

REPORT OF AIRCRAFT ACCIDENT INVESTIGATION

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**F-16C SERIAL NUMBER 85-1492
ASSIGNED TO
432ND WING (PACAF)
MISAWA AIR BASE, JAPAN
28 APRIL 1993**

CONDUCTED IN ACCORDANCE WITH AFR 110-14

**APPOINTING AUTHORITY:
ROBERT L. RUTHERFORD
GENERAL, USAF
COMMANDER IN CHIEF
PACIFIC AIR FORCES
HICKAM AFB, HI 96853**

**SUBMITTED BY: PFS
Exh. 149
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ACCIDENT INVESTIGATOR
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REGULATORY COMMISSION

Official Exh. No. 149

Number of

175

Identified	✓
Applicant	✓
RECEIVED	
REJECTED	
Interview	
Other	
DATE	7/11/07
Witness	
Clerk	



DEPARTMENT OF THE AIR FORCE
PACIFIC AIR FORCES



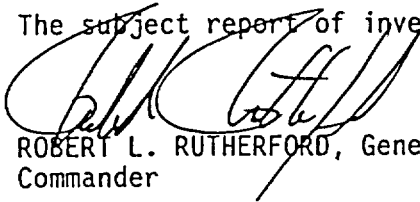
FROM: PACAF/CC
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SEP 20 1993

SUBJ: AFR 110-14 Report of Investigation, F-16C, SN 85-1492

TO: 5 AF/CC

The subject report of investigation is approved.


ROBERT L. RUTHERFORD, General, USAF
Commander

FORMAL REPORT OF INVESTIGATION

I. STATEMENT OF AUTHORITY AND PURPOSE

Pursuant to Air Force Regulation 110-14, the Commander, Pacific Air Forces (COMPACAF) appointed Colonel Loren J. Schroeder on 2 June 1993, to investigate the aircraft accident involving an F-16C, aircraft serial number 85-1492, which occurred on 28 April 1993. The aircraft (Nomad 13) was assigned to the 432nd Fighter Wing (FW), Misawa Air Base (AB), Japan. The accident occurred 3 nautical miles (NM) west of Osan AB, Republic of Korea (ROK). By the same authority and on the same date COMPACAF appointed Captain David R. Nardi as technical advisor and Captain Deborah L. Collins as legal advisor to assist in the investigation.

II. SUMMARY OF FACTS

A. History of Flight:

A.1. At 1335 Local time(L), on 28 April 1993, Nomad 13 departed Osan AB as number three in Nomad 11 flight of four. Their mission was two versus two similar intercepts. Upon arrival in the training area the weather was determined unsuitable for the briefed intercept mission. The flight then proceeded to Crown, the published Initial Approach Fix (IAF) and holding pattern for Osan to burn down fuel and set up for twoship element Aircraft Surge Launch and Recovery (ASLAR) instrument arrivals to Osan. Nomad flight split into two flights of two at this time. (Tab A, pg 1). Nomad 11 flight proceeded on the original Air Traffic Control (ATC) clearance and landed at Osan without remark. Nomad 13 flight obtained a separate ATC clearance and was cleared to Osan via the ASLAR TACAN Runway 09 Approach. While on final approach Nomad 13 collided with trees on a ridge line 3.5 miles from Osan AB ejecting safely at 1435L. Nomad 14 landed uneventfully at Osan AB.

A.2. The mishap generated medium media interest which included several Korean and Japanese publication and the Pacific Stars and Stripes. Media inquiries have been handled through the 51st Wing Public Affairs Office, Pacific Air Forces, at Osan AB, ROK. (Tab BB, pg 1).

B. Mission:

B.1. Nomad 13 was scheduled as number one in a flight of two F-16C aircraft on temporary duty (TDY) at Osan for a Close Air Support (CAS) Mission in support of a Close Air Support Exercise being flown in the Republic of Korea. Nomad 13 launched as number three in a flight of four on an alternate two versus two, similar, day Air Intercept Mission. (Tab A, pg 1).

