

USAF AIRCRAFT ACCIDENT INVESTIGATION REPORT



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DATE 7/1/02 Witness _____

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F-16A SERIAL NUMBER 82-0934
 182nd FIGHTER GROUP
 ILLINOIS AIR NATIONAL GUARD
 BUCKLEY ANG BASE, COLORADO
 12 JUNE 1994

CONDUCTED IN ACCORDANCE WITH AFR 110-14

APPOINTING AUTHORITY:
 STEPHEN B. CROKER
 LIEUTENANT GENERAL, USAF
 COMMANDER
 EIGHTH AIR FORCE
 BARKSDALE AFB, LA

SUBMITTED BY:
 JOHN POUTIER
 LIEUTENANT COLONEL, USAF
 DEPUTY OPERATIONS OFFICER
 347TH OPERATIONS GROUP
 MOODY AFB, GEORGIA

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III. SUMMARY OF FACTS

A. History of Flight:

The pilot of the accident aircraft, call sign TORCH 1, was the flight leader of three F-16A aircraft taking off for the final leg of a navigational proficiency mission that originated on 9 June 1994 from Peoria, Illinois. On 12 June 1994, the mission included a flight from Davis-Monthan Air Force Base, Arizona, to Buckley Air National Guard Base, Colorado. The aircraft crashed at 11:40 a.m. while taking off from Buckley on runway 14 for a flight back to Peoria. The pilot, [REDACTED], ejected safely prior to the aircraft crashing. There was no damage to private property. News media interest was initially high with public inquiries handled by the 140th Fighter Wing Office of Public Affairs (Tab V-2).

B. Mission:

The pilot of the mishap aircraft was the flight leader of a three aircraft navigational proficiency mission. The mission was used to increase pilots' basic navigational skills and instrument flying proficiency by exposing the pilots to different operating environments, varying weather conditions and various types of airfield approach and departure procedures (Tab V-23).

C. Briefing and Preflight:

The flight briefed in detail on 9 June 1994 prior to departing Peoria. This briefing included normal operating procedures, emergency procedures, and probable flying activities while

at Davis-Monthan Air Force Base (Tab V-23, V-28). During this briefing the flight lead instructed each pilot to calculate their own takeoff and landing data for the entire trip and briefed that they would use military power on takeoff and fifteen seconds between aircraft unless otherwise told by the flight lead (Tab V-22, V-23, V-28). Operations at Davis-Monthan Air Force Base included Close Air Support missions on Friday, 10 June 1994. Saturday, 11 June 1994 was spent at leisure in the Tucson area. Crew rest prior to the flight on Sunday was adequate (Tab V-22, V-28). After landing at Buckley Air National Guard Base on 12 June 1994, the pilots went in to base operations to update the weather, check the NOTAMS (Notice to Airmen), and call back to Peoria to tell the Supervisor of Flying that they were going to be approximately one hour late. The Supervisor of Flying replied that it was no problem (Tab V-22, V-28). TORCH 1 and TORCH 2 calculated takeoff data which showed takeoff rolls of approximately 4,000 feet and 4,200 to 4,500 feet respectively (Tab V-28, V-22). Aircraft preflight, start, and taxi procedures all appeared normal to Buckley Transient Services personnel, both wingmen, and tower personnel (Tab V-2, V-3, V-6, V-22, V-23). The three pilots stated that they had approximately fifteen to thirty minutes to complete all checklist items (Tab V-22, V-23, V-28). Transient Services personnel observed TORCH 1 performing flight control checks (Tab V-1, V-6) and stated that the time from start to taxi seemed about normal (Tab V-2, V-3, V-6). The Transient Services person who launched TORCH 1 did not recall if the pilot looked for a response to his manual flight control inputs but recalled nothing abnormal about the sequence. The Transient Services person did recall seeing the flight controls moving. He did not know if the movement was due to the flight control computer or pilot inputs. The Transient Services person also stated that he normally checks the horizontal tail in the takeoff trim position (Tab V-6). [REDACTED] testified that sometime after engine start, but before taxi, [REDACTED] realized that [REDACTED] had the wrong map for the return flight and reached back to [REDACTED] left to get the appropriate map from [REDACTED] helmet bag. This was the only distraction that [REDACTED] could recall (Tab V-28). TORCH 1 first contacted ground control at 11:33 a.m. (Tab N records that time as 1733 hours Zulu time) and received the flight's clearance which included an initial level off altitude of eight thousand feet. The flight was then cleared to taxi to runway 14 and given the winds and the altimeter setting. TORCH 1 was then informed by ground control that two BAK-12 cables were across the runway approximately two thousand five hundred feet from either end. TORCH 1 asked for a quick climb to twenty thousand feet on departure but the request was subsequently denied due to Denver traffic (Tab N, V-10). After TORCH 1 received the flight's clearance, [REDACTED] commented to TORCH 2 and 3 on VHF radio that there was about 8,500 feet of runway available for takeoff past the cable (Tab V-22, V-23, V-28). TORCH 3 planned to match TORCH 1's power on takeoff because he believed the calculated takeoff roll was close to fifty percent of the available runway which would require an afterburner takeoff (Tab V-23).

