

AIRCRAFT ACCIDENT INVESTIGATION REPORT

AIRCRAFT ACCIDENT INVOLVING F-16A SERIAL NUMBER 79-0379

DOCKETED
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OFFICE OF THE SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Pilot - [REDACTED]

127TH FIGHTER WING
SELFRIDGE AIR NATIONAL GUARD BASE
MICHIGAN AIR NATIONAL GUARD

21 APRIL 1993

NUCLEAR REGULATORY COMMISSION

| | |
|--------------------------------|--|
| Docket No. _____ | Official Exh. No. <u>79</u> |
| In the matter of <u>PFS</u> | |
| Staff _____ | IDENTIFIED <input checked="" type="checkbox"/> |
| Applicant <u>79</u> | RECEIVED <input checked="" type="checkbox"/> |
| Intervenor _____ | REJECTED _____ |
| Other _____ | WITHDRAWN _____ |
| DATE <u>4-12-02</u> | Witness _____ |
| Clerk <u>Susette M. Snider</u> | |

Submitted by:
Garry Bahling
Colonel, MI ANG
Investigation Officer

57617

SUMMARY OF FACTS

A. HISTORY OF FLIGHT:

The mishap occurred on 21 April 1993 and involved aircraft 79-0379, an F-16A assigned to the 127th Fighter Wing. The aircraft was flown by Major Michael Cosby ("Claw 01") on a Functional Check Flight (FCF) from Selfridge ANGB, Michigan. [REDACTED] filed an IFR flight plan for a 1300L departure to the Peck Military Operating Area (Peck MOA), located 52 nautical miles north of Selfridge (TAB K-1). Pre-flight inspections, start, taxi, and takeoff were normal (TABs V-3; V-10).

Shortly after takeoff, while in a vertical climb going through approximately 7,300 feet MSL, the aircraft experienced an augments failure, evidenced by a sudden loss of thrust and banging sensations (TAB AA-1). [REDACTED] brought the throttle out of afterburner and into full military power. [REDACTED] initiated a recovery from the vertical by pulling the aircraft to an inverted position. As the nose approached the horizon, [REDACTED] experienced a second set of "bangs" and retarded the throttle to idle (TAB V-10). [REDACTED] recovered from a nose low attitude and declared an emergency (TAB N-4). With the throttle at idle, [REDACTED] observed normal engine instrument readings and advanced the throttle to approximately 80%, at which time the engine stagnated (TAB V-10). [REDACTED] attempted a Back Up Control (BUC) air start, which was unsuccessful. [REDACTED] turned toward the airfield, reaching the airfield boundary with insufficient altitude and airspeed to align properly on the runway, and insufficient clearance from a taxiing aircraft to land on a parallel taxiway, and ejected (TAB V-10).

Aircraft and pilot impacted between the runway and taxiway. [REDACTED] experienced mild compressive fractures of the thoracic vertebral bodies (TAB X-3). The aircraft was destroyed by impact and subsequent fire.

The Selfridge ANG Public Relations Office and the 127th Wing Commander addressed all news media inquiries.

B. MISSION:

[REDACTED] was conducting a FCF to clear a previous write-up involving the Environmental Control System (ECS) and the Unified Fuel Control (UFC) (TAB V-10).

C. BRIEFING AND PREFLIGHT:

██████████ had complied with Air Force directives for crew rest and arrived for his 1300 FCF at 0900 (TAB V-10). The preflight briefing with maintenance was normal. Maintenance was initially unaware of the scheduled flight and accordingly assigned substitute quality assurance personnel for the briefing (TAB V-12). This was of no consequence to the subject mishap.

The preflight of the aircraft was normal (TAB V-3).

D. FLIGHT ACTIVITY:

"Claw 01" was airborne from Runway 01 at Selfridge at 1258 hrs local (TAB N-6). Consistent with accepted FCF takeoff procedures (TAB V-1), Claw entered a vertical climb at 380 kts (TAB AA-1). Twenty-eight seconds into the flight, at 90 degrees of pitch, 310 kts, and 7,300 ft MSL, the aircraft had an afterburner (A/B) failure accompanied by a sudden deceleration and two "bangs." ██████████ came out of A/B and reported, "Departure, Claw is coming back" (TAB N-4). ██████████ recovered the aircraft from the vertical climb, and when it was nearly inverted with the nose approaching the horizon, there was a second series of "bangs" which prompted ██████████ to retard the throttle to idle (TAB V-10).

Forty seconds into the flight, ██████████ was at approximately 10,000 ft MSL and 150 kts, with 45 degrees of negative pitch when he made his second transmission, "Tower, Claw had a Flameout and will be landing Runway 19, opposite direction" (TAB N-4). Selfridge tower responded by stating that the active runway was 01. ██████████ responded with a third transmission, "Claw is declaring an emergency and will be landing Runway 19. Copy?" Tower cleared the mishap aircraft to land (TAB N-4). ██████████ made ██████████ forth and final transmission, this time to the Supervisor of Flying (SOF), "SOF, Claw's coming back with engine Flameout, landing Runway 19" (TAB N-4).