C. . Briefing and Preflight:

C.1. Due to low forecasted weather, squadron supervision directed Nomad 11 and Nomad 13 flights to brief an alternate mission of two versus two intercepts, as well as their primary CAS mission. The briefing was conducted by Nomad 11 who was selected to lead the four ship if launched on the alternate mission. Nomad 11 briefed the administrative, two versus two intercept, flight split up, and Osan recovery options. He briefed a visual arrival option to fly the overhead pattern as a flight of four and an instrument arrival option to split up into two separate elements for instrument arrivals. (Tab V, pgs 8, 59). The remainder of the briefing was handled by each individual element in preparation for the CAS mission. Nomad 13 briefed the remaining portions of this element's briefing. Neither flightlead briefed the TACAN Rwy 09 approach procedure. Nomad 13 states he had approximately 30 minutes after the flight briefing in which he personally reviewed this approach procedure. (Tab V, pgs 8, 24).

C.2. Crew rest was more than adequate and not a factor to this accident. Preflight and before flight operations were normal with no aircraft discrepancies noted. (Tab V, pg 8, 17, 60, 64, 351). The mishap aircraft had flown previously that day without discrepancy. (Tab H, pg 1).

D. Flight Activity:

D.1. Nomad 11, flight of four launched on the backup intercept mission from Osan AB at 1335L. Using single ship take offs into a twenty second radar trail formation, they climbed through the weather southwest bound to the overwater training area. Upon arrival in the training area the weather was determined unsuitable for the briefed intercept mission. The flight then proceeded to Crown, the published Initial Approach Fix (IAF) and holding pattern for Osan to burn down fuel and set up for twoship, element, ASLAR instrument arrivals to Osan. Nomad flight split into two flights of two at this time. (Tab V, pgs 8, 9, 18). Nomad 11 flight proceeded on the original Air Traffic Control (ATC) clearance and landed at Osan without remark. Nomad 13 flight obtained a separate ATC clearance and was cleared to Osan via the ASLAR TACAN Runway 09 Approach. He led his flight in the holding pattern and through the penetration as published on the approach procedure, spending most of this time in the weather under Instrument Meteorological Conditions and Instrument Flight Rules. Nomad 13 had led flights down through the weather on only six previous occasions and states he was being extra smooth as a consideration for his wingman. (Tab V, pgs 19, 31, 53). This included requesting deletion of an intermediate altitude restriction and being "slightly high and fast" at all checkpoints on the approach. Nomad 13 issued an altimeter setting to his wingman as he told him to drag at the published drag point. Crossing the deceleration point with his wingman now in a trail formation he reduced his power and extended his speed brakes. (Tab V, pgs 9, 10).

D.2. The weather Nomad 13 received from Osan Approach control was the hourly observation which was one observation old at that time. This

weather was two observations old at the time of the mishap. The weather was rapidly changing as evidenced by these observations and several pilot reports to approach control and the Supervisor of Flying. Nomad 13 received a weather report of a ceiling at 2000 feet and a visibility of 7 miles with 2/8ths cloud coverage at 1000 feet and 5/8ths cloud coverage at 1500. The ceiling information was misread by the controller and was actually at 1500 feet. (Tab K, pg 10, Tab N, pgs 2,4). The special observation that Nomad 13 did not receive showed the visibility at 2.5 miles. Pilot reports showed previous pilots finding the runway approach lights at only 2 miles. (Tab N, pgs 2, 3, 9, 12; Tab V, pgs 67-69).

D.3. Communications with Radar Approach Control were normal for an aircraft on a TACAN approach. Radar traffic advisories were provided. Altitude monitoring was not provided as it is the pilot's responsibility and not required by regulation. (Tab V, pgs 84, 106, 107). The radar final controller was not monitoring Nomad 13's altitude. Nomad 13 was not observed below the safe altitude for the approach. (Tab V, pg 89).

