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OFFICE OF THE SECRETARY RULEMAKINGS AND ADJUDICATIONS STAFF

AIRCRAFT ACCIDENT INVESTIGATION

AUTHORITY: Under the provisions of Air Force Regulation (AFR) 110-14, the Ninth Air Force Commander appointed Lieutenant Colonel Steven S. Forberg to conduct an Aircraft Accident Investigation of the F-16C (SN83-1151) accident which occurred on the 250 degree radial 40 miles from the 363 TFW deployed location (classified) on 3 September 1990. The investigation was conducted from 1 November 1990 to 28 November 1990. Technical advisors were Major Vincent P. Wisniewski (operations), Captain Mark H. Rumph (maintenance), Captain George F. Craft II (flight surgeon), Major Robert F. Russell (legal), and SSgt Reginald W. Williams (administrative support) (TABS Y-1 and Y-2).

PURPOSE: An aircraft investigation is convened under AFR 110-14 to collect and preserve all relevant evidence for possible use in claims, litigation, disciplinary actions, adverse administrative proceedings, or for any other purposes deemed appropriate by competent authority. The investigation is conducted to obtain factual information and is not intended to determine the cause of the accident. In addition, the aircraft accident investigation board cannot draw conclusions or make recommendations. This report is available for public dissemination under the Freedom of Information Act (5 U.S.C. 522) and AFR 12-30.

SUMMARY OF FACTS

1. History of Flight: On 3 September 1990, 1Lt Richard F. Setser, Jr., an F-16 pilot from the 363d Tactical Fighter Wing (Deployed), was scheduled as number two (wingman) for a four-ship, low-level Surface Attack Tactics (SAT) training mission in the military training area adjacent to the deployed location. The scheduled takeoff time was 1130Z. Due to a maintenance problem with the number three aircraft, the flight's actual takeoff time was delayed by 10 minutes. The flight climbed to 1500 feet MSL and was cleared direct to point Sierra, the low-level entry point. At point Sierra, the flight began a descent to 500 feet (AGL). At this point, the number 2 aircraft received several indications of engine problems, including a fire light. The pilot started to climb and after visual confirmation of the fire from the other members of the flight, he ejected. The aircraft impacted the ground at a bearing of 250 degrees, 40 nautical miles from the deployed location. The pilot made a successful parachute landing and was picked up by a host nation rescue helicopter thirty minutes later.

2. Mission: Captain Mark Decesari was scheduled to lead Claw flight, a four-ship SAT mission, to a target in the local military training area. During the mission, 1Lt Setser (mishap pilot) was scheduled to receive low altitude stepdown training (LASDT) at 500 and then 300 feet AGL. 1Lt Setser had been moved from the number four to the number two position, at his flight commander's request, prior to the briefing to accomplish the LASDT. The planned mission included single-ship afterburner takeoffs, a rejoin by elements and then a fluid four formation during a low-level navigation route at 500 and 300 feet AGL to a simulated tactical attack and recovery at the deployed location (Tabs V-2 thru V-9).

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NUCLEAR REGULATORY COMMISSION

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3. Briefing and Pre-flight: 1Lt Setser (Claw 02) arrived at the squadron prior to the briefing with adequate crew rest and mentally prepared to fly. The flight briefing began on time and lasted for approximately 55 minutes. The briefing was in accordance with the wing briefing guide and was complete and thorough, and the flight stepped to their aircraft on time (Tab V-4). The mishap aircraft (SN 83-1151) had flown once already that day. It had had a minor flight control malfunction on start for the first flight which had been corrected on the spot. The through flight inspection was completed without discrepancies and the aircraft was ready for flight when the pilot arrived. The pilot conducted a thorough preflight inspection and a normal engine start (Tab V-12). Claw 03 had maintenance problems which required a transfer to a spare aircraft. This caused the flight to taxi and take off ten minutes later than the scheduled time (Tab V-6).

