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AIRCRAFT ACCIDENT INVESTIGATION

AUTHORITY: Under the provisions of Air Force Regulation (AFR) 110-14, the Ninth Air Force Commander appointed Colonel Vincent J. Santillo Jr. to conduct an Aircraft Accident Investigation of the F-16D (SN 88-0171) and C-130E (SN 68-10942) accident which occurred near the approach to Runway 23 at Pope Air Force Base, North Carolina (Y-1). Technical advisors were Major Jeffrey R. Osborne (Legal), Major Salvatore A.J. Latteri (Flight Surgeon, Medical), Master Sergeant Peter D. Jamieson (Air Traffic Control), Master Sergeant Terry R. Sutton, Master Sergeant Charles W. Dunn, Technical Sergeant Donald L Beckman (Maintenance), and Technical Sergeant Christine W. Hart (Administrative Support) (Y-2).

PURPOSE: An aircraft accident investigation is convened under AFR 110-14. The investigation is intended primarily to gather and preserve evidence for claims, litigation, disciplinary, and administrative needs. In addition to setting forth factual information concerning the accident, the investigating officer is also required to state his opinion concerning the cause or causes of the accident (if there is clear and convincing evidence to support that opinion), or to describe those factors, if any, that in the opinion of the investigating officer substantially contributed to the accident The report is available for public dissemination under the Freedom of Information Act (5 U.S.C. 552) and AFR 4-33.

SUMMARY OF FACTS

1. History of Flight:

a. On 23 March 1994, Capt Jose Raices and 1st Lt Adam Zaret were leading a 3-ship formation of C-130s on a local training mission from Pope AFB NC (K-1,V-2-7). Due to a minor aircraft ramp door malfunction, Capt Raices cut short the scheduled formation portion of the mission, and returned his aircraft to the Pope AFB local traffic pattern for practice approaches and landings. Capt Raices, an instructor pilot, was the pilot-in-command of the mishap C-130 (call sign) Hitman 31, and was occupying the right seat. Lt Zaret was in the left seat flying the aircraft, and was in the process of completing a low approach to runway 23 at Pope. Shortly after being cleared by tower for a right closed pattern, Hitman 31 was struck from behind by the mishap F-16 (V-4-10).

b. Capt Joseph Jacyno and Capt Scott Salmon were number three in a 3-ship F-16 Surface Attack Tactics mission flying locally from Pope AFB NC on 23 March 1994. Capt Jacyno was the pilot-in-command of (call sign) Weebad 03 and occupied the front seat of the F-16D (K-2, V-1-8). Upon completing the tactical portion of the mission, Weebad 03 returned single-ship to the Pope AFB local traffic pattern for a straight-in simulated flame-out (SFO) low approach. After being cleared by tower "to land", and advised of C-130 traffic "on the go", Capt Jacyno applied power for the go-around portion of his planned low approach, and to attempt to deconflict his aircraft with the just reported C-130 which he had not visually acquired (V-1-14). The F-16 nose then struck the right horizontal stabilizer of the C-130; the radome of the F-16 and a large portion of the C-130 stabilizer departed the respective aircraft (R-2). With the major visible damage to the F-16, its unknown control responsiveness, and hearing several calls for ejection, both pilots of the F-16 successfully ejected (V-1-19, V-3-14). The F-16 impacted a parking ramp abeam the departure end of the runway and was destroyed. Nearby Fort Bragg Army personnel suffered 23 fatalities and 100 injured. A parked C-141 was destroyed, with other collateral damage. C-130 Hitman 31 was able to maintain controlled flight, and the aircraft was landed by Capt Raices following a visual pattern. The aircrew ground-egressed the aircraft. Additional crewmembers on the aircraft included the

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Other _____ WITHDRAWN _____

DATE 7/1/02 Witness _____

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flight engineer, the loadmaster, and the flight surgeon News media inquiries were handled by Pope AFB Public Affairs Office.

2. Mission

a. Weebad 03 was the number three F-16 in a local surface-attack tactics mission for aircrew training. Route of flight from Pope AFB was in accordance with local flight plan "29A": Pope, via intermediate fixes at 7,000 feet to a visual low level route to Dare Range, return to Pope at 18,000 feet via intermediate fixes (K-2,3).

b. Hitman 31 was leading a 3-ship C-130 formation for aircrew training. Route of flight from Pope AFB was to an instrument low-level to the Ft Bragg Nijmegen drop zone, back to Pope, then on a visual low-level to the same drop zone and back to Pope, followed by a repeat of the first route (K-1).

3. Briefing and Pre-Flight:

a. Capt Jacyno reported for duty at approximately 0800 hours, with the flight briefing at 1100L EST. Capt Salmon reported for life support and egress training at approximately 1030L, and was also present at the 1100L flight briefing. Both pilots of the F-16 reported being adequately rested and nourished, with clear minds, and no unusual stress prior to flying (V-1-3, V-3-3). Pre-flight, ground operations, taxi, and pre-takeoff procedures were conducted without significant event, although the number four aircraft ground aborted. Three-ship options had been covered in the main briefing, and Weebad 03 took off as briefed (V-1-6)

b The pilots of Hitman 31 reported to duty at approximately 0600 hours. Both pilots reported being adequately rested and nourished, with clear minds, and no unusual stress prior to flying (V-2-2, V-4-3). Pre-flight, ground operations, taxi, and pre-takeoff procedures were conducted without significant event, although the C-130 ramp door had to be worked on by maintenance personnel (V-17). Hitman 31 took off number one in formation, as scheduled.

4. Flight:

a. Weebad 03 took off at 1309 EST (O-161). The flight rejoined to a 3-ship formation and proceeded via flight plan to Dare County Bombing Range, for the tactical portion of the mission. Due to the lower fuel capacity of the F-16D-model. Weebad 03 departed the bombing range first, and proceeded as briefed, single-ship, back to Pope AFB. Contacting Fayetteville Approach Control at 1407:11 EST, Weebad 03 requested a straight-in SFO from 8,500 feet. At 1407:28 Fayetteville Approach told Weebad 03 to enter holding VFR until some traffic was cleared out of the way. Weebad 03 commenced holding, and shortly thereafter was given clearance to contact Pope tower (N-2, V-10-6); however, the Fayetteville Approach controller neglected to coordinate this action by telephone with Pope tower (O-134).

b. At 1408:41, Weebad 03 contacted Pope tower at "ten DME for a straight in SFO low approach" (N-36). With no prior coordination on this new traffic, Sgt Barnes, the tower local controller trainee, was immediately concerned that there was a potential separation conflict between Weebad 03 and two C-130s in the local pattern. He ordered one C-130, call sign Hitman 05, to maintain 4,500 feet and hold (N-36, V-6-8). Hitman 05 was passed as traffic to Weebad 03, who confirmed a visual with that C-130 (N-6). With some call sign confusion, exacerbated by a tower radar display which had not been updated, immediate attention was then

focused by Sgt Barnes on deconflicting Weebad 03 with Hitman 31, who was now on a right downwind for the landing runway (V-6-9). Sgt Barnes twice attempted to contact Hitman 31, to have him make a "left three-sixty for traffic on final" (N-6); however, Sgt Barnes used the wrong call sign, and Hitman 31 instead began his normal base turn. Contributing to the confusion was erroneous placement of flight progress strips by the tower coordinator (O-134). Sgt Barnes then attempted to have Hitman 31 continue his right base to fly through final, and make a left 270 degree turn back to final (V-6-10).

c. At this point, SrA Combs, the local controller monitor who was supervising Sgt Barnes, assumed control of the local controller position from Sgt Barnes, and countermanded that instruction, instead directing Hitman 31 to continue his approach to a low approach (V-8-19). Hitman 31 confirmed the low approach at 1409.51 EST, and at 1409.58 EST Weebad 03 called "Five DME" (N-7). At 1410 00 SrA Combs advised Weebad 03 there was "C-130 traffic short final on the go " This was the first indication to Weebad 03 that there was anyone in the traffic pattern, other than Hitman 05 whom he had already seen and acknowledged (N-6, V-1-13). At 1410:04 SrA Combs cleared Weebad 03 "to land", and Weebad 03 acknowledged his gear was checked for "low approach." SrA Combs then gave Hitman 31 clearance for a "present position right closed" pattern, which Hitman acknowledged (N-7); however, before he began his right turn, Hitman 31 was struck by Weebad 03.

