out light and informed the pilot who accepted the confirmed discrepancy (TAB V-14).

l. Engine, Fuel, Hydraulic and Oil Inspection Analysis.

(1) Engine inspection data was normal.

(2) Fuel test data was normal.

(3) Hydraulic fluid data was normal.

(4) Oil test data was normal.

m. Airframe and Aircraft Systems. Based on technical and engineering evaluations of materials found, for an undetermined reason the engine experienced an augments stall during flight which proceeded to stagnation and did not recover during three start attempts (TAB J). Except for the engine's stagnation and subsequent failure to start, aircraft systems seemed to be operating normally. The following discrepancies are noted although they could not be determined to have failed prior to impact:

(1) One nut plate was found lodged between the fifth variable vane and the fifth synchronizing ring (TAB J-5).

(2) The Rear Compressor Variable Vanes (RCVV) were found in the cambered position. Although impact marks on the Inlet Guide Vane I.D. shroud indicate that the RCVV were in the axial position at impact and presumably dragged to their present cambered position during the breakup (TAB J-5).

(3) For an undetermined reason the jet fuel starter did not operate during the pilot's attempt to restart the aircraft (TAB J).

n. Operations Personnel and Supervision: This mission was authorized by Lt Col Scott C. Harrison on Luke AFB Form 175, order number 159 (TAB K). Captain Ellison briefed the mission using ACCR 55-116 briefing guides. Squadron supervisory personnel were in the squadron building but did not attend Irate's flight briefing, which is normal. The mission was thoroughly and adequately briefed (TABS V-2, V-3, V-4, V-5, V-6).

o. Pilot Qualification:

(1) Examination of pilot records indicated the mishap pilot was highly qualified and current in accordance with current regulations and directives to fly the mission.

(2) Captain Moran was an experienced instructor pilot with 1687.4 hours of flight time, 1157.6 of those in the F/A-18, and 262.9 hours in the F-16C/D. Captain Moran's formal training courses were normal and unremarkable. He was proficient in all 314th missions and had flown regularly during the last 30, 60, and 90 day periods (TAB T-1). His instrument qualification was valid through Dec 92. His tactical mission/instructor qualification was valid through April 93 (TAB T).

(3) The flying experience for Captain Moran follows:

TOTAL TIME	F-16C/D	F/A-18	IP	30/60/90
1687.4	262.9	1157.6	140.3	23.7/51.8/72.5

p. Medical:

(1) The pilot was medically qualified for flight at the time of the mishap (TAB X). The toxicological report on Captain Moran was negative.

(2) Captain Moran suffered mild barotrauma to the left tympanic membrane. He was hospitalized overnight with no complications and returned to flying status on 4 Sep 92.

q. Nav aids and Facilities: All navigational aids and facilities were operational during the mission (TAB V AA-7).

r. Weather:

(1) There was no significant weather during the mishap flight. Weather observations from stations near the crash site were as follows (TAB AA-6):

(a) Luke AFB (1329) 25,000 scattered, 20 miles visibility, temperature 95 degrees, dewpoint 40 degrees, winds 220/05, altimeter 29.85.

(b) Gila Bend AFAF (1329) 6000 scattered, 25,000 thin broken, 40 miles visibility, winds 190/04, temperature 97 degrees, dew point 44 degrees, altimeter 29.87.

(2) Weather warnings and advisories

(a) Luke AFB- none

(b) Gila Bend AFAF- none

s. Directives and Publications:

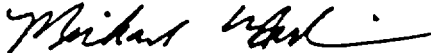
(1) The following publications were applicable to the mission:

AFM 50-46	Weapons Ranges
AFR 60-1	Flight Management
AFR 60-16	General Flight Rules
AACM 3-3, Vol V	Mission Employment Tactics - F-16
ACCR 51-50	Flying Training - Tactical Fighter
ACCR 51-50, Vol 6	F-16 Aircrew Training
ACCR 55-79	Aircrew/Weapons Controller
	Procedures for Air Operations

(Directives and Publications continued)

ACCR 55-116	F-16 Aircrew Operational Procedures
ACCR 60-2	Aircrew Standardization/Evaluation Procedures
T.O. 1F-16C-1	Fight Manual F-16C
T.O. 1F-16C-6-WC-1	Inspection requirements for the F-16C aircraft

(2) With the exception of documentation omissions in the maintenance training records shown in section k. (2) of this report, there were no known or suspected deviations from the directives or publications by the pilot or others involved in the mission.



