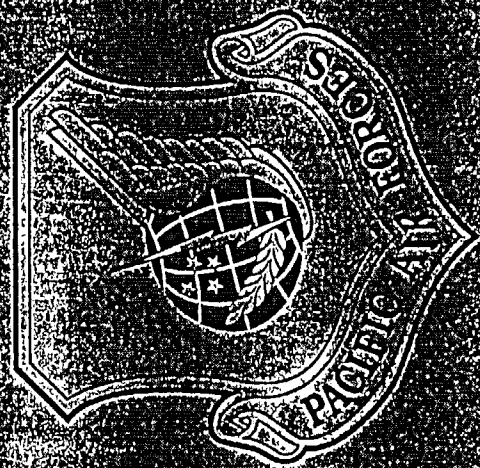


FILE INCIDENTS (AFR 110-14) (CY91)
16, Kunsan, 23 Oct 90, #86-0354)

REPORT OF AIRCRAFT ACCIDENT INVESTIGATION



F-16C SERIAL NUMBER 86-0354

ASSIGNED TO

8th TACTICAL FIGHTER WING (PACAF)

KUNSAN AIR BASE, KOREA

23 OCTOBER 1990

CONDUCTED IN ACCORDANCE WITH AFR 110-14

APPOINTING AUTHORITY

MICHAEL C. KERBY

MAJOR GENERAL USAF

VICE COMMANDER IN CHIEF

PACIFIC AIR FORCES

HICKAM AFB HI 96858

SUBMITTED BY

GARY H. SILENCE

COLONEL USAF

ACCIDENT INVESTIGATOR

HQ PACAF

HICKAM AFB HI 96853

PFS Exh. 116
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Intervenor _____ REJECTED _____
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DATE 7/1/02 Witness _____
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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS PACIFIC AIR FORCES
HICKAM AIR FORCE BASE, HAWAII 96853-5001

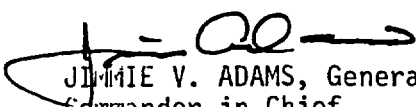
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ATTN OF: CC

8 March 1991

SUBJECT: AFR 110-14 Report of Investigation, F-16 86-0354, Accident of 23 Oct 90

TO: 7AF/CC

The subject report of investigation is approved.


JIMMIE V. ADAMS, General, USAF
Commander in Chief

SUMMARY OF FACTS
AIRCRAFT ACCIDENT INVESTIGATION, AFR 110-14
KUNSAN AB, REPUBLIC OF KOREA

1. Statement of Authority and Purpose. The Vice Commander in Chief, Pacific Air Forces, appointed Colonel Gary H. Silence on 15 November 1990, to investigate the aircraft accident involving an F-16C, 86-0354, which occurred on 23 October 1990. The aircraft (Killer 14) was assigned to the 8th Tactical Fighter Wing (TFW), Kunsan Air Base, Republic of Korea.

2. Summary of Facts:

a. History of Flight - On 23 October 1990 Killer 11 flight was scheduled as the second four-ship in an eight-ship low-level interdiction mission against a simulated target located approximately 60 nautical miles northeast of Taegu Air Base, Korea (V-1-III, V-2-II). Takeoff was scheduled for 0900 local (L) time and actual takeoff was logged at 0905L (K-10). Working backward from Killer 13's video tape recorder (N-1) and its time of day, combined with the flight data recorder information from Killer 14 (O-9), the actual time of takeoff was 0913L. At approximately 0941L (28 minutes after takeoff) Killer 14 experienced a sudden loss of thrust accompanied by illumination of the Secondary Engine Control (SEC) caution light indicating transfer of engine control from the primary mode to the secondary mode. After stabilizing briefly at 83 percent, the engine thrust continued to decay until flameout and, following a zoom and glide maneuver, the pilot ejected safely at 0942L. The aircraft was destroyed when it impacted the ground approximately one and a half miles north of the pilot in a mountainous, wooded area 32 nautical miles northeast of Taegu AB (V-1).

b. Mission - Killer 11 flight's mission was to conduct a simulated attack (dry--no ordnance) on a first-look target as part of a coordinated eight-ship package and then return to Kunsan AB (V-2-II). The aircraft was configured with two 370-gallon external fuel tanks, six BDU-33 practice bombs in a SUU-20 and an additional three BDU-33s on a TER-9A triple ejector rack, one captive AIM-9M air-to-air missile, 30 chaff bundles, 15 flares, three MAU-12 pylons with their three associated Advanced Conventional Remote Interface Units (ACRIU), 385 rounds of 20mm cannon ammunition and one acceleration monitoring device (M-1, BB-1-1).