5. Midair Collision:

a. Witness, aircrew, and tower personnel testimony, and aircraft wreckage plots confirm the midair occurred prior to the overrun of runway 23. After the midair collision, Weebad 03 appeared to pitch approximately 30 degrees nose up, and bank slightly right (S-1, V-11, V-12-1). Capt Jacyno observed his radome cover was gone, and when he heard "eject" calls over the radio he assumed he had further damage to his aircraft (V-1-19). Data indicates he and his backseater commanded ejection simultaneously (J-65). Capt Raices assumed control of Hitman 31 after the midair collision, and determined that the aircraft was flyable at approximately 140 knots airspeed (V-2-17). He flew a visual pattern and landed the damaged aircraft on runway 23 at 1419 EST (N-12), essentially without incident. The crew ground-egressed the aircraft after shutting down on the runway (V-2-19).

b. Weebad 03 initially impacted the "Green Ramp" (R-8) approximately 918 feet from a parked C-141 (R-6). The F-16 bounced and slid across the Green Ramp, igniting the parked C-141, and strewing wreckage along its path. The F-16 continued essentially straight ahead, exiting the Green Ramp, and up a dirt rise, through a chain link fence and between two buildings in the "900" area of the base (S-2, 3, 4). The numerous casualties occurred in this area to paratroopers preparing for a jump. The F-16 wreckage was finally contained in this area, with fire and impact damage to buildings, parked vehicles, equipment and vegetation. The F-16 was destroyed beyond economical repair (D-2). Impact heading was generally along the runway heading of 230 degrees (O-40, R-7), and wreckage was scattered along a 2244 foot by 681 foot area (R-7).

6. Ejection Seats: Both F-16 crewmembers initiated the ejection sequence (J-65); however, while the front-seat received proper inputs for a Mode I sequence (airspeeds 0-250 KEAS/altitudes 0-15,000 feet MSL) the aft seat sensed inputs for a Mode II sequence (airspeeds > 250 KEAS/ altitudes 0-15,000 feet MSL) (J-64; J-65). Detailed analysis of the aft seat environmental sensor did not reveal the reason for Mode II sequencing (J-65).

7. Personal and Survival Equipment: All inspections of the mishap F-16 pilots' personal and survival equipment were current (U-5) The seat kits deployed normally. Four-line jettison was performed by Capt Jacyno, but not by Capt Salmon (V-1-20). The locator beacons functioned normally (N-13). The pilots did not use their survival radios (V-1-21, V-3-16). Capt Jacyno landed in a parking lot along the flightline perimeter road. Capt Jacyno then walked over to where Capt Salmon landed to check on his condition (V-1-21). Capt Salmon landed in a tree near a flightline building, which was being demolished. Workmen on the building assisted Capt Salmon from the tree onto the roof of the building (V-3-16). The medical clinic ambulance arrived shortly thereafter, transporting both pilots to the clinic for examination (V-1-22) No other equipment was used.

8. Rescue:

a. Pope Tower personnel observed the midair collision at approximately 1410:28 EST (N-7, N-19). They immediately requested crash response from local agencies. The Supervisor of Flying (SOF) observed both F-16 pilots land near the F-16 squadron operations building, and called squadron supervision on the land line to have someone assist the pilots (V-12-1). The pilots were quickly located, with no apparent injuries.

b. Hitman 31 continued flight after the midair, with Capt Raices taking control of the aircraft (V-2-17). He landed on runway 23 at 1419 EST. No emergency vehicles responded to the landing, and the crew shut down the aircraft and ground egressed on the runway. The crew was eventually picked up by a maintenance vehicle, and they were transported to their squadron (V-4-15)

9. Crash Response: Pope tower Flight Data Controller activated the crash net at 1410:37 EST (N-60). The base fire department responded with 2 control vehicles, 5 primary fire fighting vehicles, 1 rescue vehicle, 2 fire engines. and 2 tankers (O-158). The 23d Medical Squadron responded with 5 ambulances and 17 personnel. The crash vehicles reached the scene at 1412 EST (O-156). Capt Jacyno and Capt Salmon were immediately picked up by two clinic personnel, and had no apparent injuries. Both pilots were transferred to an ambulance and taken to the Pope Clinic (V-1-22). Fire personnel continued to fight the C-141 fire on the Green Ramp, and medical and rescue personnel, with additional disaster teams, worked in the building 900 area behind the Green Ramp, where many casualties occurred (O-157). The hydrazine team arrived on the scene shortly after the accident, and located the hydrazine H-70 tank at 1450. The H-70 tank was contained, and subsequently neutralized (O-155).

10. Maintenance Documentation:

a. A thorough review of maintenance records for the F-16 (SN 88-0171) revealed no open discrepancies related to the accident. The aircraft had no overdue time compliance technical order (TCTO) or time change items (TCI) which affected the airworthiness of the aircraft or the engine (U-1). All scheduled inspections were satisfactorily completed with no discrepancies identified (U-1, 2). Oil analysis records were reviewed and no abnormalities were noted (U-1). The equipment review report was reviewed with no overdue inspections noted (U-1, 2).

b. A thorough review of maintenance records for the C-130 (SN 68-10942) also revealed no open discrepancies related to the accident. The aircraft also had no overdue TCTOs or TCIs which affected the airworthiness of the aircraft or engines (U-3). All scheduled inspections were satisfactorily completed with no discrepancies identified (U-3). Oil analysis records were reviewed and no abnormalities were noted (J-19). The equipment review report was also reviewed, with no overdue inspections noted (U-3).

11. Maintenance Personnel and Supervision:

a. The mishap F-16 was launched by 74 FS personnel. Preflight servicing of the aircraft was reviewed with no discrepancies identified (H-1). Individual training records were reviewed with no problems noted (U-1).

b. The mishap C-130 was launched by 2 ALS personnel. Preflight servicing of the aircraft was reviewed with no discrepancies identified (H-1). Individual training records were reviewed with no problems noted (U-3).

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

a. The F-16 (SN 88-0171) had no abnormal engine inspection data (U-4). No hydraulic fluid samples were available following the crash. There is no evidence to indicate fuel abnormalities contributed to the accident, and refueling unit samples all reveal normal readings (J-26, 28, 31). Oil test reports were all normal (U-1).

b. The C-130 (SN 68-10942) also had no abnormal engine inspection data (U-3). Fuel samples from all fuel tanks were taken after the crash and analyzed, with all readings being satisfactory for Air Force use (J-8 through J-16). Refueling units also showed no abnormalities in testing (J-26, 28, 31) There is no reason to suspect hydraulic fluid abnormalities contributed to the accident. The oil test reports were all normal (J-19).

13. Airframe and Aircraft Systems:

a. Engine analysis for the F-16 revealed extensive post-crash impact damage. The engine broke apart into four major components: the core, consisting of the High Pressure Compressor (HPC), combustor, and turbine, the fan section, the augmenter, and the gearbox (J-62). The nozzle position indicator showed 54%, and both cockpit fuel flow indicators showed 46,900 pph (J-63); these indications are consistent with Capt Jacyno's testimony that he put the throttle in afterburner following the midair collision (V-1-19). The Engine Monitoring System Computer (EMSC) survived the mishap, as did the Crash Survivable Flight Data Recorder (CSFDR). Flight and navigation instruments from both cockpits were analyzed, and although there was generally major impact damage noted, there was nothing noted during the post-crash analysis indicating instrument or instrument system failure prior to impact, or loss of input signal (J-61).

b. The F-16 CSFDR data in Tab O can be correlated with actual events and F-16 aircraft parameters. The AOA side mount failure at computer time 101:31 (or approximately 61 minutes and 31 seconds after takeoff), is a strong indication of the midair time (O-113). Correlating computer ejection time as 61:38 (O-25), with recorded ejection time as approximately 1410:38 (N-7), gives a midair collision time of approximately 1410:28. This time also correlates with a "logged" takeoff time of 1309 (O-161). CSFDR data confirms an approximate 30 degree pitch and right roll after collision (O-40); radar altimeter data indicated the midair occurred at approximately 300' AGL (O-41). The last data recorded, prior to impact, shows the F-16 was operating in afterburner, with gear down, 13 degrees angle of attack, 11 degrees nose down, and 22 degrees left bank (O-104).

c. Post-flight inspection of the C-130 (SN 68-10942) revealed damage to the right portion of the horizontal stabilizer, including loss of the tip, leading edge, trim tab and severe damage to the right elevator (M-25). Collision damage and F-16 pilot testimony indicate the F-16 struck the C-130 from above (V-1-18, Z-1). The C-130 co-pilot testimony indicates the aircraft was flying normally

(V-4-10), and there is no reason to suspect in-flight separations or failures in any flight control system prior to the midair collision.