D. Flight Activity:

Ground control cleared the flight to tower frequency and on to the runway to hold. Buckley tower cleared the flight for takeoff at 11:38:12 a.m. and acknowledged the flight's request to taxi down beyond the cable. At 11:39:47 the tower told Denver control

that TORCH 1 was on takeoff roll (Tab N-2, N-3). TORCH 1 used military power for takeoff because request for a quick climb was denied and wanted to save fuel (Tab V-28). TORCH 1's takeoff roll appeared normal until disengaged nosewheel steering at approximately 60 to 70 knots at which time the aircraft yawed to the right. TORCH 1 then reengaged nosewheel steering and the aircraft came back to the left while still on the runway (Tab V-28). At 90 to 100 knots TORCH 1 again disengaged nosewheel steering without encountering further problems (Tab V-28). Immediately upon takeoff at about 150 knots TORCH 1 yawed to the right approximately 20 to 30 degrees and began what felt to the pilot like an uncoordinated right roll (a roll with either too much or not enough rudder) (Tab V-2, V-22, V-23, V-28). TORCH 2 stated that looked up and saw TORCH 1 yawing hard to the right upon takeoff (Tab V-22). Several witnesses also said the aircraft abruptly pitched up (Tab V-2, V-10, V-13). At that point TORCH 2 said on the VHF radio "Understand Aborting?" (Tab V-22, V-28). The aircraft continued to increase yaw and pitch in what appeared to be a rudder roll (rolling the aircraft by using the rudder and without the use of aileron) to approximately sixty degrees of bank plus or minus ten degrees when the pilot ejected (Tab V-2, V-10, V-22). TORCH 1 commented to one rescuer immediately after the accident that "I went to rotate, the aircraft rotated, and then it pitched right for no reason" (Tab V-7). To another rescuer commented "Well, I went into a twenty to thirty degree bank and then it just lost it" (Tab V-14).

E. Impact:

The aircraft crashed on 12 June 1994 on Buckley Air National Guard Base at 11:40 a.m. It impacted on the infield grass approximately 200 feet right of the runway centerline 6,600 feet from brake release in approximately 90 degrees of bank and 142 knots (Tab O, R).

F. Ejection Seats:

The pilot ejected approximately fifty feet above the ground with the aircraft in an approximately sixty degree right bank (Tab V-2, V-9, V-10, V-18, V-22, V-23, V-26). All egress and life support systems were maintained in accordance with established regulations and worked as designed (Tab V-19). Although the pilot did get a full parachute, was on the edge of the designed ejection envelope and had only approximately one half swing before landing (Tab O-16, V-9).

G. Personal and Survival Equipment:

All personal and survival equipment was maintained in accordance with established regulations and procedures (Tab V-27).