c. Briefing and Preflight - The briefing was conducted in three phases. A mass briefing was conducted by the squadron commander, Lt Col Vanderford, at 0615L, in the 80th Tactical Fighter Squadron (TFS) (BB-2). This was followed by a mission brief by Captain Harding who was upgrading as a mission commander. He had completed most of the mission planning for all eight members of the package and the material was provided to the pilots. All required items were covered. The leaders of the four-ship flights then conducted detailed briefings. All briefings were conducted in accordance with MCM 55-116. There were no unresolved questions after the briefings. Preflight, start and taxi were normal (V-1-III, V-2-III). Testimony confirmed all required checks were performed on the accident aircraft to include the main fuel shutoff valve (MFSOV) check, SEC check and the verification that all six boost pumps were functioning properly (V-1-III, V-4-III). The aircraft had been performing well with no history of engine problems (V-4-II, V-5-II).

d. Flight Activity - Killer 11 flight took off at 0913L and joined the mission package as briefed in an offset box formation with Killer 13 and 14 three miles behind Killer 11's element. Killer 14 (the accident pilot) was spread 9000 feet to the left of Killer 13 during the first leg of the low level, which proceeded eastward from Kunsan AB to a turn point south of Taegu AB (V-2-V, V-3-II, AA-1). General parameters for the overall mission package were 500 feet above ground level (AGL) and 480 knots ground speed. At the turn point south of Taegu the route of flight 11 turned northeast. Killer 14 moved to the right side of the formation during the turn. A few minutes after turning northward (28 minutes after takeoff) (0-9) Killer 14 experienced a sudden loss of thrust, which threw him forward in his shoulder straps. He immediately advanced the throttle to military power and began to evaluate the problem. He noted the SEC caution light illuminated and the engine speed stable at 80 percent. He began the recommended 3g pull-up to trade airspeed for altitude/time and called Killer 13 to "knock-it-off" (terminate the mission) due to an auto transfer to SEC (V-1-IV thru V-1-V, BB-9-4). During this brief climb of approximately 4000 feet (0-12, 0-26) engine instrument readings became erratic and indications of a flameout began to appear. At about 5000 feet above Mean Sea Level (MSL) both RPM and engine temperature began to fluctuate rapidly, but no engine surges were felt by the pilot. He perceived a possible surging engine condition and snapped the throttle to idle. Both engine temperature and RPM continued to decrease, so the pilot proceeded with procedures for an engine airstart by bunting over to maintain about 250 knots while placing the throttle in OFF, then setting it in a mid-range position (V-1-V, VI). The aircraft reached a maximum height of approximately 6000 feet MSL (0-28, V-1-VII). The Jet Fuel Starter (JFS) was running in the start 2 position. The B system hydraulic pressure was low and the A system pressure was up and

fluctuating. The Emergency Power Unit (EPU) was running to power flight controls, A system hydraulic, and emergency electrical system buses (V-1-VI). The F-16C Dash-1 indicates that 'If the zoom results in an altitude below 5000 feet AGL, there may be insufficient time to achieve an airstart prior to reaching minimum recommended ejection altitude .' (BB-9-4) Killer 14's zoom was about 4500 feet AGL. Both external fuel tanks were jettisoned near the maximum zoom altitude. There were no indications of a successful engine start so Killer 14 informed the flight that he was going to eject (V-1-VII). He ejected safely at 1500 to 2000 feet AGL.

e. Impact - The accident aircraft impacted the ground at about 1700 feet MSL in hilly terrain at 36 degrees 13.53' North latitude, 120 degrees 08.93' East longitude or 32 nautical miles northeast of Taegu AB (A-1, AA-2). The time of the crash was approximately 0942L, 23 October 1990 (N-2).

f. Ejection - The ejection was initiated at about 3500 feet MSL (2000 feet AGL) and 250 knots and was normal. The pilot experienced twisted risers, but bicycled to easily correct this. The left four-line release strap could not be pulled from the flute so the pilot used a manual parachute slip to steer himself to a more favorable landing area (V-1-VIII). The ejection seat could not be located by the crash recovery team (BB-10).

g. Personal and Survival Equipment - This equipment was properly carried by the accident pilot and equipment inspections were complete and current (BB-4). After landing the pilot turned off the Emergency Locator Transmitter (ELT), but when he turned on his radio the ELT was still transmitting so he removed its battery. The survival radio functioned well on 282.8. One gyro jet flare was used to signal his position to circling members of his flight (V-1-IX).