14. Operations Personnel and Supervision:

a. The F-16 mission was conducted under the authority of ACCR 51-50 and the 74 FS (K-2). Both pilots were briefed by the flight lead, using the squadron standard briefing guides (V-1-4). Additionally, Capt Jacyno briefed Capt Salmon on F-16 D-model crew coordination procedures, using the squadron briefing guide and F-16 dash one (V-1-5, V-3-5). Squadron supervision was present during the briefing as an instructor pilot, who was also the squadron operations officer, in the number two aircraft. The briefing was considered thorough and adequate (V-1-5, V-3-5).

b. The C-130 mission was conducted under the authority of ACCR 51-50 and the pilot-in-command (K-1). All crew members were briefed by the mission commander, using the squadron standard mission briefing guide, and Capt Raices briefed his crew using the C-130 checklist. A supervisor was present during the briefing in the form of the Chief of Standardization/Evaluation, and the briefings were considered thorough and adequate (V-2-5, V-4-5).

c. The F-16 SOF present in the tower was current and qualified in the F-16, and was also a currently qualified SOF (T-1).

15. Crew Qualifications: Capt Jacyno was fully qualified and current to perform the scheduled F-16 mission (T-1). Capt Salmon was a "banked" pilot; in that status he had completed basic pilot training and was awaiting advanced fighter training. He was flying in the aft cockpit as an observer. Individual flying experience was as follows:

		F-16	A-10	AT-38	TOTAL	
Capt Jacyno:	Primary	510.6	660.2	28.5	1199.3	
	Secondary	1.8	——	——	1.8	
	Other	2.5	——	——	2.5	
	Student	——	——	——	194.7	
Grand Total:		514.9	660.2	28.5	1398.3	(G-3)

Hours Last 30/60/90 Days: 16.9 / 16.9 / 19.9 (G-2)

		F-16	C-130	TOTAL	
Capt Salmon:	Primary	——	3.7	3.7	
	Secondary	——	3.6	3.6	
	Other	1.1	1.5	2.6	
	Student	——	——	191.5	
Grand Total:		1.1	8.8	201.4	(G-7)

Hours Last 30/60/90 Days: 1.1 / 1.1 / 1.1 (G-6)

Capt Raices and Lt Zaret were fully qualified and current to perform the scheduled C-130 mission (T-1). Individual flying experience was as follows:

		C-130	CES-172	TOTAL	
Capt Raices:	Primary	857.5	237.7	1095.2	
	Secondary	694.7	1.3	696.0	
	Instructor	257.6	——	257.6	
	Other	227 2	——	222.7	
	Student	——	——	181.8	
Grand Total:		2037.0	239.0	2457.8	(G-11)
Hours Last 30/60/90 Days:		15 6 / 15.6 / 19.9 (G-10)			

		C-130	TOTAL	
Lt Zaret:	Primary	365.0	365.0	
	Secondary	346.9	346.9	
	Other	88.7	88.7	
	Student	——	198.7	
Grand Total:		800.6	999.3	(G-15)
Hours Last 30/60/90 Days:		38.0 / 136.1 / 209.6 (G-14)		

16. Medical: Capt Jacyno, Capt Raices, Capt Salmon, and Lt Zaret were medically qualified to fly (X-1, X-2). Toxicology reports revealed no evidence of prescribed or illegal drugs (X-5, X-7, X-9, X-11). SSgt Cross, Sgt Barnes, SrA Burnett, and SrA Combs were medically qualified to work (X-12, X-13). Toxicology results did show SrA Burnett positive for trace amounts of a decongestant in the blood. Traces of decongestant and a non-narcotic cough suppressant were detected in the urine results (X-16). There is no evidence to suggest that these over-the-counter medications altered the alertness, judgment, equilibrium, vision, speech, or state of consciousness of SrA Burnett (X-12). Also, toxicology results were positive for SrA Combs for Acetaminophen in the blood; the active ingredient in Tylenol was taken at least 12 hours before the mishap (X-15). There is also no evidence to indicate that this over-the-counter medication altered the alertness, judgment, equilibrium, vision, speech, or state of consciousness of SrA Combs (X-13). In conclusion, no evidence in the medical records or toxicology studies indicates that physiological factors contributed to the mishap.

17. Navaids and Facilities: All applicable Navaids were in operation; no NOTAMs were applicable to the accident (O-159, O-160).

18. Weather: The Pope AFB weather observation at 1413 hours EST was generally clear, with good visibility (W-1). Tower and flying personnel confirmed clear flying conditions (V-1-9, V-2-11, V-5-6).

19. Directives and Publications:

a. The following directives and publications were applicable to this mission:

AFR 60-5, Air Traffic Control; AFR 60-16, Flight Rules.
ACCR (MCR) 55-116, F-16 Pilot Operational Procedures.
T.O. IF-16CG-1, Flight Manual, F-16.
T.O. IF-16CG-1-1CL1, Pilot's Abbreviated Flight Crew Checklist, F-16.
T.O. 1C-130E-1, Flight Manual, C-130E.
T.O. 1C-130E-1CL1, Pilots Abbreviated Flight Crew Checklist, C-130E.
FAAH 7110.65, Air Traffic Control.
FAAH 7220.2, Operational Position Standards.
Fayetteville ATC Tower and Pope AFB 23d OSS, Letter of Agreement, 24 Jan 94: IFR, SVFR, Class C Airspace Operations and Inter facility Coordination Procedures for Pope AFB.
Fayetteville ATC Tower and USAF 23d WG, Letter of Agreement, 3 May 93: IFR, VFR Operating Procedures

b. Known deviations of the above include:

(1) AFR 60-16 para 4-4b was not adhered to by the F-16 pilot when he did not "see and avoid" the mishap C-130, though there were clearly extenuating circumstances in this case. Additionally, para 5-3 requires pilots to stay "well clear" of other aircraft.

(2) Local Letters of Agreement (LOA) were not followed by Fayetteville Approach Control North controller and Pope Tower local controllers and supervisor. LOA, 24 Jan 94 requires controllers to telephonically coordinate straight-in SFOs with Pope tower, but this was not done.

(3) Separation standards between the F-16 and C-130 were not adhered to by Pope controllers. These standards are published in AFR 60-5 (paragraph 2-1g(2)), FAAH 7220.2 (paragraphs 24-3, 4, 5, and 6), and FAAH 7110.65 (paragraph 3-122).

(a) Also, the BRITE system was not used to its fullest extent, as called for in AFR 60-5 (paragraph 2-7b(2)).

(b) Tower position responsibilities were not followed, as called for in AFR 60-5 (paragraph 2-7b(4)) and FAAH 7110.65 (paragraph 2-152).

(c) Incorrect traffic and landing advisories were given, contrary to FAAH 7110.65 (paragraphs 2-21, 3-124 and 3-126).