4. Flight: Claw flight took off at 1140Z. The flight made 20-second interval, afterburner, single-ship takeoffs. There were no abnormalities noted in Claw 02's aircraft during takeoff. The flight climbed to 1500 feet MSL and was cleared direct to point Sierra, which was the entry point for the planned low-level portion of the mission. The flight switched to Zone control and coordinated clearance onto the low level, then began a descent to 500 feet AGL and accelerated to 480 knots ground speed. Eight to ten miles past the entry point, Claw 02 experienced several warning lights, including the Fire and Overheat lights. The pilot initiated a climb and retarded the throttle to mid-range and transmitted to Claw 01 that he had an engine problem. Claw 04 made a radio transmission that he saw a flare and possibly flames coming from Claw 02's aircraft. Claw 01 transmitted that flames were coming from Claw 02's aircraft and directed a zoom. Claw 02 began a zoom climb, retarded the throttle to idle and switched to the back-up fuel control (BUC). Claw 03 transmitted that the aircraft was still on fire. Thirty seconds after the onset of the initial problem, and with multiple indications of an aircraft fire, Claw 02 made the decision to eject. He transmitted his decision to the flight and initiated the ejection sequence. The ejection equipment worked normally, providing a safe separation of the pilot from the aircraft and a controlled descent to the ground. After ejection, the aircraft pitched forward violently and impacted the ground at a near-inverted (110 to 120 degree) dive angle and slow speed. All four members of the flight observed the fireball. No video recordings or UHF channel audio recordings of the mishap were available (Tab V-2 thru V-9, N-1).

5. Impact: The aircraft impacted open desert north of a major road. All wreckage except the canopy and seat was located within 650 feet of the original impact point (Tab R-1 to R-3). There was no damage to civilian property (Tab P-1). The aircraft impacted at a steep dive angle (110 to 120 degrees) and at low speed (Tab V-8) and exploded in a large fireball at impact (Tab V-6).

6. Ejection Seat: The ACES II ejection seat functioned normally, safely separating the pilot from the aircraft and deploying the pilot's parachute (Tab V-2).

7. Personal and Survival Equipment: The pilot's parachute deployed normally, but his helmet came off during the ejection sequence, despite having the visor down, oxygen mask on and chin strap snugly fastened. The pilot could not immediately find the four line release loops and could not perform the four line release. The pilot's survival knife separated from the survival vest and he released his survival kit prior to landing. Upon landing, the pilot performed a

parachute landing fall (PLF), released one riser, and was momentarily dragged until he could release the other.

8. Crash Response: Claw 01 initiated rescue coordination immediately after aircraft impact with a radio call to Zone Control (Tab N-1, V-5, V-7). Claw 03 switched to the 363 TFW Wing Operations center frequency and informed them of the crash. He asked that they follow up on the request made through Zone Control for a helicopter. A host-nation helicopter was scrambled and arrived on the scene approximately 30 minutes after the ejection (Tab V-7). The mishap pilot was in contact with Claw 01 using the radio in his survival vest. He was assisted by local civilians who stopped on the road south of the crash site and provided him with water. The pilot was picked up by the host-nation helicopter and transported to a host-nation military medical center where he was examined and released to U.S. medical personnel (Tabs V-3 and X-1). The aircraft fire burned out without firefighting actions.

9. Maintenance Documentation: A review of the AFTO 781 series aircraft forms revealed the aircraft to be properly configured, serviced, inspected, and released for the flight by qualified maintenance personnel (Tabs H-1 though H-3). The aircraft had an RWR write-up on the first flight which was corrected prior to the second flight. SOAP samples after the first flight were normal. There were no overdue inspections, time compliance technical orders, or time change items (Tab V-11).

10. Maintenance Personnel and Supervision: All personnel involved in the preflight launch and end-of-runway inspection were qualified and current (Tab V-13).