D.4. At the final Approach fix Nomad 13 was "100-200 feet" high and "a little" fast (Tab V, pg 9). Leaving his speed brakes extended he lowered his nose for a 5 degree nose low descent and reduced his power further in preparation for the final approach airspeed point 2.3 NM ahead and the step down fix and altitude 3NM ahead. The terrain at the step down fix for this approach is 512 feet in elevation at 3.5 NM from the TACAN. (Tab R, pg 8). This specific terrain is erroneously depicted on the approach chart at approximately 5NM from the TACAN. Upon reaching 1000 feet he reduced his dive angle by approximately one half and added a "half knob width" of power. He does not recall retracting his speed brakes although that was his normal habit pattern. At this time the aircraft felt "strange" as if his engine was not spooling up and he diverted his attention to the engine instruments to determine if he had an engine problem. He advanced and retarded the throttle and observed the engine instruments following. Rechecking the instruments he still could not determine the cause for the aircraft feeling "strange". At this time he emerged from the bottom of the cloud deck and directed his attention to the visual environment. He saw the ground and two ridge lines, but not the runway. (Tab V, pg 11). Something then caught his eye and he redirected his attention inside the cockpit to determine what it was. He thought it was a light on the right side but could not find anything out of the ordinary. Through his peripheral vision he then noticed the "ground rush" of the trees and once again directed his attention outside the cockpit. Seeing the trees he advanced the throttle ending up in afterburner range and pulled the nose of the aircraft up just prior to the impact with the trees. Exiting the trees he noted the engine gauges showing an uncommanded decrease in engine RPM, saw many red "eyebrow" warning lights and felt the aircraft begin to lose altitude. He elected to eject at that point. (Tab V, pg 11).

D.5. There is no evidence of any aircraft system or engine malfunction prior to impact with the trees. The engine ingested a large amount of tree debris limiting its thrust to minimum afterburner. The engine was still operating at an undetermined power

setting above idle at the time of the final impact with the ground. The seat data recorder began showing flight control faults immediately at and during impact with the trees. (Tab J, pgs 1,6).

E. Impact:

E.1. The aircraft impacted the trees along the top of a ridge line at 450 feet Mean Sea Level (MSL), 3.5 NM and bearing 266 degrees from the Osan TACAN. The time of impact was 1435L on 28 April 1993. The aircraft altitude was 450 feet MSL, airspeed approximately 127 knots with an angle of attack of approximately 17 degrees. The aircraft was heading approximately 085 degrees inbound to Osan on the 265 degree radial in nearly level, decelerating flight. (Tab J, pgs 7,8,12,13; Tab R, pgs 3,6).

E.2. Pursuant to the Status of Forces Agreement, Republic of Korea (ROK) citizens who suffer damages as a result of official acts of the United States Forces in Korea must claim for these damages against the ROK. A District Compensation Committee in the province where the accident occurred received the claim, adjudicates it and pays the claimant. The United States then reimburses the ROK 75% of the claim. As a direct result of aircraft 1492's impact with the ridgeline and adjacent rice paddies damages suffered by local nationals include soil destruction, water contamination, loss of use of farm land, destruction of timber, damage to roads and dikes and costs to clean the debris. In addition to any monies paid for actual damages a solatium payment was made to the owner of the land where the aircraft came to its final resting place. (Tab P, pgs 1).

F. Ejection

F.1. Ejection was initiated in region one of the ACES II ejection seat envelope and functioned normally except for one Wiggins Quick Disconnect that failed to disconnect. That initiator hose subsequently tore as the ejection seat proceed up the rails. This malfunction did not affect the ejection. (Tab BB, pgs 2).

G. Personal and Survival Equipment:

G.1. All inspections and time change items were current. (Tab BB, pg 2). Nomad 13 utilized both his survival vest and seat kit PRC-90 UHF radios. Due to his location in a valley with two hills between he and Osan AB, only a few base agencies and aircraft faintly heard his Guard frequency transmission and/or his Emergency Locator Transmitter (ELT). Nomad 13 made successful contact with an airborne aircraft who relayed his situation to agencies at Osan. (Tab V, pgs 12, 13).

H. Rescue and Crash Response:

H.1. Nomad 13 ejected from his aircraft at 1435L. His ELT was heard faintly by only a few agencies. The weakness of the ELT and his Guard frequency transmission led those agencies to believe they were hearing an errant ELT and/or survival radio check in progress. (Tab V, pg 278; Tab N pg 11). After landing from his ejection, Nomad 13 attempted contact with other aircraft and agencies. Initially he did not use his radio ear piece and failed to hear several radio

transmissions returned to him. After a delay he connected his ear piece and made contact with an airborne aircraft. Nomad 13 mistakenly gave his position to that aircraft as 2 miles east of Osan and one half mile east of the crash site. (Tab V, pg 13). The actual crash position was 2 miles west of Osan. The airborne aircraft relayed this erroneous information through his operations who initiated the first call to the Osan Command Post at 1500L. (Tab V, pg 112).

