

Rec'd 7/1/02

2003 JAN 15 AM 11:35

OFFICE OF THE SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFFAIRCRAFT ACCIDENT INVESTIGATION

AUTHORITY: Under the provisions of Air Force Regulation (AFR) 110-14, the Ninth Air Force Commander appointed Lieutenant Colonel Joseph H. Long to conduct an Aircraft Accident Investigation of the F-16D (SN-84-1321) accident which occurred approximately 6 nautical miles northwest of Charleston AFB, South Carolina. The investigation was conducted from 7 Sep 90 to 21 Sep 90. Technical advisors were Lieutenant Colonel Thomas A. Pyrch (Operations), Captain Charles R. Epperson (Legal), Captain Edward J. Hayman (Maintenance) and Staff Sergeant James H. Lloyd, Jr. (Information Management Support).

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 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 nor make recommendations. This report is available for public dissemination under the Freedom of Information Act (5 U.S.C. 552) and AFR 12-30.

SUMMARY OF FACTS

1. **History of Flight:** On 7 August 1990, First Lieutenant Tortsen K. Arnold and Lieutenant Colonel Gregory W. Lewis were scheduled for an instrument mission. The flight, call sign PACA 54 (K-2) departed Shaw AFB SC at 1002 EDT enroute to Myrtle Beach AFB, SC for an instrument approach, then proceeded direct to Shelley MOA for acrobatics. PACA 54 then departed the MOA on an enroute descent to Charleston AFB, SC for an additional instrument approach. During the descent the aircraft developed engine problems. On the approach the engine eventually failed, the pilots safely ejected and the aircraft was destroyed (V-2, V-5). The crash site was 6.4 nautical miles northwest of Charleston AFB, SC, coordinates 35 degrees 57.4 minutes north latitude, 80 degrees 6.6 minutes west longitude (A-1). The Charleston and Shaw AFB Public Affairs offices handled news inquiries (2-2, 2-3).

2. **Mission:** The mission was scheduled to accomplish a mission qualification training (MQT) upgrade single ship instrument mission for Lt Arnold with Lt Col Lewis performing as instructor pilot. The planned mission included afterburner takeoff direct to Myrtle Beach for an instrument approach, direct to Shelley MOA for acrobatics, direct to Charleston for another instrument approach, direct to McEntire NGB for practice simulated flame out patterns and then return to Shaw AFB (V-2, V-5).

3. **Briefing and Pre-flight:** Lt Arnold and Lt Col Lewis arrived for duty at approximately 0700 and 0730 respectively. Both had adequate crew rest. Lt Col Lewis and Lt Arnold discussed, planned, and prepared for the mission together. Lt Col Lewis conducted the briefing utilizing the squadron standard briefing guide. He emphasized engine emergencies and instrument procedures. Ground operations, taxi, and pre take-off procedures were conducted without any significant events (V-2, V-5).

COMMISSION

Official Exh. No. 11

PTS

Subject No. _____
in the matter of

State ☒
Applicant ☒
Intervenor _____
Other _____
DATE 2/1/64
Clock _____
Witness _____
WITHDRAWN _____
REJECTED _____
RECEIVED _____
IDENTIFIED ☒

4. Flight: PACA 54 took off at approximately 1002 EST. They flew directly to Myrtle Beach for an instrument approach and then to Shelley MOA for acrobatics. They departed the MOA, with an enroute descent into Charleston AFB for an instrument approach to runway 15. Passing 4000 - 5000 feet, the pilots heard the engine miss and thump. Lt Arnold observed momentary RPM fluctuations. Lt Col Lewis pulled the throttle to idle power and directed Lt Arnold to turn the EEC/BUC switch to off. Lt Col Lewis referred to the abnormal engine response emergency procedure checklist while Lt Arnold continued to fly. They declared an emergency with approach control and planned a full stop landing. Approach control vectored PACA 54 to a 6 mile final (N-1). As PACA 54 was turning onto final at about 185 knots and 1800 feet MSL, the engine sputtered again and quit. Lt Arnold immediately went EEC/BUC switch to BUC. Lt Col Lewis took control of the aircraft and also selected BUC. As Lt Col Lewis watched the engine unwind, he rolled the aircraft to a level altitude and began the engine failure critical action procedure. Lt Col Lewis attempted to zoom the aircraft and said "Throttle Off", the third step in the emergency procedure. Lt Arnold attempted to retard the throttle to off. At this time the RPM had decayed to 45%. Lt Col Lewis determined an attempt to restart the engine would be futile and commanded ejection. Both pilots pulled their ejection handles. Ejection was successful at approximately 1000 feet. The aircraft crashed 6 miles northwest of Charleston AFB in a thickly wooded area. Lt Col Lewis parachuted into a large tree and became hung upside down 50 - 60 feet high as the raftline and chute cords tangled with the tree. He cut himself free and climbed down the tree. Lt Arnold's parachute also caught up in a tree, with him hanging three feet above ground. He was able to release himself and jump to the ground. A Medical University Medivac and Navy helicopter were immediately on scene. The Navy helicopter crew directed the pilots toward a logging road. Upon reaching the road, they were met by a base ambulance, received medical attention and transported to the hospital (V-2, V-5).