11. Oil Inspection Analysis. A review of the oil analysis records (Tab J-5) and fuel test (Tab J-6) reports revealed no abnormalities prior to the accident. Post-accident analysis showed increased iron (FE), aluminum (AL), nickel (NI), and silicon (SI) (Tab J-5). These readings are indicative of bearing wear and outside contamination (sand) consistent with the post-accident engine analysis.

12. Air Frame and Aircraft Systems:

a. Engine: The third stage fan disk failed in flight. The failure caused severe damage to the other compressor stages in the engine and severed the number one bearing oil pressure tube. An engine fire began near the severed oil line at the 12 o'clock position on the engine and progressed aft in a swirling pattern to the 6 o'clock position on the augmentor. The fire ignition source was provided by sparks generated from the titanium debris resulting from the engine blades striking other engine/airframe components.

b. Instrument Systems: All instruments were functioning properly at the time of the engine failure (Tab J-1 through J-3).

c. Flight Controls: The flight controls were functioning properly through the pilot's ejection. On the flight prior to the accident the aircraft had an A branch flight control malfunction during start. The malfunction was corrected by a flight control specialist prior to flight and the aircraft returned with no flight control discrepancies (Tab V-12).

d. Fuel System: The fuel system was indicating normally at the time of the mishap. Analysis of the fuel from the refueler and the base fuel system found no abnormalities (Tab J-6). The fuel used at the deployed base was Jet A-1 with corrosive inhibiting agents added (Tab V-10). This is an authorized substitute for JP-4 IAW T.O. 1F-16C-1 Section 5 page 1.

13. Operations Personnel and Supervision: The mission was conducted under authority of the 363d Tactical Fighter Wing (Deployed) and the 33d Tactical Fighter Squadron (Deployed). All supervisor briefings and actions were accomplished (Tab V-6, V-10).

14. Pilot Qualifications: 1Lt Setser was current and fully qualified to perform the scheduled mission (Tab V-10). His flying experience follows (Tab T-1 thru T-5):

MAJOR AIRCRAFT	HOURS
F-16 C/D	207.4
AT-38	28.7
Student Pilot Time	258.0
Total Pilot Time	494.1

RECENT HISTORY	HOURS/SORTIES
Last 30 Days	24.4/7
Last 60 Days	56.2/24
Last 90 Days	83.5/42

15. Medical: 1Lt Setser was medically qualified for flight at the time of the accident. Toxicological studies performed after the accident were negative for the presence of alcohol or drugs. There was no evidence of any permanent injury as a result of the mishap. 1Lt Setser was medically returned to flying duty on 8 September 1990 {X-1}.

16. Navigation Aids and Facilities: Navigation aids and facilities were not a factor in this mishap.

17. Weather: The weather was clear skies with 6000 meters (3.75 NM) visibility in haze at the departure base. Winds were 290 degrees at 7 knots with an altimeter setting of 29.47 inches. Temperature was 33 degrees centigrade (92 degrees Fahrenheit) (Tab W-1). The number four pilot reported inflight visibility was 5 to 10 nm. (Tab V-4).

18. Directives and Publications:

a. Directives and publications applicable to the mishap were:

(1) AFR 60-16, General Flight Rules

(2) TACM 51-50, Tactical Aircrew Training

(3) TACR 55-116, F-16 Pilot Operational Procedures

(4) TO 1F-16C-1, F-16 C/D Flight Manual

b. No deviations from regulations occurred.

STEVEN S. FORBERG, Lieutenant Colonel, USAF
AFR 110-14 Accident Investigation Officer

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Glossary

NOTE: Acronyms, jargon, and terms are explained in the context in which they appear in this report. The application of these definitions is not universal and may be limited to this report.