H.2. During this time there was confusion among ATC agencies on whether Nomad 13 and landed or was still in the radar traffic pattern. The final controller who lost contact with Nomad 13 thought he heard other controllers working him and then overheard that tower was calling Nomad 13 on the ground. At that point he began controlling additional traffic and did not pursue Nomad 13's status any further. (Tab V, pgs 101, 103, 104). The tower controller working Local Control thought that Nomad 13 had landed and logged him down when he logged Nomad 14 down. (Tab V, pg 104).

H.3. The Fire Department dispatched the first vehicle at 1502L which proceeded to the east of Osan per the initial description of the crash location. (Tab V, pg 112). The 38th Air Rescue Squadron was alerted and began preparations to launch at that time. Their helicopter was ordered airborne at 1510L and launched at 1512L. After proceeding to the east and searching for the accident site they made subsequent radio contact with Nomad 13 and determined through the quality of the radio reception that he was not to the east of Osan. Shortly after moving the search to the west they saw the smoke and located the crash site. Nomad 13 was hoisted aboard the rescue helicopter at 1527L and delivered to an ambulance at Osan at 1533L. (Tab V, pgs 345, 346).

H.4. The 51st Wing Disaster Control Group was immediately recalled to the Air Base Control Center where the fire and rescue vehicles were also assembled. At 1554L the Mobile Command Post, Fire Chief vehicle, one ambulance, one Explosive Ordinance Disposal vehicle, One P-19 crash truck, one P-10 Rescue vehicle, one P-18 water tanker and three Security Police vehicles departed for the crash site. A second helicopter was launched at 1545L carrying security police to the accident scene. The initial response vehicle arrived at the scene at 1622L. Narrowness of the local roads prohibited the vehicles from approaching closer than one half mile to the crash site. Fire fighters carried portable extinguishers and breathing apparatus to the crash site and extinguished several spot fires remaining on their arrival. (Tab V, pgs 109-116).

H.5. The delay in initiation of the initial rescue call was due to Air Traffic Control losing track of Nomad 13 and Nomad 13's ELT and Guard transmissions not being clearly heard. (Tab N, pgs 11; Tab V, pgs 99-101, 104). Difficulties in reaching the crash scene included: the initial call by the pilot that he was to the east of Osan when he was to the west, poorly marked Korean roads and confusing directions received via radio from the ROK local fire department and low ceilings/visibility making the smoke from the wreckage not visible from the tower or the helicopter until the weather improved and the helicopter until the weather improved and the helicopter was closer to the crash location. (Tab V, pg 109-116).

I. Maintenance Documentation:

I.1. There were no maintenance discrepancies noted in the Air Force Technical Order (AFTO) Forms 781 for aircraft 85-1492 that relate to the accident. (Tab BB, pg 3).

I.2. There were no time Compliance Technical Orders incomplete that relate to the accident. (Tab BB, pg 3).

I.3. Two scheduled inspections were not accomplished; a records documentation check, and a 30 day arresting gear check. Neither of these had an impact on the accident. (Tab BB, pg 3).

I.4. Oil analysis records were free of discrepancy with the preaccident oil sample within standards. (Tab J, pg 3; Tab V pgs 123-126).

I.5. All time change requirements were completed on time. (Tab BB, pg 3).

I.6. The Equipment Review Report revealed that timely component inspections were accomplished with the exception of those noted above. Those inspections are the responsibility of USAF personnel. (Tab BB, pg 3).

I.7. Post accident tear down and analysis was accomplished by OO-ALC. (Tab J, pgs 1-9, 12-13).