20. Opinion as to the Cause of the Accident: **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.**

Based on the evidence which I found to be clear and convincing, it is my opinion as investigating officer that there were multiple causes for the midair collision. The majority of errors which caused the midair collision occurred in air traffic control. This includes the use by the Fayetteville Approach Controller of improper SFO hand-off procedures for the F-16, and a chain of errors by ATC personnel in the tower. The local controller trainee tried on several occasions to provide separation for the two mishap aircraft, but did not do so The local controller monitor supervising the trainee also did not deconflict the two aircraft. He did not issue a traffic advisory on the C-130 to the F-16 until just prior to midair collision. Overseeing the entire local control sequence, the tower watch supervisor did not correct errors by his personnel, and ensure traffic separation. The confusion caused by the incorrect call sign, the uncorrected tower radar display, the coordinator's erroneous placement of flight data strips, and unfamiliarity with F-16 straight-in SFO patterns by four of the five ATC personnel involved were all significant. The F-16 pilot did not "see and avoid" and stay "well clear" of the mishap C-130, as required by AFR 60-16 However, pilot testimony suggests the C-130 was not in the F-16 pilot's field of view. The pilot became concerned about a potential conflict with the mishap C-130 after being advised of its presence, and was in the process of executing a low approach when the midair occurred. Another cause for the midair collision was insufficient training of ATC personnel, since four of the five ATC personnel involved had never seen an F-16 straight-in SFO, and were untrained in handling it. A final consideration is that while there were two letters of agreement which included F-16 SFO procedures, there was no evidence of a comprehensive airspace plan which addressed flying operations for the various types of aircraft based at Pope AFB. A single source reference document for local operating procedures on all Pope aircraft (A-10, C-130, and F-16) was not yet published on the date of the mishap.

Vincent J Santillo

VINCENT J. SANTILLO, Jr., Col, USAF
Accident Investigating 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.

ACCR	- Air Combat Command Regulation
A/DACG (Tab S)	- Arrival/Departure Airfield Control Group
AFB	- Air Force Base
AFR	- Air Force Regulation
AFTO	- Air Force Technical Order
AFTO Forms 781	- Aircraft Maintenance Records
AGL	- Above Ground Level
ASR	- Area Surveillance Radar
ATC	- Air Traffic Control
ATCT	- Air Traffic Control Tower
ATIS	- Automatic Terminal Information Service
AWADS	- Adverse Weather Air Delivery System
CAMS	- Core Automated Maintenance System
CAPS	- Critical Action Procedures
DBS	- Doppler Beam Sharpening (F-16-Radar Mode)
DBRITE	- Type of ATC radar
DME	- Distance Measuring Equipment
DNIF	- Duty Not Involving Flying
EOR	- End of Runway
EP	- Emergency Procedure
EST	- Eastern Standard Time
FAA	- Federal Aviation Administration
FCIF	- Flight Crew Information File
FCP	- Front Cockpit
FLCS	- Flight Control System (F-16)
FLUG	- Flight Lead Upgrade
FS	- Fighter Squadron
IAF	- Initial Approach Fix

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IFR	- Instrument Flight Rules
JOAP	- Joint Oil Analysis Program
MSL	- Mean Sea Level
NAVAID	- Navigation Aid
NDI Lab	- Non-Destruction Inspection Laboratory
NOTAM	- Notice to Airmen
PIF	- Pilot Information File
Pitot Tube	- Air Pressure Sensor
PLF	- Parachute Landing Fall
PPH	- Pounds Per Hour (fuel flow)
PQDR	- Product Quality Deficiency Report
Radome	- F-16 Nose Section
RCP	- Rear Cockpit
RED "X"	- Flight Grounding Maintenance Item
RTB	- Return to Base
SEPT	- Simulated Emergency Procedures Training
SFO	- Simulated Flame Out Approach
SN	- Serial Number
SOF	- Supervisor of Flying
SQUAWK	- Transponder Code Operation
SUP/SUPER	- Supervisor
TCTO	- Time Compliance Technical Order
T/O	- Takeoff
UHF	- Ultra High Frequency
VFR	- Visual Flight Rules
VHF	- Very High Frequency
VVI	- Vertical Velocity Indicator

Additional Note: Throughout this report, the F-16 callsign may be spelled Weebad (reflecting FS callsign spelling), or Webad, reflecting ATC conventions. Both are considered correct.

AFI 51-503
USAF AIRCRAFT ACCIDENT RE-INVESTIGATION REPORT

VOLUME 1 OF 2

F-16/C-130 Midair Mishap
23 March 1994
Pope Air Force Base, North Carolina

Colonel Michael S. Brake
Investigating Officer

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AIRCRAFT ACCIDENT REINVESTIGATION OF 23 MARCH 1994 F-16/C-130 MISHAP

AUTHORITY: Pursuant to Air Force Instruction (AFI) 51-503, on 13 February 1997, General Richard E. Hawley, Commander, Air Combat Command (COMACC) appointed Colonel Michael S. Brake to conduct an Aircraft Accident Re-Investigation of the accident which occurred at Pope Air Force Base, North Carolina on 23 March 1994 (Y-1). The aircraft involved were an F-16D (SN 88-0171 - callsign "Webad 03") and a C-130E (SN 68-10942 - callsign "Hitman 31"). Also on 13 February 1997, COMACC appointed Major Del Grissom as Colonel Brake's legal advisor (Y-2). By letters dated 18 February 1997, COMACC appointed the following personnel as technical advisors: Lieutenant Colonel Timothy D. Hammon (control tower advisor), Major Monty L. Brock (F-16 pilot advisor), Major Mitchell G. Gerving (C-130 pilot advisor), and Technical Sergeant Deborah J. Sullivan (air traffic control advisor) (Y-3 to Y-6). By letter dated 11 March 1997, COMACC appointed Major Raymond E. King, Biomedical Service Corps (BSC), and Captain Kevin W. Miller, BSC, as human factors specialists (Y-7).

*Previously, an aircraft accident investigation was conducted pursuant to Air Force Regulation (AFR) 110-14. That investigation was approved by the Commander, Ninth Air Force on 15 June 1994. Material from that 1994 report which has been deemed relevant and necessary to this reinvestigation has been incorporated and tabbed herein consistent with the material as it originally appeared in the 1994 report. Material from the 1994 report which was not necessary for the reinvestigation was not duplicated and is not included in this report. For that reason, some entire sections of Tabs A-Z are not used and others may appear to be missing some pages. The index at the beginning of each tab will list the inclusive pages deemed relevant to our reinvestigation.

PURPOSE: An aircraft accident reinvestigation shares the same purpose as the initial investigation - to preserve evidence for claims, litigation, disciplinary, and administrative needs. For this reinvestigation, COMACC directed that Colonel Brake, the investigating officer (IO), address specific areas contained in the Department of Defense Inspector General's (DOD/IG) 9 January 1997 report of investigation (Y-1). To this end, this reinvestigation report will set forth relevant factual information concerning the accident. In an investigation, the IO is required to state facts garnered during the investigation about the causes or factors leading up to the accident. The IO concludes the report by offering his "opinion" as to the cause or factors in the accident. This report will follow that format -- a factual

report and a separate opinion setting out answers. In an initial investigation of an accident, an IO is required to state his opinion concerning the cause or causes of the accident if there is clear and convincing evidence to support that opinion, or to describe those factors, that, in his opinion, substantially contributed to the accident. Opinions of the investigating officer in this report will use the terms "clear and convincing evidence", "substantial evidence", or "my opinion" to connote relative lessening degrees of certainty when offering an opinion as to answers to questions posed.

In accordance with the findings of the DOD/IG report of investigation, this report will not address air traffic control personnel's causal role in this accident nor will it address whether the "composite wing" concept (as it existed at Pope AFB, NC in 1994) was causal or contributory to the accident. This particular accident ultimately caused 24 fatalities among Army personnel and injured more than 100 Army and civilian personnel. Approximately $59,079,512.39 in property damage and labor costs were incurred as a result of this accident.

METHODOLOGY:

In an effort to answer the questions posed to this accident investigation and to recreate the relative positions of the aircraft on 23 March 1994, a non-exhaustive list follows of the investigative steps taken to ensure the reliability and accuracy of any information we collected or included in this report.

A recreation of Hitman 31's flight path was necessary since no cockpit voice recorder (CVR) for Hitman 31 was ever located despite an extensive search. Additionally, the Digital Flight Data Recorder (DFDR) data obtained from the mishap C-130E (SN 68-10942) was not found to correlate to any flight path flown on 23 March 1994. Analysis of the DFDR tape indicated it had wound around the tape capstan and was not functioning during any relevant period of Hitman 31's flight on 23 March 1994.