H. Rescue:

Because the crash occurred on the base, rescue efforts consisted of crash response.

L. Crash Response:

Crash response efforts were characterized as outstanding (Tab V-2, V-7, V-10, V-20). The senior tower controller activated the crash net by telephone at 11:40:22 a.m. 1 (one) second before the pilot ejection sequence activated the emergency locator beacon at 11:40:23 (Tab N, V-10, V-13). Several security police personnel, who had just completed small arms training on a nearby range, ran to the pilot immediately after the ejection to provide assistance (Tab V-9, V-20, V-26). Fire trucks and rescue vehicles began rolling immediately and reached the crash site within a few minutes where the pilot was stabilized by an Emergency Medical Technician (Tab V-9, V-14, V-16, V-17). Fire fighting personnel rapidly extinguished the fuselage and surrounding grass fires as security cordoned off the area. Once stabilized, the pilot was transported to Fitzsimons Army Medical Center (Tab V-24).

J. Maintenance Documentation:

An examination of the records for F-16A serial number 82-0934 was conducted. The AFTO Form 781 series did not reveal any current open discrepancies relevant to the mishap. Forms dated 8 December 1993 through 8 June 1994 were available. Corresponding computerized maintenance history was also available. AFTO Forms from 9 June 1994 to 12 June 1994 were attached to the forms binder in the aircraft and were burned. The last scheduled inspection was a Phase 2 inspection (400 hours) completed 28 January 1994. Aircraft hours was 2749.8 at the time of this phase inspection (Tab U-1, U-2).

All Time compliance Technical Orders were complied with or were within recission dates. All documented periodic/hourly inspections were complied with except:

- a. OTI (local) 94-03. Constant Speed Drive filter inspection.
- b. Aircraft Wash and Corrosion (due 11 June 94).
- c. 75 hour SFDR (Standard Flight Data Recorder) download (due at 2825.0 hours).
- d. 50 hour #1 - 2 spacer inspection (due at 2826.5 hours).
- e. 50/100 hour borescope inspection (due at 2826.5 hours).

Hourly inspection due times are based on the aircraft having 2824.3 hours on 8 June 1994 and accumulating 3.7 hours on 9 June, 1.7 hours on 10 June, and 1.9 hours on 12 June. Total aircraft hours just prior to the mishap is calculated to be 2831.6 hours (not including any fraction during the mishap sortie). (See Tab U-3 through U-5).

A review of the unscheduled maintenance records reveals that the most recent discrepancies includes a "radar inop" (8 June 94), a "JFS no start" (11 May 94), and an "FLCS fail" (5 May 94). Of these most recent discrepancies the radar antenna was replaced for the radar inop; starter solenoid wires were repaired for the no start; and a wiring harness and left ISA (Servo Actuator) were replaced, correcting the flight control failure (Tabs U-6 through U-10). The history of parts removed and replaced indicated no

unusual historical data. Following the repair of the flight control discrepancy, the aircraft flew 8 sorties without a recurring problem (Tab U-11, U-12).

K. Maintenance Personnel and Supervision:

Maintenance was performed by the 182nd Fighter Group. A summary of training records for all individuals who performed maintenance on this aircraft for 30 days prior to the mishap reveals that all maintenance personnel were adequately trained and qualified for the work performed. Training records examined further indicated that training programs and supervision was conducted in accordance with AFR 50-23 (Enlisted Specialty Training). The aircraft was refueled prior to the mishap at Buckley ANG Base, Aurora, Colorado. Personnel involved in pre-flight servicing and launch of the mishap aircraft were certified to perform these tasks (Tabs U-13 through U-17). There was no evidence of maintenance practices or procedures that contributed to the mishap.