I.8. Unscheduled maintenance on this aircraft since completion of the last scheduled inspection includes: the Fire Control Radar, the Radar Warning Receiver, the nose gear steering, the Horizontal Situation Indicator, the Airspeed Indicator, the altimeter and the Inertial Navigational Unit. While there were several recurring problems with the avionics, thorough review indicates that proper maintenance procedures and fault isolation procedures were followed and sound fixes were made to the aircraft. All avionics removed and replaced for maintenance were bench checked in the back shop who duplicated the problem thereby validating the flightline maintenance work. The aircraft had flown 15 sorties since the last avionics discrepancy. There is no evidence that any of the unscheduled maintenance performed contributed to this accident. (Tab V, pgs 178-205, 220-230, 245-259, 313-317, 353-356).

J. Maintenance Personnel and Supervision:

J.1. Preflight servicing personnel and supervision were unremarkable. On the job training records showed all personnel working this aircraft qualified for the tasks performed. There was no evidence of maintenance practice or procedure as a factor in this accident. (Tab BB, pg 3).

K. Engine, Fuel, Hydraulic, and Oil Inspection Analysis.

K.1. The aircraft engine F110-GE-100 serial number 509286 (Low Flow) had accumulated 2419.4 hours of engine operating time. (Tab J, pg 1).

K.2. Engine Inspection Data: The aircraft engine AFTO Form 95 revealed that all inspections were complete. All safety of flight Time Change Technical orders (TCTO) were accomplished. The AFTO Form 95 did not show completion of TCTO2J-F110-672, however, the TCTO status from the Tinker Air Logistics Center (ALC) data base revealed this TCTO complete. The engine AFTO Form 781K in the aircraft AFTO 781 forms did not show completion of TCTO2J-F110-578 and TCTO2J-F110-644, however, the engine work package documentation showed completion on 24 February 93. The following non grounding TCTOs were not accomplished: TCTO2J-F110-617, TCTO2J-F110-633 and TCTO2J-F110-637. These TCTOs had kits on order for their accomplishment. These documentation anomalies and open TCTOs had no effect on this accident. (Tab BB, pg 4).

K.3. Fuel test report data was normal. (Tab O, pg 36-38).

K.4. Hydraulic fluid test report data was normal. (Tab O, pg 39).

K.5. Oil test report data was normal. (Tab O, pgs 33,42).

L. Airframe Structure Report:

L.1. A Product Quality Deficiency Report (PQDR) was submitted on one item:

"Valve, Air pressure regulating and shutoff, Inter pressure,"
Part no. 320135
Serial no. 195
National Stock no. 4810-01-363-1952
Contract No. 16 VY007002-4
PQDR no. 93-1003. (Tab I, pg 1).

During tear-down this part was determined to be missing pieces. The results of the PQDR have not been received, however, the engineer analysis of the aircraft engine, serial no. 509286, states that the missing pieces did not enter the engine and were not the cause of this accident (Tab J, pg 4). There was no evidence of Foreign Object Damage (FOD) other than soft tree FOD consistent with tree impact. There was no evidence of bird ingestion. There are no suspected system or engine malfunctions (Tab J, pgs 4,6), therefore there are no manufacturer that may be contacted in relation to any system failure.

M. Operations Personnel and Supervision:

M.1. The flight was duly authorized by the 13th Fighter Squadron Commander (Tab K, pgs 4-8). The briefing was conducted by Nomad 11 for the departure, intercept and recovery portions with Nomad 13 conducting his own element brief. The briefing was conducted using PACAF Manual 55-116 briefing guides. Squadron supervisory personnel were not present in the flight briefing. (Tab V, pgs 26-27,60-61).

M.2. The briefing adequately covered the departure, intercept and flight break up portions of the mission, however, it failed to discuss recovery terrain avoidance, hazards associated with human factors, visual illusions/perceptions and spatial disorientation as prescribed in PACAF Regulation 55-116. Briefing items in PACAF Regulation 55-116

may be briefed in any logical sequence an/or briefed as "Standard" if they are understood by all participants. This is a factor as both briefers were aware they would be recovering to Osan Runway 09 which was a first time procedure for all in the flight, has significant terrain features and normally has rapidly changing weather conditions. (Tab R, pg 8; Tab V, pgs 26-27, 58-60, 351).

N. Aircrew Qualifications:

N.1. The pilot of Nomad 13 was qualified to perform the assigned mission in the aircraft. He had recently completed an Instrument Evaluation without discrepancy. His flying currency was average and he had performed precision, nonprecision and ASLAR instrument approaches within one week of the accident. He is an experienced pilot with 519 hours in the F-16 and 816 total hours. He upgraded to flightlead seven sorties prior to the accident. His training progress was average and his training program showed no deficiencies. (Tab G, pgs 1-10, Tab V pg 77-78).