MICHAEL W. BODENHEIMER, Lt Col, USAF
Investigating Officer

MEMO FOR RECORD

27 Oct 92

SUBJECT: Testimony of Witnesses not Used in Report

All witnesses interviewed by the safety board were also interviewed by the AFR 110-14 board. The testimony of the following individuals is not included in AFR 110-14 report as the testimony was either redundant or did not add to the report.

1. A1C Michael Mistretta
2. Mr. Mark Bristol
3. Mr. Anthony Alberico

Their testimony is on file with 12 AF/JA, Bergstrom AFB, TX.

Michael W. Bodenheimer

MICHAEL W. BODENHEIMER, Lt Col, USAF
Investigating Officer

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 58TH FIGHTER WING (ACC)
LUKE AIR FORCE BASE, ARIZONA

FROM: AFR 110-14 Accident Investigation Board
Luke AFB, AZ 85309-5000

28 Oct 92

SUBJECT: Wreckage Release to 58 FW/JA

TO: HQ USAF/JACC
Bolling AFB, DC 20332-6128

In accordance with AFR 110-14, para 10, all salvage wreckage from F-16C aircraft 83-1139, is released to 58 FW/JA.



MICHAEL W. BODENHEIMER, Lt Col, USAF
AFR 110-4 Investigating Officer

1st Ind, 58 FW/JA

TO: AFR 110-14 Investigating Officer

The salvaged wreckage was released to me by Lt Col Michael W. Bodenheimer.



JARRISSE J. SANBORN, Lt Col, USAF
Staff Judge Advocate

Aircraft Parts

- (1) Classified material, bldg 928, 314 FS.
- (2) Hanger 983, dock 8 remainder of aircraft. Key included with letter.

Memorandum for Record

Subject: Location of Original Documents for AFR 110-14 Board, F-16C SN 83-1139.

All documents in the AFR 110-14 Aircraft Accident Report are originals, except the following:

1. TAB A, Mishap Report, Original on file at 12 AF/SE.
2. TAB I, Material Deficiency Report Request, Original on file at 58 LG/LGQP.
3. TAB J, Technical and Engineering Evaluation of Materials, Original on file at 12 AF/SE.
4. TAB K-2, Local DD Form 175, Original on file at 314 FS.
5. TAB K-3, TAC Form 297 (Daily Schedule), Original on file at 314 FS.
6. TAB K-4 and 5, Forecast Weather and Weather Observation, Original on file at 58 OSS/OSW.
7. TAB L, Weight and Balance, Original on file at 314 FS.
8. TAB O-2, Printout from Seat Data Recorder, Original on file at 12 AF/JA AFR 110-14 Board Document Archives Aircraft SN 83-1139.
9. TAB Q, Orders Appointing Investigating Board, Original on file at HQ 12 AF/SE.
10. TAB R, Diagrams of Crash Site, Original on file at 12 AF/JA.
11. TAB T-2, AF Forms 8, Originals on file at 314 FS.
12. TAB T-3, Instructor Pilot Certification, Original on file at 314 FS.
13. TAB T-4, Instructor Pilot Training Summary, Original on file at 314 FS.
14. TAB T-5, TAC/PACAF/USAFER 55-116 (Atch 2), Original on file at 314 FS.
15. TAB W, Weather Observations, Originals on file at 58 OSS/OSW.
16. TAB X-2-1, Toxilogical Report, Original on file at 58 MED GP.

17. TAB X-3, Capt Moran's Last Flight Physical, Original on file at 58 MED GP.
18. TAB Y, Orders Appointing AFR 110-14 Board Members, Originals on file at 12 AF/JA.
19. TAB AA-5, TAC/PACAF/USAFER 55-116 (Atch 1), Original on file at 314 FS.
20. TAB AA-9, News Release, Original on file at 58 FW/PA.
21. TAB AA-1, Active Aircraft, Engine, and TCTO AFTO Forms 781, Originals on file at 12 AF/JA AFR 110-14 Board Document Archives Aircraft SN 83-1139.
22. TAB AA-2, AFTO Form 781A dated 19 Aug 92, Original on file at 12 AF/JA AFR 110-14 Board Document Archives Aircraft SN 83-1139.
23. TAB AA-3, Joint Oil Analysis Record, Original on file at 12 AF/JA AFR 110-14 Board Document Archives Aircraft SN 83-1139.

Michael W. Bodenheimer

MICHAEL W. BODENHEIMER, Lt Col, USAF
Investigating Officer