Due to these crucial information gaps, Hitman 31's flight path on 23 March 1994 was recreated at Pope AFB, NC using another C-130E. This flight was flown during the same daylight period and with approximately the same weather conditions, configuration, and fuel. The recreation flight was flown as accurately as possible based on the personal observations/recollections and presence on the flight deck of Captain Zaret (the pilot who was in command of Hitman 31 at the time of the accident) and SSgt Joel Myers (Hitman 31 flight engineer). Captain Zaret and SSgt Myers provided ground track, airspeed, and altitude inputs to the pilot flying the visual pattern to match the flight path flown 23 March 1994. Several practice patterns were flown to ensure the proper flight path was followed. A transponder code was also assigned to the flight by Federal Aviation Administration (FAA) personnel at the Fayetteville, NC, Approach Facility to allow National Track Analysis Program (NTAP) data to be developed from this flight if needed. After approximately the sixth pattern, a low approach was flown at three feet to recreate the touch-and-go performed by Hitman 31 on the pattern immediately prior to the

accident. The recreation flight then maneuvered to a right hand closed traffic pattern. The final pattern was flown at 1200 feet MSL (Mean Sea Level) which was the visual pattern altitude for C-130s at Pope AFB in March 1994. The landing gear was down and the flaps were at 50%, also duplicating Hitman 31's configuration. The downwind airspeed was flown at 140 IAS (Indicated Airspeed) to match the estimated groundspeed of Hitman 31. Approximately halfway through the final turn and during the entire final approach, the aircraft was flown at 150 IAS to duplicate the 23 March 1994 flight. The final approach was flown down to an altitude of 500 feet MSL or approximately 300 feet AGL (Above Ground Level).

The navigator on the flight recorded the flight path using the Falcon View® Program (version 2.1) with a hand-held GPS (Global Positioning Satellite) unit (Flight Mate Pro GPS Trimble, Model 17319) connected to a notebook computer (Gateway 2000 Solo). Following the flight, the navigator plotted the course on to a 1 to 50,000 chart of the Pope AFB area.

Video of the flight path was also taken from the cockpit during the recreation. Information derived from the actual radar plots of Hitman 31 on 23 March 1994 (from the FAA's NTAP) and information from the DFDR from the recreated flight, among other data, were used by the Mishap Analysis Animation Facility (MAAF) at Tinker AFB, Oklahoma, to analyze or reconstruct the relative positions of the two aircraft in the moments prior to collision.

The flight path reconstruction and final approach flight characteristics prior to collision were validated by sworn testimony given by Captain Zaret and by SSgt Myers. (V-5, V-9) Collision location was also confirmed by their testimony after reviewing the video shot from the cockpit and using maps of the Pope AFB/Ft. Bragg area. Both Captain Zaret and SSgt Myers gave additional testimony concerning the mishap sortie.

An F-16D (Block 40 model), similar to Webad 03, was flown to Pope AFB, NC.. While at Pope AFB, NC, the F-16 pilot advisor and the Investigating Officer attempted to maneuver the F-16D in an effort to recreate the straight-in SFO flight path flown by Captain Jacyno prior to the accident. Data derived from Webad 03's Crash Survivable Flight Data Recorder (CSFDR) (O-1 to O-132) were constantly monitored in an attempt to replicate Webad 03's flight path and timing. These maneuvers were filmed using the Airborne Video Tape Recorder (AVTR). A "field of view" was filmed from the pilot's viewpoint in the cockpit using a hand held 8mm video camera. This was cross-checked against standard F-16D specifications for pilot field of view (approximately 13° lookdown ability at design eye). A cockpit diagram from the F-16 Technical Order (T.O.) and a schematic drawing defining the blind cone from the front cockpit of a Block 40 F-16D at design eye sitting height was obtained from Lockheed Fort Worth. (O-134, O-135) Both the C-130E sortie and the F-16D sortie were filmed from the Pope AFB, NC, control tower with various board members and the board's legal advisor present.

Two crew members from Hitman 05 (C-130 orbiting the field at 4500 feet) were interviewed and gave sworn testimony (V-7, V-8). Captains Goff and Kisch observed portions of Webad 03 and Hitman 31's flight paths on 23 March 1994 and each saw the actual collision. Neither of these pilots were interviewed as part of the

original AFR 110-14 board. We were also able to interview and take sworn testimony from Major Kleperis, the pilot of Felix 03 (a C-130 which was on Pope AFB's Delta taxiway) at the time of the accident. (V-6) He also witnessed the planes collide and had never previously given testimony or been interviewed as part of the original AFR 110-14 board.

While at Pope AFB, NC, the wreckage of the F-16D (SN88-0171) was located and its canopy examined to confirm the presence of any defects in the canopy tending to affect Captain Jacyno's visibility. Relevant portions of the tape recording made by the Pope AFB, NC, control tower on 23 March 1994 was obtained, analyzed, and re-transcribed by the air traffic control member of our board in an effort to determine who said what when (N-1 *et seq.*).

The original CSFDR data from Webad 03 had been maintained as evidence since the accident. A printout of the data is included in this report (O-1-to O-132). Along with the CSFDR, the DFDR from the C-130 flight path recreation, and NTAP data from Hitman 31's 23 March 1994 flight were used in conjunction with information about the pilot's field of view in an F-16D, along with other data to professionally analyze and recreate the accident with computer animation at MAAF. The animation developed provided analytical data used to evaluate Captain Jacyno's visual perception, blind spot locations, acuity, as well as spatial relationships of the aircraft at various points, (R-2, R-3) and the timing of the "5 DME" call made by Captain Jacyno.

Human factors experts were used as consultants on issues concerning Captain Jacyno's situational awareness, attentiveness, diligence, and judgment. A vision specialist was consulted by the human factors experts to help with the analysis of Captain Jacyno's visual acuity (O-133).

The times in Tabs AA-AG and IO opinion pages are Zulu Times taken from the tower UHF frequency 291.1 (N-1-1 to N-1-3). These times are within 3 seconds of the times recorded on the remaining tower transcripts and found in other locations throughout this report. The time discrepancies are most likely due to recording equipment accuracy and age of original recorded medium.

AFR 110-14
USAF AIRCRAFT ACCIDENT INVESTIGATION REPORT

23 March 1994
Pope AFB, NC

F-16D SN 88-0171 C-130E SN 68-10942	23 WG, 74 FS 23 WG, 2 ALS

Volume 1 of 3

INVESTIGATING OFFICER

Col Vincent J. Santillo, Jr.
6th Operations Group (ACC)
MacDill AFB, FL

COPY NUMBER 109 OF 125

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS NINTH AIR FORCE (ACC)
SHAW AIR FORCE BASE SOUTH CAROLINA

15 JUN 1994

MEMORANDUM FOR 9 AF/JA

FROM: 9 AF/CC
524 Shaw Drive
Shaw AFB, SC 29152-5029

SUBJECT: Investigation Report of Aircraft Accident, F-16D, SN 88-0171, and C-130E, SN 68-10942, 23 WG

The subject report is approved.

MICHAEL A. NELSON
Lieutenant General, USAF
Commander

Global Power For America

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AIRCRAFT ACCIDENT INVESTIGATION

AUTHORITY: Under the provisions of Air Force Regulation (AFR) 110-14, the Ninth Air Force Commander appointed Colonel Vincent J Santillo Jr. to conduct an Aircraft Accident Investigation of the F-16D (SN 88-0171) and C-130E (SN 68-10942) accident which occurred near the approach to Runway 23 at Pope Air Force Base, North Carolina (Y-1). Technical advisors were Major Jeffrey R. Osborne (Legal), Major Salvatore A.J. Latteri (Flight Surgeon, Medical), Master Sergeant Peter D. Jamieson (Air Traffic Control), Master Sergeant Terry R. Sutton, Master Sergeant Charles W. Dunn, Technical Sergeant Donald L. Beckman (Maintenance), and Technical Sergeant Christine W. Hart (Administrative Support) (Y-2).