O. Medical

O.1. The mishap pilot's medical records contain an Air Force Form 1042 showing he is currently medically qualified to fly. His Annual Flying Physical is current, expiring on 30 April 1994. He possesses a waiver requiring the wearing of spectacles or contact lenses during flight. The mishap pilot testifies he was wearing his contacts during the mishap flight which was confirmed by the post accident examining Flight Surgeon. The post accident medical evaluation showed no injuries and the toxicology report was negative (Tab V, pgs 273-276).

P. Navaids and Facilities

P.1. A review of the Notices to Airmen (NOTAMS) for the accident date revealed nothing of interest to the accident.

Q. Weather

Q.1. On 28 April 1993 the weather at Osan AB was under the influence of a frontal boundary moving southwest to northeast. The system was very slow moving bringing continuous rain showers throughout the day. Additionally there were embedded thunderstorms detected on the radar to the west moving southwest. As the influx of moisture continued over Korea, fog also developed in the early afternoon persisting until approximately 1500L.

Q.2. The only weather advisory was issued at 1334L for thunderstorms within 10 miles of Osan. These storms never approached within 10 miles and the advisory was canceled at 1656L. The official forecast issued at 1200L called for a ceiling of 2,500 feet and a visibility of 5 miles in rainshowers with thunderstorms in the area. The forecast then called for a visibility of 3 miles in thunderstorms and fog by 1400L. After 1400L the forecast also called for a ceiling of 2,500 feet containing cumulonimbus clouds with a broken deck at 8,000 feet and an overcast deck at 20,000 feet.

Q.3. The actual weather at 1400L showed the ceiling dropping to 1,500 feet for one and one half hours with the visibility dropping to 2.5 miles at 1430L for approximately one hour. Heavy rainshowers in the area at this time caused these decreased conditions. During this time there was also another scattered cloud deck at 700 to 1,000 feet. (Tab K, pg 1-9).

Q.4. The Supervisor of Flying in the tower and several aircraft in the instrument traffic pattern verified the existence of the lower field conditions reflected in the 1400L observation. Traffic was landing from West to East with weather conditions worse to the West. At the time of the accident, pilots were reporting detection of the sunway approach lights at 2 miles. (Tab N, pgs 2, 3, 9, 12; Tab V, pgs 67-69).

R. Directives and Publications;

R.1. The following directives and publications were applicable to the mission being flown at the time of the mishap.

Technical Orders:

T.O. IF-16C-1, Change 7	Flight Manual
ISS-135	
ISS-143	
ISS-145	
ISS-147	
T.O. IF-16C-1CL-1, Change	Flight Crew Checklist
Same as above	
T.O. IF-16C-2-12JG-00-1	Aircraft Servicing
	Scheduled Inspections
	and Maintenance
T.O. IF-16C-6WC-1-11	Preflight, Postflight,
	Throughflight, Launch
	and Recovery

Air Force/PACAF:

AFM 51-37	Instrument Flying
AFR 60-16	General Flight Rules
MCM 51-50, Vol 1	Tactical Aircrew
	Training
PACAFR 55-116 Supplement	F-16 Operational Procedures

432nd Fighter Wing:

PACAFR 55-116	Chapter 8, 432 FW Operational
	Procedures
432 FW Standards	

S. Known Deviations from Directives:

S.1. PACAF Regulation 55-116 briefing guides outline the subjects to be covered in flight briefings. Pilots may address these subjects in any logical order and may brief them as "Standard" if they are

understood by all participants. In this incident, the briefings adequately covered the departure, intercept and flight break up portions of the mission, however they failed to discuss recovery terrain avoidance, hazards associated with human factors, visual illusions/perceptions and spatial disorientation as prescribed in this regulation. Both flightleads chose to brief these items as standard without adequate regard to the type of weather they would be penetrating on an approach they had not flown that has high terrain on final approach.

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.