5. Impact: The aircraft impacted in an undeveloped heavily wooded area 6.4 miles from Charleston AFB (A-1, R-2, R-3, Z-4). The aircraft caught fire and was destroyed. The aircraft heading was 235 degrees (magnetic); attitude at impact was wings level with 9 degrees nose down, airspeed was 157 knots (J-2). The engine was at low to zero RPM at ground impact. For an undetermined reason the engine failed to operate properly before ground impact (J-11).

6. Ejection Seat: The two ejection seats functioned normally upon initiation (V-2, V-5).

7. Personal and Survival Equipment: All inspections of the mishap pilots' personal and survival equipment were current (U-4). Lt Col Lewis became tangled in a tree upside down 50 to 60 feet above ground. Lt Col Lewis did not wear a parachute lowering device (PLD) and climbed down from the tree. Lt Col Lewis was medically exempt from wearing a PLD (U-5).

8. Crash Response: The Charleston AFB RAPCON activated the crash phone at 1052 local of an F-16 IFE with unspecified engine problems. At 1055 the RAPCON informed the crash phone that the F-16 had gone down. The Charleston AFB fire fighting and rescue vehicles responded to the accident but had trouble locating the site. Factors delaying the discovery of the crash site were visibility due to rain and fog, poor radio communications, and dense foliage. One of the fire fighting vehicles found both pilots at 1139 after they had walked out of the woods. The pilots were picked up by Air Force personnel and transported to Charleston AFB hospital (V-2, V-5). The County Sheriff's Department officers were the first on the scene. By approximately 1145 the Charleston AFB crash response personnel had assumed control of the area. No local fire vehicles assisted. Four civilians and three airmen were sent to hospitals for observation after becoming nauseous (V-9).

9. Maintenance Documentation: A thorough review of maintenance records for aircraft 84-1321 revealed no discrepancies relating to the accident. There were no overdue time compliance technical orders (TCTO) or time change items (TCI) on either the aircraft (U-2, H-4) or the engine (U-2, H-5, H-6). All scheduled inspections were satisfactorily completed with no discrepancies identified (U-2). Oil analysis records were reviewed and no abnormalities were noted (O-9). The equipment review report was reviewed with no overdue inspections or other discrepancies noted (U-2).

10. Maintenance Personnel & Supervision: Preflight servicing of the aircraft was reviewed with no discrepancies identified (H-8). Individual training records were reviewed with no discrepancies noted (H-9).

11. Fluid Sample Analysis: A review of the aircraft's engine oil analysis record revealed no abnormalities (O-9). Fuel, oxygen, and hydraulic sample tests revealed no abnormalities (O-10 through O-18).

12. Airframe and Aircraft Systems: A technical evaluation was made of the mishap engine (Pratt and Whitney F100-PW-200, Serial Number E705240) by Roger Saucedo and Thomas Faryniarz of San Antonio Air Logistics Center, Kelley Air Force Base. Their examination, although hardware evaluation did not reveal any failure or abnormality causing engine failure, did determine that the engine failed to operate normally for unknown reasons. Rotating engine components were either "not rotating, or rotating slowly" at time of impact (J-11). Material Deficiency Reports were submitted on the Unified Fuel Control (UFC), Back-Up Control (BUC), TT2.5 Sensor, N1 Sensor Cable, Pressurizing and Dump Valve, Gear Pump, and N2 Sensor (I-2 through I-20). The pilots reported no aircraft system malfunctions other than engine problems resulting in loss of thrust (V-2, V-5).

13. Operations Personnel and Supervision: The mission was conducted under the authority of the 363 TFW and the 19 TFS (K-2, K-3). The briefing was conducted by Lt Col Lewis using the 363 TFW briefing guide and was thorough and complete (V-2, V-5).

14. Pilot Qualifications:

a. Lt Col Lewis was current and fully qualified to conduct the mission (G-2, G-4, G-6, T-5). His flying experience follows (G-2).

<u>Aircraft</u>	<u>Hours</u>
F-16	950.3
A-10	2036.4
F-5	1.0
AT/T-38	15.7

30/60/90 Day Summary

30 Day	15 Sorties/33.4 Hours
60 Day	18 Sorties/38.7 Hours
90 Day	25 Sorties/50.7 Hours

b. Lt Arnold initially failed to complete the MQT program and was subsequently grounded. He was reinstated into the program by the squadron commander after a records review. Lt Arnold had approximately a seven week layoff. His last flight was accomplished on 12 Jun 90. This was his first sortie after restarting. Lt Arnold was flying under the supervision of an instructor pilot and was qualified to perform the mission (G-2, G-4, G-6, T-2). His flying experience follows (G-2).