PURPOSE: An aircraft accident investigation is convened under AFR 110-14. The investigation is intended primarily to gather and preserve evidence for claims, litigation, disciplinary, and administrative needs. In addition to setting forth factual information concerning the accident, the investigating officer is also required to state his opinion concerning the cause or causes of the accident (if there is clear and convincing evidence to support that opinion), or to describe those factors, if any, that in the opinion of the investigating officer substantially contributed to the accident. The report is available for public dissemination under the Freedom of Information Act (5 U.S.C. 552) and AFR 4-33.

SUMMARY OF FACTS

1. History of Flight:

a. On 23 March 1994, Capt Jose Raices and 1st Lt Adam Zaret were leading a 3-ship formation of C-130s on a local training mission from Pope AFB NC (K-1,V-2-7). Due to a minor aircraft ramp door malfunction, Capt Raices cut short the scheduled formation portion of the mission, and returned his aircraft to the Pope AFB local traffic pattern for practice approaches and landings. Capt Raices, an instructor pilot, was the pilot-in-command of the mishap C-130 (call sign) Hitman 31, and was occupying the right seat. Lt Zaret was in the left seat flying the aircraft, and was in the process of completing a low approach to runway 23 at Pope. Shortly after being cleared by tower for a right closed pattern, Hitman 31 was struck from behind by the mishap F-16 (V-4-10).

b. Capt Joseph Jacyno and Capt Scott Salmon were number three in a 3-ship F-16 Surface Attack Tactics mission flying locally from Pope AFB NC on 23 March 1994. Capt Jacyno was the pilot-in-command of (call sign) Weebad 03 and occupied the front seat of the F-16D (K-2, V-1-8). Upon completing the tactical portion of the mission, Weebad 03 returned single-ship to the Pope AFB local traffic pattern for a straight-in simulated flame-out (SFO) low approach. After being cleared by tower "to land", and advised of C-130 traffic "on the go", Capt Jacyno applied power for the go-around portion of his planned low approach, and to attempt to deconflict his aircraft with the just reported C-130 which he had not visually acquired (V-1-14). The F-16 nose then struck the right horizontal stabilizer of the C-130; the radome of the F-16 and a large portion of the C-130 stabilizer departed the respective aircraft (R-2). With the major visible damage to the F-16, its unknown control responsiveness, and hearing several calls for ejection, both pilots of the F-16 successfully ejected (V-1-19, V-3-14). The F-16 impacted a parking ramp abeam the departure end of the runway and was destroyed. Nearby Fort Bragg Army personnel suffered 23 fatalities and 100 injured. A parked C-141 was destroyed, with other collateral damage. C-130 Hitman 31 was able to maintain controlled flight, and the aircraft was landed by Capt Raices following a visual pattern. The aircrew ground-egressed the aircraft. Additional crewmembers on the aircraft included the

flight engineer, the loadmaster, and the flight surgeon News media inquiries were handled by Pope AFB Public Affairs Office.

2. Mission

a. Weebad 03 was the number three F-16 in a local surface-attack tactics mission for aircrew training. Route of flight from Pope AFB was in accordance with local flight plan "29A": Pope, via intermediate fixes at 7,000 feet to a visual low level route to Dare Range, return to Pope at 18,000 feet via intermediate fixes (K-2,3)

b. Hitman 31 was leading a 3-ship C-130 formation for aircrew training. Route of flight from Pope AFB was to an instrument low-level to the Ft Bragg Nijmegen drop zone, back to Pope, then on a visual low-level to the same drop zone and back to Pope, followed by a repeat of the first route (K-1).

3. Briefing and Pre-Flight:

a. Capt Jacyno reported for duty at approximately 0800 hours, with the flight briefing at 1100L EST. Capt Salmon reported for life support and egress training at approximately 1030L, and was also present at the 1100L flight briefing. Both pilots of the F-16 reported being adequately rested and nourished, with clear minds, and no unusual stress prior to flying (V-1-3, V-3-3). Pre-flight, ground operations, taxi, and pre-takeoff procedures were conducted without significant event, although the number four aircraft ground aborted. Three-ship options had been covered in the main briefing, and Weebad 03 took off as briefed (V-1-6).

b. The pilots of Hitman 31 reported to duty at approximately 0600 hours. Both pilots reported being adequately rested and nourished, with clear minds, and no unusual stress prior to flying (V-2-2, V-4-3). Pre-flight, ground operations, taxi, and pre-takeoff procedures were conducted without significant event, although the C-130 ramp door had to be worked on by maintenance personnel (V-17). Hitman 31 took off number one in formation, as scheduled.

4. Flight:

a. Weebad 03 took off at 1309 EST (O-161). The flight rejoined to a 3-ship formation and proceeded via flight plan to Dare County Bombing Range, for the tactical portion of the mission. Due to the lower fuel capacity of the F-16D-model. Weebad 03 departed the bombing range first, and proceeded as briefed, single-ship, back to Pope AFB. Contacting Fayetteville Approach Control at 1407:11 EST, Weebad 03 requested a straight-in SFO from 8,500 feet. At 1407:28 Fayetteville Approach told Weebad 03 to enter holding VFR until some traffic was cleared out of the way. Weebad 03 commenced holding, and shortly thereafter was given clearance to contact Pope tower (N-2, V-10-6); however, the Fayetteville Approach controller neglected to coordinate this action by telephone with Pope tower (0-134).

b. At 1408.41, Weebad 03 contacted Pope tower at "ten DME for a straight in SFO low approach" (N-36). With no prior coordination on this new traffic, Sgt Barnes, the tower local controller trainee, was immediately concerned that there was a potential separation conflict between Weebad 03 and two C-130s in the local pattern. He ordered one C-130, call sign Hitman 05, to maintain 4,500 feet and hold (N-36, V-6-8). Hitman 05 was passed as traffic to Weebad 03, who confirmed a visual with that C-130 (N-6). With some call sign confusion, exacerbated by a tower radar display which had not been updated, immediate attention was then

focused by Sgt Barnes on deconflicting Weebad 03 with Hitman 31, who was now on a right downwind for the landing runway (V-6-9). Sgt Barnes twice attempted to contact Hitman 31, to have him make a "left three-sixty for traffic on final" (N-6); however, Sgt Barnes used the wrong call sign, and Hitman 31 instead began his normal base turn. Contributing to the confusion was erroneous placement of flight progress strips by the tower coordinator (O-134). Sgt Barnes then attempted to have Hitman 31 continue his right base to fly through final, and make a left 270 degree turn back to final (V-6-10).

c. At this point, SrA Combs, the local controller monitor who was supervising Sgt Barnes, assumed control of the local controller position from Sgt Barnes, and countermanded that instruction, instead directing Hitman 31 to continue his approach to a low approach (V-8-19). Hitman 31 confirmed the low approach at 1409:51 EST, and at 1409:58 EST Weebad 03 called "Five DME" (N-7). At 1410 00 SrA Combs advised Weebad 03 there was "C-130 traffic short final on the go." This was the first indication to Weebad 03 that there was anyone in the traffic pattern, other than Hitman 05 whom he had already seen and acknowledged (N-6, V-1-13) At 1410.04 SrA Combs cleared Weebad 03 "to land", and Weebad 03 acknowledged his gear was checked for "low approach." SrA Combs then gave Hitman 31 clearance for a "present position right closed" pattern, which Hitman acknowledged (N-7), however, before he began his right turn. Hitman 31 was struck by Weebad 03.

5. Midair Collision:

a. Witness, aircrew, and tower personnel testimony, and aircraft wreckage plots confirm the midair occurred prior to the overrun of runway 23. After the midair collision, Weebad 03 appeared to pitch approximately 30 degrees nose up, and bank slightly right (S-1, V-11, V-12-1). Capt Jacyno observed his radome cover was gone, and when he heard "eject" calls over the radio he assumed he had further damage to his aircraft (V-1-19). Data indicates he and his backseater commanded ejection simultaneously (J-65). Capt Raices assumed control of Hitman 31 after the midair collision, and determined that the aircraft was flyable at approximately 140 knots airspeed (V-2-17). He flew a visual pattern and landed the damaged aircraft on runway 23 at 1419 EST (N-12), essentially without incident. The crew ground-egressed the aircraft after shutting down on the runway (V-2-19)

b. Weebad 03 initially impacted the "Green Ramp" (R-8) approximately 918 feet from a parked C-141 (R-6). The F-16 bounced and slid across the Green Ramp, igniting the parked C-141, and strewing wreckage along its path. The F-16 continued essentially straight ahead, exiting the Green Ramp, and up a dirt rise, through a chain link fence and between two buildings in the "900" area of the base (S-2, 3, 4). The numerous casualties occurred in this area to paratroopers preparing for a jump. The F-16 wreckage was finally contained in this area, with fire and impact damage to buildings, parked vehicles, equipment and vegetation. The F-16 was destroyed beyond economical repair (D-2). Impact heading was generally along the runway heading of 230 degrees (O-40, R-7), and wreckage was scattered along a 2244 foot by 681 foot area (R-7).