One minute and 16 seconds into the flight, at 165 kts and 5500 ft MSL, ██████████ brought the throttle from idle to "off" in response to engine stagnation displayed by decreasing RPM and increasing FPM following a throttle advance to 80% (TAB O-1). ██████████ switched to HOC and activated the Jet Fuel Starter (JFS) in an attempt to get an air start. This was unsuccessful due to compressor damage sustained earlier in the flight (TAB A-2). Noticing a residential area in ██████████ flight path, ██████████ made a 2-G left turn toward Selfridge. ██████████ recognized that ██████████ would be unable to reach Runway 19 because of insufficient air speed and altitude, but thought ██████████ could recover upon the parallel taxiway. As ██████████ started to align with the taxiway, ██████████ saw a C-12 taking southbound on the taxiway. Unable to successfully land on either the runway or taxiway, ██████████ rolled wings level, between the runway and the taxiway, and ejected (TAB V-10).

E. IMPACT:

At approximately 1300 hrs on 21 April 1993, aircraft 79-0379 impacted on the northwest section of Selfridge ANGB and was destroyed by impact damage and resulting fire (TAB A). The aircraft impacted in a landing attitude at approximately 170 kts on a heading of approximately 190 degrees (TAB K-1)

F. EJECTION SEAT:

Because of the aircraft's sink rate, the ejection was initiated outside the ejection seat envelope at approximately 50 ft (TAB O-2). The seat separated from the aircraft as the aircraft impacted the ground. A flawless Mode 1 ejection sequence, including at least a partial parachute deployment followed (TAB S-6). Due to the rapid deceleration of the aircraft following ground impact and due to [REDACTED] forward momentum, [REDACTED] impacted ahead of and to the right of the aircraft (TAB R-2). Following [REDACTED] contact with the ground, the aircraft slid approximately 30 yards to the east of [REDACTED] (TAB R-2).

G. PERSONAL AND SURVIVAL EQUIPMENT:

All personal and survival equipment inspections were current and no apparent difficulties were experienced (TAB O-1).

H. RESCUE:

The time of the mishap was 1300 EST (TAB N-4). At 1259, the mishap pilot called with an inflight emergency (TAB N-4). Approximately 25 seconds later, the plane crashed on base property between the main runway and parallel taxiway. The mishap pilot successfully ejected, receiving minor injuries, and was transported to Mt Clemens General Hospital for x-rays and observation.

I. CRASH RESPONSE:

Selfridge ANG Base fire equipment was deployed immediately and arrived on scene at 1303. Vehicles deployed consisted of one P-10 Rescue Truck, one P-19 Major Crash Vehicle (MCV), two P-4 Crash Trucks, one P-2 Crash Truck and one P-20 Small Support Vehicle. Also, one structural fire truck, Engine-13 was dispatched (TAB AA-5). Fire suppression was accomplished, but the aircraft was totally destroyed.

J. MAINTENANCE DOCUMENTATION:

A detailed review of the Air Force Technical Order (AFTO) Form 781 series was accomplished. There were four open, but non-contributing, discrepancies in the Form 781A's (TAB H-3, H-4):

| Discrepancy | Date |
|--|---------------|
| 1. 30 day aircraft document review | 8 April 1993 |
| 2. FCF required for UFC change | 12 April 1993 |
| 3. Aircraft forms to be reviewed by QA prior to first flight after FCF | 12 April 1993 |
| 4. KY58 installation required | 13 April 1993 |

There were no Time Compliance Technical Orders (TCTO) overdue (TAB H-1). There were five delayed discrepancies in the Form 781K (TAB H-5). None of the five was urgent. A review of the oil analysis history of the engine revealed no trends or indications of excessive wear of engine components. A complete review of the Maintenance Documentation was conducted, with no discrepancies discovered (TAB H-1). The time change requirements and inspection requirements were reviewed, with no overdue requirements found. There were no negative trends or problem areas, and the aircraft was properly certified for flight (TAB H-1).

K. MAINTENANCE PERSONNEL AND SUPERVISION:

Aircraft 79-0379 was serviced and postflighted Wednesday, 14 April 1993, by [REDACTED] also accomplished a preflight on Friday, 16 April 1993. [REDACTED] accomplished a pre-flight on Tuesday, 20 April 1993 (TAB H-3) and launched the aircraft on Wednesday, 21 April 1993. The exceptional release on the AFTO Form 781H, releasing the aircraft for flight, was signed by [REDACTED] (TAB H-3). All individuals were qualified to perform the tasks identified above.

L. ENGINE, FUEL, HYDRAULIC, AND OIL INSPECTION ANALYSIS:

All inspection analyses were found normal or satisfactory. None of the fluids disclosed any contamination (TAB O).

M. AIRFRAME AND AIRCRAFT SYSTEMS:

1. The NI engine electrical cable was analysed and a report was issued by the Materials Directorate Systems Support Division at Wright-Patterson Air Force Base, Ohio. The analysis provided no indication that the NI cable contributed to the mishap (TAB AA-2).

The engine high compressor turbine blades were also analysed by Materials Directorate Systems Support Division. Its report found that the blades were damaged by iron-based alloy debris (TAB AA-2).