A. Factors Causing this Accident

A.1. In the course of my investigation certain information was discovered which clearly indicated the cause of Nomad 13's mishap and from which I was able to conclude the cause of the accident. While flying an approach to Osan AB Rwy 09 under instrument conditions Nomad 13 failed to level off at the 800 foot Mean Sea Level (MSL) step down fix altitude restriction and failed to level off at the 540 foot MSL minimum descent altitude restriction causing him to strike trees on a ridgeline at 450 feet MSL. (Tab R, pgs 3, 6; Tab V, pgs 48-51). Had he adhered to these published altitude restrictions this accident would not have occurred. These altitude restrictions are published to keep aircraft above and safely clear of terrain and/or other obstructions on the instrument approach.

A.2. Clear and convincing information also establishes that Nomad 13 failed to follow T.O.1F-16C-1 Emergency Procedures Chapter 3, basic rules which apply to all emergencies which include; rule 1. maintaining aircraft control, rule 2. analyze the situation and take proper actions, and rule 3. land as the situation dictates. When he perceived he had a problem with his aircraft Nomad 13 should have followed the basic emergency procedure rules. He failed to follow rule number 1, maintain aircraft control, by allowing his aircraft to continue to descend below restrictive altitudes published for the instrument procedure he was flying. He cannot testify he never saw level flight on his instruments and his last recollection of his altitude was 700 to 800 feet MSL which is below the step down fix altitude. He also testified he never consciously determined he was beyond the step down fix and cleared to a lower altitude. He never crosschecked the altimeter as he approached the final approach fix altitude of 540 feet MSL. He states he thought he was at 700 to 800 feet MSL (Tab V, pgs 9,10, 29-31, 48-51), when he was in fact at 450 feet MSL as is evidenced by the fact that he impacted the trees on the ridgeline. Due to failing to follow rule number 1 (maintaining aircraft control), Nomad 13 did not have time to follow rules 2 and 3.

B. Contributing Factors

B.1. In addition to the factors which, in fact, caused the mishap there were certain factors which in my opinion and based on my years in aviation, contributed to the mishap. These factors are not based on clear and convincing evidence but my personal flying experience.

B.2. Nomad 13's flightlead inexperience was a contributing factor in my opinion. Nomad 13 had led only four flights through heavy weather to instrument arrivals and had flown only seven sorties since his flightlead certification, several of which were in the wingman position. His concern for his wingman was shown by trying to be smooth, requesting deletion of an altitude restriction on the approach to facilitate this. He also states (Tab V, pgs 9, 19) that he was slightly "high and fast" at all subsequent checkpoints on the approach which set up a situation where he was high, fast and heavier than normal on final approach. But he did not see this as any special problem. He further stated that he did not slow down at the deceleration point as readily as normal in order to ensure separation for his wingman. This kept him high and fast on the approach and reveals a lack of understanding of the ASLAR procedures which already ensure adequate separation. He then flew what he describes as a pretty normal approach. In this approach he has to lose his extra altitude and airspeed in an aircraft that is heavier than normal. He does this with speedbrakes and a 5 degree nose low descent. If he had been on speed and altitude along the entire approach he would not have had to descend as rapidly making his level off more normal. The minimum rate of descent from the Final Approach Fix (FAF) all the way to the impact point is over 2000 feet per minute (FPM) if just 200 feet high and 30 knots fast versus 1400 FPM if on speed and altitude at the FAF. His flightlead inexperience and over concern for his wingman put him in an abnormal approach profile which contributed to his later distraction.

B.3. In my opinion based on my experiences another factor contributing to the mishap was pilot distraction. As Nomad 13 reduced his descent angle and applied power for his level off at the step down fix he was distracted by a wrong feel to the aircraft (Tab V, pgs 10, 11, 19, 20, 49). He believed the engine was not responding normally but could not confirm this. The engine instruments appeared normal and responded to throttle movement. This distracted him further as he spent additional time trying to find the source of the wrong feel to the aircraft. He failed to level off and meet the altitude restrictions of the approach during this distraction. I believe the wrong feel to the aircraft was caused by the extra aircraft weight (i.e. fuel) and the speed brakes still being extended. When he added power he did not feel the normal acceleration of the aircraft. I believe he broke his habit pattern of retracting the speed brakes as he advanced the throttle (Tab V, pgs 10, 20, 24, 49, 54) because he was still trying to slow to the final approach airspeed and because the speedbrakes had been extended for a long time in the holding pattern and again on most of the final segment of the approach. Nomad 13 does not specifically remember retracting the speed brakes (Tab V, pgs 24, 20, 49).