L. Engine, Fuel, Hydraulic, and Oil Inspection Analysis:

Review of automated data history for engine SN PW0E703236 revealed no discrepancies (Tab U-18 through U-21). Oil spectrometric analysis up to 8 June 1994 indicated no discrepancies. Fuel samples from the mishap aircraft were analyzed and exceeded limits, probably due to contaminated sample bottles and exposure to the environment (Tab J-5 through J-8). Fuel storage and refueler samples were found to be within limits (Tabs J-11 and J-12). A hydraulic fluid sample failed to meet specifications, possibly due to exposure to foam and water used to extinguish the aircraft fire (Tab J-10). An oil sample was analyzed and found to be within specifications (Tab J-9).

M. Airframe and Aircraft Systems:

Investigation of aircraft subsystems revolved around the flight control system due to the fact that the trim control panel was found with several switches out of their normal takeoff positions instead of centered for takeoff in accordance with T.O. 1F-16A-1 (Tab AA). The pitch trim was slightly over two dots nose up (Tab BB-1). The TRIM/AP (trim/autopilot) switch was in the DISC (disconnect) position rather than the NORM (normal) position (Tab BB-1). Analysis of the caution and warning lights determined that there were no lights illuminated at aircraft impact (Tab J). Analysis of the Flight Control Computer Test Program, ECA Memory Card Printout, and Seat Recorder Printouts showed that there were no flight control malfunction indications until six seconds after takeoff when the aircraft began to break up upon ground impact (Tab O-1 through O-15). Analysis of both wheel speed sensors showed that they worked normally (Tab BB-3). The SFDR (Standard Flight Data Recorder) malfunctioned and was unable to provide additional flight data.

N. Operations Personnel and Supervision:

The flight was flown under the authority of the 182 Tactical Air Support (Fighter) Group (Tab K-2). The pilots of the second and third aircraft in the mission indicated that the briefings were clear and thoroughly covered all necessary items. The pilots had immediate access by telephone to senior leadership at Peoria (Tab V-22, V-23, V-28).

O. Crew Qualifications:

The pilot was current and qualified to fly the mission. [REDACTED] is a rated Senior Pilot and a qualified four-ship flight lead with 1734 hours of Air Force flying time and 1181 hours in the F-16A/B and F-16C/D aircraft (Tab G-5). [REDACTED] aircraft qualification is valid until 30 Jun 1995 (Tab T). In January 1993 [REDACTED] received an "Exceptionally Qualified" rating on [REDACTED] Emergency Procedures Evaluation (Tab T). [REDACTED] last Situational Emergency Procedures Training was accomplished on 6 June 1994.

P. Medical:

The pilot was medically qualified to fly the mission. [REDACTED] most recent flight physical was accomplished on 11 September 1993 and no significant abnormalities were found. Post accident toxicology reports were negative. There is no evidence that physiological factors contributed to this accident (Tab X).

Q. Nav aids and Facilities:

There was one significant Notice To Airmen (NOTAM) on the day of the accident. Two temporary cables were in the raised position. The approach end BAK-12 was 2450 feet from the approach end of runway 14 and the departure end BAK-12 was 2,262 feet from the end of the runway. There was 6288 feet of useable runway between the cables and 8,738 feet from the approach end cable to the end of the runway (Tab K-4).

R. Weather:

Weather at the time of the accident was characterized as a normal summer day for the Denver area although several witnesses did mention that it was warmer than usual (Tab V-2, V-4, V-5, V-6, V-8). There were scattered clouds at six thousand feet and twelve thousand feet and an estimated deck of broken clouds at twenty five thousand feet (Tab K-6). The temperature at the time of the accident was ninety degrees Fahrenheit. The winds given to the pilot just prior to takeoff were 200 degrees at 10 knots (Tab N-3) and a reading five minutes after the accident showed them to be 220 degrees at 4 knots (Tab K-6).