6. Ejection Seats: Both F-16 crewmembers initiated the ejection sequence (J-65); however, while the front-seat received proper inputs for a Mode I sequence (airspeeds 0-250 KEAS/altitudes 0-15,000 feet MSL) the aft seat sensed inputs for a Mode II sequence (airspeeds > 250 KEAS/ altitudes 0-15,000 feet MSL) (J-64; J-65). Detailed analysis of the aft seat environmental sensor did not reveal the reason for Mode II sequencing (J-65).

7. Personal and Survival Equipment: All inspections of the mishap F-16 pilots' personal and survival equipment were current (U-5). The seat kits deployed normally. Four-line jettison was performed by Capt Jacyno, but not by Capt Salmon (V-1-20). The locator beacons functioned normally (N-13). The pilots did not use their survival radios (V-1-21, V-3-16). Capt Jacyno landed in a parking lot along the flightline perimeter road. Capt Jacyno then walked over to where Capt Salmon landed to check on his condition (V-1-21). Capt Salmon landed in a tree near a flightline building, which was being demolished. Workmen on the building assisted Capt Salmon from the tree onto the roof of the building (V-3-16). The medical clinic ambulance arrived shortly thereafter, transporting both pilots to the clinic for examination (V-1-22). No other equipment was used.

8. Rescue:

a. Pope Tower personnel observed the midair collision at approximately 1410:28 EST (N-7, N-19). They immediately requested crash response from local agencies. The Supervisor of Flying (SOF) observed both F-16 pilots land near the F-16 squadron operations building, and called squadron supervision on the land line to have someone assist the pilots (V-12-1). The pilots were quickly located, with no apparent injuries.

b. Hitman 31 continued flight after the midair, with Capt Raices taking control of the aircraft (V-2-17). He landed on runway 23 at 1419 EST. No emergency vehicles responded to the landing, and the crew shut down the aircraft and ground egressed on the runway. The crew was eventually picked up by a maintenance vehicle, and they were transported to their squadron (V-4-15).

9. Crash Response: Pope tower Flight Data Controller activated the crash net at 1410:37 EST (N-60). The base fire department responded with 2 control vehicles, 5 primary fire fighting vehicles, 1 rescue vehicle, 2 fire engines, and 2 tankers (O-158). The 23d Medical Squadron responded with 5 ambulances and 17 personnel. The crash vehicles reached the scene at 1412 EST (O-156). Capt Jacyno and Capt Salmon were immediately picked up by two clinic personnel, and had no apparent injuries. Both pilots were transferred to an ambulance and taken to the Pope Clinic (V-1-22). Fire personnel continued to fight the C-141 fire on the Green Ramp, and medical and rescue personnel, with additional disaster teams, worked in the building 900 area behind the Green Ramp, where many casualties occurred (O-157). The hydrazine team arrived on the scene shortly after the accident, and located the hydrazine H-70 tank at 1450. The H-70 tank was contained, and subsequently neutralized (O-155).

10. Maintenance Documentation:

a. A thorough review of maintenance records for the F-16 (SN 88-0171) revealed no open discrepancies related to the accident. The aircraft had no overdue time compliance technical order (TCTO) or time change items (TCI) which affected the airworthiness of the aircraft or the engine (U-1). All scheduled inspections were satisfactorily completed with no discrepancies identified (U-1, 2). Oil analysis records were reviewed and no abnormalities were noted (U-1). The equipment review report was reviewed with no overdue inspections noted (U-1, 2).

b. A thorough review of maintenance records for the C-130 (SN 68-10942) also revealed no open discrepancies related to the accident. The aircraft also had no overdue TCTOs or TCIs which affected the airworthiness of the aircraft or engines (U-3). All scheduled inspections were satisfactorily completed with no discrepancies identified (U-3). Oil analysis records were reviewed and no abnormalities were noted (J-19). The equipment review report was also reviewed, with no overdue inspections noted (U-3).

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11. Maintenance Personnel and Supervision:

a. The mishap F-16 was launched by 74 FS personnel Preflight servicing of the aircraft was reviewed with no discrepancies identified (H-1). Individual training records were reviewed with no problems noted (U-1).

b The mishap C-130 was launched by 2 ALS personnel. Preflight servicing of the aircraft was reviewed with no discrepancies identified (H-1). Individual training records were reviewed with no problems noted (U-3).

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

a. The F-16 (SN 88-0171) had no abnormal engine inspection data (U-4) No hydraulic fluid samples were available following the crash. There is no evidence to indicate fuel abnormalities contributed to the accident, and refueling unit samples all reveal normal readings (J-26, 28, 31). Oil test reports were all normal (U-1).

b. The C-130 (SN 68-10942) also had no abnormal engine inspection data (U-3). Fuel samples from all fuel tanks were taken after the crash and analyzed, with all readings being satisfactory for Air Force use (J-8 through J-16). Refueling units also showed no abnormalities in testing (J-26, 28, 31). There is no reason to suspect hydraulic fluid abnormalities contributed to the accident. The oil test reports were all normal (J-19).

13. Airframe and Aircraft Systems:

a. Engine analysis for the F-16 revealed extensive post-crash impact damage. The engine broke apart into four major components: the core, consisting of the High Pressure Compressor (HPC), combustor, and turbine, the fan section, the augmenter, and the gearbox (J-62). The nozzle position indicator showed 54%, and both cockpit fuel flow indicators showed 46,900 pph (J-63); these indications are consistent with Capt Jacyno's testimony that he put the throttle in afterburner following the midair collision (V-1-19). The Engine Monitoring System Computer (EMSC) survived the mishap, as did the Crash Survivable Flight Data Recorder (CSFDR). Flight and navigation instruments from both cockpits were analyzed, and although there was generally major impact damage noted, there was nothing noted during the post-crash analysis indicating instrument or instrument system failure prior to impact, or loss of input signal (J-61).

b. The F-16 CSFDR data in Tab O can be correlated with actual events and F-16 aircraft parameters. The AOA side mount failure at computer time 101:31 (or approximately 61 minutes and 31 seconds after takeoff), is a strong indication of the midair time (O-113). Correlating computer ejection time as 61:38 (O-25), with recorded ejection time as approximately 1410:38 (N-7), gives a midair collision time of approximately 1410:28. This time also correlates with a "logged" takeoff time of 1309 (O-161). CSFDR data confirms an approximate 30 degree pitch and right roll after collision (O-40); radar altimeter data indicated the midair occurred at approximately 300' AGL (O-41). The last data recorded, prior to impact, shows the F-16 was operating in afterburner, with gear down, 13 degrees angle of attack, 11 degrees nose down, and 22 degrees left bank (O-104).

c. Post-flight inspection of the C-130 (SN 68-10942) revealed damage to the right portion of the horizontal stabilizer, including loss of the tip, leading edge, trim tab and severe damage to the right elevator (M-25). Collision damage and F-16 pilot testimony indicate the F-16 struck the C-130 from above (V-1-18, Z-1). The C-130 co-pilot testimony indicates the aircraft was flying normally

(V-4-10), and there is no reason to suspect in-flight separations or failures in any flight control system prior to the midair collision.