<u>Aircraft</u>	<u>Hours</u>
F-16	111.8
AT/T-38	27.0

30/60/90 Day Summary

30 Day	0 Sorties/0 Hours
60 Day	1 Sortie/1.6 Hours
90 Day	6 Sorties/8.4 Hours

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15. Medical: Lt Col Lewis and Lt Arnold were medically qualified for flight (T-6, T-4) Lt Col Lewis suffered minor contusions and abrasions of the shoulder, hips, and lower leg from the ejection and subsequent parachute landing in the tree (X-3). Lt Arnold suffered no injuries from the ejection and subsequent parachute landing (X-2). The toxicology report revealed no illegal or prescription medications and no alcohol for either pilot (X-2, X-3).

16. Navigation Aid and Facilities: All applicable navigation aids were operational.

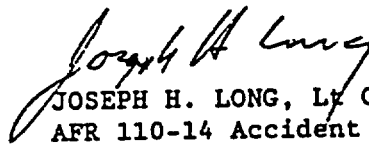
17. Weather: The Charleston AFB weather at the time of mishap was 900 scattered, measured 2200 feet overcast; visibility 5 miles with rain and light fog, and the winds were from the northeast at 8 knots (K-4, K-5).

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) TACR 55-116/SAFB Sup 1, Local Operational Procedures
- (5) TO 1F-16C-1, Flight Manual
- (6) TO 1F-16C-1CL-1, Flight Manual Checklist
- (7) 363 TFW Briefing Guide

b. No deviations to regulations occurred.


JOSEPH H. LONG, Lt Col, USAF
AFR 110-14 Accident Investigation Officer

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.

AB	- Afterburner
ADI	- Attitude Director Indicator
AF	- Air Force
AFB	- Air Force Base
AFISC	- Air Force Inspection Safety Center
AFR	- Air Force Regulation
AFTO	- Air Force Technical Order
AGL	- Above Ground Level
ALC	- Air Logistics Center
ALC/MMET, MMIRIA	- Air Logistics Center/Office Symbols
AMU	- Aircraft Maintenance Unit
AOA	- Angle of Attack: Angular difference between aircraft longitudinal axis of the aircraft and flight path.
Arming Area	- Waiting area next to runway, where aircraft are armed and checked.
ATIS	- Automatic Terminal Information Service: A recorded radio transmission which gives pilots information concerning airfield status and weather. Current information is insured by an alphabetical identification system.
BUC	- Back Up Control
CAM	- Consolidated Aircraft Maintenance
CC	- Commander
CENC	- Convergent Exhaust Nozzle Control

CIVV	- Compressor Inlet Variable Vane
DO	- Deputy Commander for Operations
EEC	- Electronic Engine Control
ER	- Exceptional Release: A signature in the aircraft records which authorizes an aircraft to be flown.
EST	- Eastern Standard Time
FTIT	- Fan Turbine Inlet Temperature
GCA	- Ground Controlled Approach: A method of recovering aircraft in marginal weather condition in which the pilot is given height and direction information by a controller watching the aircraft progress on radar.
HPT	- High Pressure Turbine
IFE	- Inflight Emergency
IFR	- Instrument Flight Rules
ILS	- Instrument Landing System: Designed to provide an approach path for exact alignment and descent of an aircraft on final approach to a runway.
IMC	- Instrument Meteorological Conditions (generally, in clouds, fog or precipitation)
JFS	- Jet Fuel Starter
KTS	- Knots
JOAP (SOAP)	- Joint (Spectrometric) Oil Analysis Program
LOX	- Liquid Oxygen
MDR	- Materiel Deficiency Report
MOA	- Military Operating Area
MQT	- Mission Qualification Training: Ground and flight training given to pilots to qualify them to perform the unit's mission.
MSL	- Mean Sea Level
NM	- Nautical Mile

NOTAMS	- Notice(s) to Airmen: A notice containing information on establishment, condition, or change in an aeronautical facility, service, or procedure that may be a hazard to flight.
OUTERMARKE	- At Charleston AFB, a beacon located 4.5 NM on runway 15 extended centerline.
OVERCAST	- A cloud layer covering half or more than half the sky.
PIREP	- Pilot Report: A weather report from a pilot
RAPCON	- The facility containing radar equipment and controllers.
RCVV	- Rear Compressor Variable Vans
RPM	- Revolutions Per Minute
SA-ALC	- San Antonio - Air Logistics Center (Texas)
SCATTERED	- A cloud layer covering less than half the sky.
SFO	- Simulated Flame Out
TAC	- Tactical Air Command
TACM	- Tactical Air Command Manual
TACR	- Tactical Air Command Regulation
TAC SUP	- Tactical Air Command Supplement
TCIO	- Time Compliance Technical Order
TFS	- Tactical Fighter Squadron
TO	- Technical Order - a manual or reference document.
UFC	- Unified Fuel Control