B.4. In my opinion another contributing factor was that the actual weather was significantly different than the anticipated weather. While distracted in his analysis of the wrong feel to the aircraft Nomad 13 emerged from the bottom of the overcast. From the weather he had received (Tab N, pg 4) he expected to see 1500 feet to 2000 feet overcast with 7 miles of visibility. In actuality he was approximately 800 feet and could not see the runway 3 miles in front but perceived the weather to be better than that as he looked out and saw the cloud bottoms, the ground and several ridgelines in the distance. I believe this gave him a false confidence that he did not need to fly precise instruments any longer because he would pick up the runway visually. Also seeing a ridgeline in the distance that he was above, but not seeing the one he was about to hit, put false confidence in him that his altitude was okay. He perceived his altitude to be 700 to 800 feet just prior to impact (Tab V, pgs 48, 51, 52).

B.5. Based on my experience, it is my opinion that another factor contributing to the incident was Noamd 13's unfamiliarity with Osan Rwy 09 TACAN approach procedure and terrain features. Although Nomad 13 states he reviewed the approach procedure prior to the mission (Tab V, pg 25) there was no discussion of the 512 foot ridgeline 3 miles on final and how close a correctly flown approach takes you to it. During the Local Area Orientation briefing given at Osan prior to the first mission for this TDY unit no one in the flight remembered anything significant about the approach to Rwy 09 except that Osan is almost always on Rwy 27. (Tab V, pg 25). I believe if Nomad 13 had been more aware of the 512 foot MSL terrain on final he may have been more concerned about his alttitude when he found himself "visual" on 3nm final.

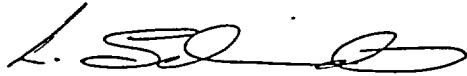
B.6. In addition, it is my opinion that Type One Spatial Disorientation was a contributing factor. Type One is unrecognized spatial disorientation, Air Force Manual 51-37 "Instrument Flying" states in Appendix 2-16, page 147 that "disoriented pilots may not always be aware of their...error. Many crash while busily engaged in some task that takes their attention away from the flight instruments." Nomad 13 was distracted by the wrong feel of the aircraft. He states he saw the altitude between 700 and 800 feet (Tab V, pgs 9,10, 29-31, 46-51) at approximately 3 miles. This is below the altitude restriction at the stepdown but he was not alarmed at the fact. I believe he was disoriented due to the distraction of the perceived problem and he was unaware of the disorientation.

B.7. Lastly, it is my opinion that the altimeter setting or the lack thereof could have been a contributing factor to this mishap. If Nomad 13 had failed to change his altimeter setting from 29.92 to 29.69 (the local altimeter setting) he would have actually been 230 feet lower than his cockpit displayed altitude. This would help account for his rapid altitude loss and low altitude at 3nm, however, by itself, it would not have caused the accident had Nomad 13 leveled off as published. Due to flight member's testimony (Tab V, pgs 8-11, 18-21, 47-52, 59-61) and analysis of how Nomad 13 flew the approach, I feel he did reset the altimeter to 26.69. Post accident teardown and analysis could not determine the altimeter setting at the time of the crash (Tab J, pgs 8,9).

C. Discrepancies/rebuttal of the Safety Report, Part One Section One, Section J

C.1. The tear down analysis from Mr. Robert C. Murray and Mr. George R. Romasz (Tab J, pg 10) states the master power was in the "off" position. The photograph taken of the wreckage before this panel was handled (Tab CC, pg 1) clearly shows this switch in the "ON" position. The "ON" position also correlates to information from the Seat Data Recorder. I believe this switch was inadvertently moved during handling/shipment.

All records and tapes not included in this report were transferred to the 7th AF/JA. Mishap wreckage was transferred to the 51st WG/JA until disposition is authorized by HQ USAF/JACC. This report is respectfully submitted 2 July 1993.



Loren J. Schroeder, Colonel, USAF
Accident Investigation Officer