h. Rescue - Killer 13 attempted to contact Airdale, the main military radar control facility in Korea, at 0943L. The contact was intermittent and not effective. Killer 11 and 12 saw the smoke from the crash site at 0943L. At 0944L Brigham, an airborne AWACS E-3 aircraft, answered Killer 13 and took over the job of relaying the request for helicopter assistance. The gyro jet signal flare from Killer 14 on the ground allowed Killer 11 and 12 to set up a low CAP above his position at 2000 to 3000 feet AGL while sending Killer 13 to a high CAP at 20,000 feet MSL. Killer 13 was able to contact the 8 TFW Supervisor of Flying (SOF) at Kunsan AB at 0947L. An MH-60G helicopter was operating south of Osan AB at the time and responded to the downed aircraft call via Airdale. At about 1045L the helicopter was vectored to the downed pilot, Lt Brilando, by Brigham and Killer 13 who was still CAPing the location. The helicopter landed very near the

pilot's position. Recovery was uneventful and Lt Brilando (Killer 14) was flown back to Kunsan AB at 1250L after a refueling stop at Camp Walker (N-2 thru N-5, V-6).

i. Crash Response - The 8 TFW responded promptly to form the Battle Staff and Disaster Control Group in order to plan initial actions. Initial response consisted of the Base Commander, security police personnel and a medical representative. They were flown to the crash site by a UH-60 helicopter. Additional personnel were transported by C-12 aircraft and surface convoy. The recovery operation was continued until 4 November 1990 (BB-10).

Media response to the accident was light. It received very limited coverage in both the local and U.S. (Stars and Stripes) press. (BB-5-1 thru BB-5-3).

Collateral damage was limited due to the area of impact. The primary damage was to small farm plots (medicinal plants and soybeans) and trees (both corporate and privately owned medicinal trees). Solatium payments totalling approximately \$855 U.S. dollars (600,000 Korean Won) were made so far to three of the four private land owners. Claims are not expected to exceed \$10,000 (U.S.). No structures, live stock or personal loss of life were involved (BB-7-1 thru BB-7-5, BB-8).

j. Maintenance Documentation - There were no maintenance discrepancies noted in the AFTO Form 781 which relate to the accident. There were three airframe-related Time Compliance Technical Orders (TCTO) not yet accomplished. All engine TCTO's were accomplished. The aircraft was ready for flight, since the nearest suspense/grounding date was 8 January 1992 (U-5). A total of 854.3 flying hours were logged on the airframe prior to the day of the accident. The last scheduled 150 hour phase inspection was accomplished at 736.4 hours on 31 May 1990. All inspections listed in the AFTO Form 781K were current and up-to-date (U-6). Unscheduled maintenance was limited to routine servicing and maintenance.

Pre-accident oil analyses were normal. Oil samples taken after the accident show normal readings except for Iron, Aluminum, Magnesium and Silicon. Testing of crash site soil indicated these increases were consistent with soil contamination/ingestion during impact (J-8, Z-4). Fuel sample tests were normal (J-27,28).

Engine records revealed nothing significant. Prior to the time of the accident mission, engine serial number GE OE509526 had logged 645 hours engine operating time. The last 75 hour engine inspection was on 24 August 1990 and was not due again until 676.9 hours (U-3,4).

All original aircraft and engine records not in this report were transferred to 7AF/JA, Osan AB, Korea.

k. Maintenance Personnel and Supervision - Preflight servicing of the aircraft was performed in accordance with technical data. No preflight servicing discrepancies were noted.

Those who performed the routine preflight and launch were qualified to perform those tasks (BB-3-1). All AF Form 623, On-The-Job Training Records, were returned to the 8th Aircraft Generation Squadron.

1. Aircraft Systems - Teardown analysis of major engine components indicated that no catastrophic system failure occurred prior to impact (J-12 thru J-18). However, at about 28 minutes after takeoff, fuel flow to the engine was abruptly reduced from nearly 10,000 pounds per hour (pph) to slightly over 3000 pph in the space of 11 seconds and the N1 RPM (Fan Speed) decayed 5.7 percent. One second later, while the fuel flow continued to decrease to only 122 pph, N1 RPM dropped another 7 percent. This decrease of greater than 5 percent in 1 second caused the engine to auto transfer to SEC. The pilot advanced the throttle to military power during this time. The engine exhibited indications of a stall due to the shortage of fuel during or just after the auto transfer to SEC. The N2 RPM (compressor speed the pilot sees in the cockpit) stabilized in the 83 percent range for about 8 seconds. When the throttle was later retarded to idle due to fluctuating engine indications during the zoom, the N1 and N2 RPM began a steady drop over the next 40 seconds to the 14 and 32 percent range respectively (O-49 thru O-61). Analysis of flight data recorder information in Tab O indicates fluctuating fuel flow after the initial major reduction, with fuel flow dropping to zero at one point (O-101). A modulating Main Fuel Shutoff Valve (MFSOV) would cause these indications (BB-3-1). The MFSOV was found in the closed (no fuel flow) position after the crash (S-1). The combination of low/fluctuating fuel flow, low N1 and N2 RPM speed, and low altitude/lack of time, made the probability of a successful airstart very low.