14. Operations Personnel and Supervision:

a. The F-16 mission was conducted under the authority of ACCR 51-50 and the 74 FS (K-2). Both pilots were briefed by the flight lead, using the squadron standard briefing guides (V-1-4). Additionally, Capt Jacyno briefed Capt Salmon on F-16 D-model crew coordination procedures, using the squadron briefing guide and F-16 dash one (V-1-5, V-3-5). Squadron supervision was present during the briefing as an instructor pilot, who was also the squadron operations officer, in the number two aircraft. The briefing was considered thorough and adequate (V-1-5, V-3-5).

b. The C-130 mission was conducted under the authority of ACCR 51-50 and the pilot-in-command (K-1). All crew members were briefed by the mission commander, using the squadron standard mission briefing guide, and Capt Raices briefed his crew using the C-130 checklist. A supervisor was present during the briefing in the form of the Chief of Standardization/Evaluation, and the briefings were considered thorough and adequate (V-2-5, V-4-5)

c. The F-16 SOF present in the tower was current and qualified in the F-16, and was also a currently qualified SOF (T-1).

15. Crew Qualifications: Capt Jacyno was fully qualified and current to perform the scheduled F-16 mission (T-1). Capt Salmon was a "banked" pilot; in that status he had completed basic pilot training and was awaiting advanced fighter training. He was flying in the aft cockpit as an observer. Individual flying experience was as follows:

		F-16	A-10	AT-38	TOTAL	
Capt Jacyno:	Primary	510.6	660.2	28.5	1199.3	
	Secondary	1.8	——	——	1.8	
	Other	2.5	——	——	2.5	
	Student	——	——	——	194.7	
Grand Total:		514.9	660.2	28.5	1398.3	(G-3)

Hours Last 30/60/90 Days: 16.9 / 16.9 / 19.9 (G-2)

		F-16	C-130	TOTAL	
Capt Salmon:	Primary	——	3.7	3.7	
	Secondary	——	3.6	3.6	
	Other	1.1	1.5	2.6	
	Student	——	——	191.5	
Grand Total:		1.1	8.8	201.4	(G-7)

Hours Last 30/60/90 Days: 1.1 / 1.1 / 1.1 (G-6)

Capt Raices and Lt Zaret were fully qualified and current to perform the scheduled C-130 mission (T-1). Individual flying experience was as follows:

		C-130	CES-172	TOTAL	
Capt Raices:	Primary	857.5	237.7	1095 2	
	Secondary	694.7	1.3	696.0	
	Instructor	257.6	——	257.6	
	Other	227.2	——	222.7	
	Student	——	——	181.8	
Grand Total:		2037.0	239.0	2457.8	(G-11)
Hours Last 30/60/90 Days:		15.6 / 15.6 / 19.9 (G-10)			

		C-130	TOTAL	
Lt Zaret:	Primary	365.0	365.0	
	Secondary	346.9	346.9	
	Other	88.7	88.7	
	Student	——	198.7	
Grand Total:		800.6	999.3	(G-15)
Hours Last 30/60/90 Days:		38 0 / 136.1 / 209.6 (G-14)		

16. Medical: Capt Jacyno, Capt Raices, Capt Salmon, and Lt Zaret were medically qualified to fly (X-1, X-2). Toxicology reports revealed no evidence of prescribed or illegal drugs (X-5, X-7, X-9, X-11). SSgt Cross, Sgt Barnes, SrA Burnett, and SrA Combs were medically qualified to work (X-12, X-13). Toxicology results did show SrA Burnett positive for trace amounts of a decongestant in the blood. Traces of decongestant and a non-narcotic cough suppressant were detected in the urine results (X-16). There is no evidence to suggest that these over-the-counter medications altered the alertness, judgment, equilibrium, vision, speech, or state of consciousness of SrA Burnett (X-12). Also, toxicology results were positive for SrA Combs for Acetaminophen in the blood; the active ingredient in Tylenol was taken at least 12 hours before the mishap (X-15). There is also no evidence to indicate that this over-the-counter medication altered the alertness, judgment, equilibrium, vision, speech, or state of consciousness of SrA Combs (X-13). In conclusion, no evidence in the medical records or toxicology studies indicates that physiological factors contributed to the mishap.

17. Navaids and Facilities: All applicable Navaids were in operation; no NOTAMs were applicable to the accident (O-159, O-160).

18. Weather: The Pope AFB weather observation at 1413 hours EST was generally clear, with good visibility (W-1). Tower and flying personnel confirmed clear flying conditions (V-1-9, V-2-11, V-5-6).

19. Directives and Publications:

a. The following directives and publications were applicable to this mission:

AFR 60-5, Air Traffic Control; AFR 60-16, Flight Rules.
ACCR (MCR) 55-116, F-16 Pilot Operational Procedures
T.O. IF-16CG-1, Flight Manual, F-16.
T.O. IF-16CG-1-1CL1, Pilot's Abbreviated Flight Crew Checklist, F-16.
T.O. 1C-130E-1, Flight Manual, C-130E.
T.O. 1C-130E-1CL1, Pilots Abbreviated Flight Crew Checklist, C-130E.
FAAH 7110.65, Air Traffic Control.
FAAH 7220.2, Operational Position Standards.
Fayetteville ATC Tower and Pope AFB 23d OSS, Letter of Agreement, 24 Jan 94: IFR, SVFR, Class C Airspace Operations and Inter facility Coordination Procedures for Pope AFB.
Fayetteville ATC Tower and USAF 23d WG, Letter of Agreement, 3 May 93: IFR, VFR Operating Procedures.

b. Known deviations of the above include.

(1) AFR 60-16 para 4-4b was not adhered to by the F-16 pilot when he did not "see and avoid" the mishap C-130, though there were clearly extenuating circumstances in this case. Additionally, para 5-3 requires pilots to stay "well clear" of other aircraft.

(2) Local Letters of Agreement (LOA) were not followed by Fayetteville Approach Control North controller and Pope Tower local controllers and supervisor. LOA, 24 Jan 94 requires controllers to telephonically coordinate straight-in SFOs with Pope tower, but this was not done.

(3) Separation standards between the F-16 and C-130 were not adhered to by Pope controllers. These standards are published in AFR 60-5 (paragraph 2-1g(2)), FAAH 7220.2 (paragraphs 24-3, 4, 5, and 6), and FAAH 7110.65 (paragraph 3-122).

(a) Also, the BRITE system was not used to its fullest extent, as called for in AFR 60-5 (paragraph 2-7b(2)).

(b) Tower position responsibilities were not followed, as called for in AFR 60-5 (paragraph 2-7b(4)) and FAAH 7110.65 (paragraph 2-152).

(c) Incorrect traffic and landing advisories were given, contrary to FAAH 7110.65 (paragraphs 2-21, 3-124 and 3-126).

20. Opinion as to the Cause of the Accident: **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.**

Based on the evidence which I found to be clear and convincing, it is my opinion as investigating officer that there were multiple causes for the midair collision The majority of errors which caused the midair collision occurred in air traffic control. This includes the use by the Fayetteville Approach Controller of improper SFO hand-off procedures for the F-16, and a chain of errors by ATC personnel in the tower. The local controller trainee tried on several occasions to provide separation for the two mishap aircraft, but did not do so The local controller monitor supervising the trainee also did not deconflict the two aircraft. He did not issue a traffic advisory on the C-130 to the F-16 until just prior to midair collision. Overseeing the entire local control sequence, the tower watch supervisor did not correct errors by his personnel, and ensure traffic separation. The confusion caused by the incorrect call sign, the uncorrected tower radar display, the coordinator's erroneous placement of flight data strips, and unfamiliarity with F-16 straight-in SFO patterns by four of the five ATC personnel involved were all significant. The F-16 pilot did not "see and avoid" and stay "well clear" of the mishap C-130, as required by AFR 60-16. However, pilot testimony suggests the C-130 was not in the F-16 pilot's field of view The pilot became concerned about a potential conflict with the mishap C-130 after being advised of its presence, and was in the process of executing a low approach when the midair occurred. Another cause for the midair collision was insufficient training of ATC personnel, since four of the five ATC personnel involved had never seen an F-16 straight-in SFO, and were untrained in handling it. A final consideration is that while there were two letters of agreement which included F-16 SFO procedures, there was no evidence of a comprehensive airspace plan which addressed flying operations for the various types of aircraft based at Pope AFB. A single source reference document for local operating procedures on all Pope aircraft (A-10, C-130, and F-16) was not yet published on the date of the mishap.

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