ACES II	- Ejection Seat for the F-16
AFR	- Air Force Regulation
AFTO	- Air Force Technical Order
Afterburner	- Use of the Augmentor to provide maximum thrust.
AGL	- Above Ground Level
AOA	- Angle of Attack: Angular difference between aircraft longitudinal axis and flight path
ATC	- Air Traffic Control
Bearing Oil-Pressure tube	- A pipe carrying lubricating oil to the engine main bearing.
Branch A Flight Control	- One of four redundant channels in the Flight Control Computer System
BUC	- Back up fuel control; provides a second means of regulating engine operations in case of failures of the primary system.
Claw 01	- Lead Aircraft in the formation
Claw 02	- 2nd Aircraft in the formation
Claw 03	- 3rd Aircraft in the formation
Claw 04	- 4th Aircraft in the formation
Code 1	- No maintenance discrepancies
Code 2	- Minor maintenance discrepancies
Code 3	- Major maintenance discrepancies
C/W	- Complied With

DO	- Deputy Commander for Operations
EEC Light	- Light indicating a failure in the Electronic Engine Control System
Flare (IR Flare)	- An expendable munition used to decoy infrared homing missiles.
Fluid Four	- A four ship formation with number 1 and 3 line abreast and one mile apart and number 2 and 4 2000 to 3000 feet out and around 45 degrees aft of their respective element leads.
Four line Release	- Lanyards located inside the rear parachute risers which, when pulled, release the aft four parachute shroud lines, increasing parachute stability and steerability.
FTIT	- Fan Turbine Inlet Temperature - a measure of engine temperature
Guard	- 243.0; UHF Radio emergency frequency
GS	- Ground Speed
HUD	- Head-up display
IFR	- Instrument Flight Rules
IP	- Instructor Pilot
Jet A-1	- Commercial Jet Aircraft Fuel
JFS No Start	- Jet Fuel STarter No Start: Term used to indicate that the JFS has failed to start the engine
JP-4	- Military Specification Jet Aircraft Fuel
JOAP (SOAP)	- Joint (Spectrometric) Oil Analysis Program
KGS	- Knots Ground Speed
MIL	- Military: Maximum engine power without afterburner
MOA	- Military Operating Area
MSL	- Mean Sea Level: Used in conjunction with an altimeter, refers to altitude above sea

level.

NAVAID	- Navigation Aid
NM	- Nautical Mile
NOTAMS	- Notices to Airmen
PLF	- Parachute Landing Fall; a rolling motion used to reduce the shock of parachute landing.
Redball	- Maintenance response to an aircraft with engine running.
RESCAP	- Rescue Combat Air Patrol
RWR	- Radar Warning Receiver
SAR	- Search and Rescue
SAT	- Surface attack tactics
Sierra	- A local air traffic control reporting point.
SN	- Serial Number
SOAP	- See JOAP
SOF	- Supervisor of Flying: An officer responsible to the DO for monitoring and supervising flying operations at a base. Works directly for the DO when filling SOF position. SOF is an extension of the DO responsibility for overall operations.
Sortie	- Flight
Step Time	- The time that the pilots go to their aircraft to fly
TACAN	- Tactical Air Navigation: A system that gives direction (azimuth) and distance (DME) from ground stations.
TACM	- Tactical Air Command Manual
TACR	- Tactical Air Command Regulation
TAC Sup	- Tactical Air Command Supplement
TCTO	- Time Compliance Technical Order

TFW	- Tactical Fighter Wing
TFS	- Tactical Fighter Squadron
Third Stage Fan	- The third set of compressor blade assemblies in the forward section of the engine.
T.O.	- Technical Order - a manual of reference document
UHF	- Ultra-High Frequency radio
VFR	- Visual Flight Rules
VHF	- Very-High Frequency radio
VTR	- Video Tape Recorder
Write-ups	- Logged maintenance discrepancies entered in the AFTO 781.
Z	- Zulu (Greenwich Mean Time)
Zone Control (Zone)	- Host nation controlling agency for the military training area.
6 O'Clock Position	- The bottom or aft of the object
12 O'Clock Position	- The top or in front of the object
Zoom	- A climb maneuver to gain altitude allowing time for an engine restart to be performed when at low altitude