n. Operations Personnel and Supervision - All four members of Killer 11 flight signed the Form 35, Local Flight Clearance/Flight Order, as authority for the flight and Lt Col Connors, 80 TFS Operations Officer, was the approving official (K-9,10).

The mass, mission and flight briefings were detailed and covered all required items in accordance with MCR 55-116. The mass brief was conducted by Lt Col Vanderford, 80 TFS Squadron Commander. Due to the time lapse between the accident and this investigation (seven weeks due to the extended Safety Investigation followed by a Headquarters PACAF Operational Readiness Inspection of the 8 TFW), testimony could not establish the time of the brief, but the 80 TFS Duties and Meetings Schedule indicates a 0615L mass brief. This would be consistent with testimony that mass briefings generally began two and one half to three hours prior to the scheduled takeoff--0900L for the subject mission (V-1-II, III, V-2-III, BB-2). No discrepancies were noted with 8 TFW operations supervision.

o. Crew Qualification - Lt Brilando, the accident pilot, was qualified for the planned mission. He was an experienced wingman with sixteen months at Kunsan AB in the 8 TFW. He had 434.1 hours in the F-16 and had been mission ready since 30 August 1989 (G-2, T-2). His last formal evaluation was an Instrument Qualification on 25 April 1990 which was rated qualified (T-1).

The only thing of note in his training records in pilot training, fighter lead-in, and F-16 upgrade, was his failure in the F-16 simulator to move the ENG CONT switch to SEC during a simulated low altitude engine failure (T-5-2). His training records reflect average to above average performance. Copies of the original records were made for this report and the original records returned to the individual.

p. Medical - Lt Brilando was medically qualified to fly. His last long flying class II physical was on 30 November 1989. It was within normal limits.

Post-ejection examination of Lt Brilando on 23 October 1990 revealed a minor bilateral paraspinal muscle strain from the ejection forces. He was hospitalized overnight for observation and returned to flying status in two days (X-1).

q. Nav aids and Facilities - Local flight facilities were not deemed a factor in this accident.

r. Weather - The complete weather forecast and slides shown at the mass briefing are at TAB K-1 thru K-8. The actual weather was confirmed by testimony as better than five miles visibility and only scattered clouds (V-2-IV, V-3-III).

s. Directives and Publications - The following directives were applicable to the mission being flown at the time of the accident.

Technical Orders:

T.O. 1F-16C-1, F-16C/D Flight Manual, Change 3, 14 May 1990

Air Force and PACAF Regulations:

AFR 60-1, Flight Management, Feb 1990

MCR 55-116, F-16 Pilot Operations Procedures, 15 April 1988

MCR 55-116, Chapter 9, PACAF Operating Procedures, 16 March 1990

8th Tactical Fighter Wing (TFW) Directives:

MCR 55-116, Chapter 8, 8TFW Operating Procedures, 30 October 1989
8TFW Safety Mishap Quick Response Checklist

Accident Investigation Guidance:

AFR 110-14, Investigation of Aircraft and Missile Accidents,
14 December 1989

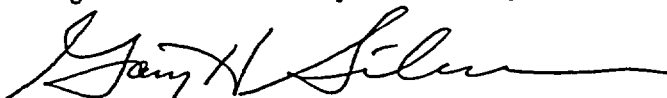
Judge Advocate General document: Aircraft, Missile, Nuclear and
Space

Accident Investigator's Handbook, January 1990

There were no known or suspected deviations from these directives.
Any delays in initiating emergency actions were minor. The pilot could
not remember moving the ENG CONT switch to SEC after the auto transfer
to SEC (a required step in the Dash-1).

All records and tapes not included in this report were transferred to
7AF/JA. The aircraft wreckage was transferred to 8 TFW/CC until
disposition is authorized by HQ USAF/JACC.

Signature - This report is respectfully submitted 18 December 1990.



GARY H. SILENCE, Colonel, USAF
Accident Investigation Officer