The Electronic Engine Control (EEC) was analyzed by Hamilton Standard and a report was issued, finding no functional abnormalities (TAB AA-2).

2. There were no components or accessory systems identified as defective or out of operating tolerances.
3. Repair stations were not contributing factors, since no components or accessories serviced were identified as a contributing cause of the mishap.

N. OPERATIONS PERSONNEL AND SUPERVISION:

The mishap flight was conducted under the authority of Selfridge Air National Guard Base Director of Operations Operating Instruction 55-5 (SANGB DO OI 55-5) (TAB G-5).

The [REDACTED] and [REDACTED] was [REDACTED] The [REDACTED] was [REDACTED] (TAB V-12). All items outlined in SANGB DO OI 55-5 were covered (TAB G-5).

O. CREW QUALIFICATIONS

1. A detailed review of [REDACTED] flight and training records was accomplished. [REDACTED] was current and fully qualified to fly an FCF (TAB G).
2. [REDACTED] had a grand total of 1255.6 military flying hours on the mishap date (TAB G-1).
3. There were no training deficiencies or discrepancies noted.

P. MEDICAL:

[REDACTED] was medically qualified to perform flight duties at the time of the accident (TAB X-3). The Air Force Form 1042 shows qualification through 31 July 1993 (TAB X-1). Physiological training records indicate [REDACTED] was current until 31 Mar 95 (TAB T-1). The report of toxicological examination shows no abnormalities (TAB X-2).

[REDACTED] received injury to the mid Thoracic Spine. [REDACTED] received a 25% anterior T-7 vertebral body compression fracture and a second anterior compression fracture at T-8 vertebral body of less than 10% from the accident. No other physical abnormality was found (TAB X-3).

Q. NAVIGATIONAL AIDS AND FACILITIES:

NOTAMS for the local flying area were reviewed and none applied to the mission.

R. WEATHER:

The weather observation for Selfridge ANG Base, valid at 1704Z on 21 April 1993, was 4,000 feet scattered clouds; 25,000 feet, thin, broken clouds; and visibility was 15 miles. Winds were from 350 at 19 knots, gusting to 31 knots. Peak winds at 1705Z were 350 at 33 knots. Ten thousand feet winds at 1200Z were 010 at 26 knots. Temperature was 45 degrees and dew point was 22 degrees. Runway Condition Ready (RCR) was 23 dry.

S. DIRECTIVES AND PUBLICATIONS:

Directives and publications applicable to the operations of the mission were:

1. AFR 60-1, Flight Management
ACC Supplement 1
NGR 60-1
2. AFR 60-16, Flight Rules
ACC Supplement 1
3. T.O. 1F-16A-1, F-16 A/B Flight Manual.
4. T.O. 1F-16A-6CF-1, F-16 A/B Acceptance and
Functional Check Flight procedures Manual
5. T.O. 1F-16A-6CL-1, F-16 A/B, F-16 Acceptance
and Functional Check Flight Checklist
6. T.O. 1F-16A-1CL-1, F-16 A/B Flight Crew Checklist
7. ANG Reg 55-116 and TAC Reg 55-116, Pilot
Operation Procedures
8. ANG Reg 55-116 and TAC Reg 55-116, Attachment 2,
Critical Action Procedures
9. 127 FW Inflight Guide, July 91
10. AFR 110-14, Investigation of Aircraft, Missile, and
Nuclear and Space Accidents
11. ANGR 110-14, Investigation of Aircraft and
Missile Accidents

STATEMENT OF OPINION AS TO CAUSE

Under 10 U.S.C. 2254(D), any opinion of the accident investigators as to the cause of, or the factors contributing to, the accident set forth in the Accident Investigation report may not be considered as evidence in any civil or criminal proceeding arising from an aircraft accident, nor may such information be considered an admission of liability by the United States or by any person referred to in those conclusions or statements.

It is the opinion of the Investigating Officer, based upon the evidence gathered, that the direct and proximate cause of the mishap was an unexplained augmentor anomaly (TAB J-6), resulting in a sudden loss of thrust at a critical time of flight (TAB V-10). This augmentor failure precipitated a compressor stall and subsequent damage to the compressor blades through injection of one or more foreign objects. The damaged compressor blades caused engine stagnation, which dictated that the engine be shut down (TAB V-10) with no possibility for an air start. (TAB J-6).

The mishap pilot performed all applicable Dash One emergency procedures in response to three sequential emergencies (TAB V-10): (1) Augmentor Failure, (2) Compressor Stall and (3) Low Altitude Engine Failure.

It is further the opinion of the Investigating Officer that the following items substantially contributed to the mishap:

1. The F100-200 engine compromises the ability of the aviator to "analyze a situation" by demanding an inordinate amount of attention to low level restart procedures when compared to all other F-16 engine options (TAB V-21);
2. The vertical climb incorporated in the FCF flight profile, while enhancing the ability to achieve SFO parameters, provides an opportunity for disorienting flight attitudes (TAB V-10); and
3. The inability of current published maintenance procedures to consistently define and correct augmentor problems (TAB J-7).


GARRY S. BAHLRING, Colonel, MIANG
Investigating Officer