S. Directives and Publications:

The following were applicable to this accident:

AFR 60-1 Flight Management AFR 60-16 General Flight Rules
T.O. 1F-16A-1 Flight Manual
T.O. 1F-16A-1-1 Supplemental Flight Manual
T.O. 1F-16A-1CL-1 Flight Crew Checklist
MCI 11-416 F-16 Pilot Operational Procedures
MCR 60-2 Aircrew Standardization/Evaluation Program
ANGR 66-14 Aircraft Maintenance Management
T.O. 00-20-5 Aircraft, Drone, Aircrew Training Devices, Engines, and Air Launch Missile Inspections, Flight Reports, and Supporting Maintenance Documents.
AFR 50-23 Enlisted Specialty Training

IV. STATEMENT OF OPINION

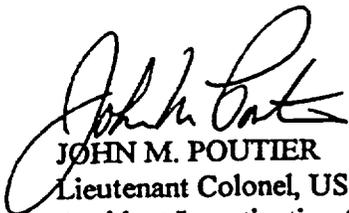
Under 10 U.S.C. 2254(D), any opinion of the accident investigator as to the cause of, or the factors contributing to, the accident set forth in the accident investigation report may not be considered as evidence in any civil or criminal proceeding arising from an aircraft accident, nor may such information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

In my opinion, F-16A aircraft 82-0934 crashed because it was not properly trimmed for takeoff. Due to the surprising nature of the 20 to 30 degree yaw maneuver immediately after takeoff, the pilot could not maintain control and ejected (Tab V-28). The most likely reason for incorrect trim was the pilot's failure to return the TRIM/AP (trim/autopilot) switch to the NORM position during the after start checks and failure to check the trim in the center position prior to takeoff in accordance with T.O. 1F-16A-1 (Tab AA).

Although the pilot testified that sometime between starting the aircraft and taxi he dragged his helmet bag across the trim panel, repeated attempts to duplicate the pitch trim setting by dragging an object over the trim panel moved the pitch trim only one dot. Similar attempts to move the "lift and move" TRIM/AP disconnect switch were also unsuccessful. The TRIM/AP switch was found captured in the DISC (disconnect) position at impact (Tab BB-1). The Rudder Trim was determined to be right of center based on pilot and witness testimony of the yaw maneuvers on the runway and immediately after takeoff (Tab V-2, V-22, V-23, V-28), as well as examination of impact and burn marks on the rudder and tail control surfaces and examination of the rudder actuator (Tab BB-2). An accurate determination of how far the rudder was trimmed to the right at impact could not be made because the aircraft impacted without leaving definite initial impact marks on control surfaces (Tab BB-2) and because the shaft of the rudder trim potentiometer was not available for analysis. A photograph of the top of the rudder trim potentiometer shaft

shows a slot that does not correlate with the position of the rudder trim knob (Tab Z). This was determined by conversations with the vendor and by checking seven other trim control panels.

With the TRIM/AP switch in the DISC position the pitch trim did not drive to neutral when wheel speed reached 60 knots. The combination of over two dots of nose up pitch trim and right rudder trim, gave the pilot an uncoordinated rolling sensation that he attempted to correct with opposite roll stick inputs (Tab V-28). Since immediately after takeoff the wheels have not yet spun down to below 60 knots, the pilot did not have the advantage of the Aileron-to-Rudder Interconnect (ARI) when he attempted to roll out of the bank. The ARI would have provided an appropriate rudder deflection for coordinated flight when roll inputs were made to the ailerons, although it would not have corrected for sideslip due to the right trim condition (Tab AA). The pilot stated that he did not use forward stick because he reacted instinctively to a perceived rolling sensation without pitch (Tab V-28). The pilot did use aileron to attempt to roll out of the bank but did not recall whether [redacted] continued to maintain rudder inputs after takeoff. If he did not, which is likely because of the uncoordinated rolling sensation, [redacted] would have been in a cross control situation (right rudder and left aileron) at low altitude with the nose relatively high (due to the pitch trim), low airspeed, high density altitude and military power. In this flight regime, the pilot was unable to control the aircraft and ejection was warranted.


JOHN M. POUTIER
Lieutenant Colonel, USAF
Accident Investigation Officer