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SUMMARY OF FACTS

OFFICE OF THE SECRETARY  
RULEMAKINGS AND  
ADJUDICATIONS STAFF

AIRCRAFT ACCIDENT INVESTIGATION, AFR 110-14

KUNSAN AB, REPUBLIC OF KOREA

1. Statement of Authority and Purpose - Pursuant to Air Force Regulation 110-14, the Commander in Chief, Pacific Air Forces (CINCPACAF), appointed Colonel Dale O. Haselhorst on 16 August 1991, to investigate the aircraft accident involving a F-16D, aircraft serial number 86-0045, which occurred on 17 July 1991 (Y-1). The aircraft (FALCON 11) was assigned to the 8th Tactical Fighter Wing (TFW), Kunsan Air Base (AB), Republic of Korea (ROK). The accident occurred 25 nautical miles (NM) south/southeast of Pohang AB, ROK in the Sea of Japan. By the same authority and on the same date, CINCPACAF appointed Captain Beth A. Townsend as legal advisor for the investigation (Y-1). Additionally, by the same authority and on 19 August 1991, the Commander, 8th TFW appointed Captain David C. Pearce and Captain Daniel M. Mamula, Maintenance and Operations Technical Advisors respectively, to assist in the investigation. (Y-2, Y-3).

2. Summary of Facts:

a. History of Flight - On 17 July 1991, FALCON 11, line number 105, was scheduled as a single ship incentive ride mission from Kunsan AB, ROK. Takeoff was scheduled for 0900 local (L) with actual takeoff at 0856L. The mishap pilot (MP) accomplished an instrument flight rules (IFR), afterburner takeoff and visual flight rules (VFR) subsonic cruise to the southeastern portion of the ROK. At approximately 0928L, FALCON 11 experienced a fire warning light and initiated a climb. MP deselected afterburner and the fire warning light went out approximately 3 seconds later. MP climbed to 9000 MSL and 230 knots indicated airspeed (KIAS) and turned north toward Taegu AB. MP noticed multiple Maintenance Fault Listing's (MFL's) and elected to emergency jettison the stores/fuel tanks. MP subsequently noticed the oil pressure at 20 pounds per square inch (PSI) and falling. Based on weather and terrain at Taegu AB, MP decided to turn east toward the coast after the oil pressure went to zero. Both crew members safely ejected at 0936L. The aircraft crashed and was destroyed in the Sea of Japan at approximately 0938L.

b. Mission - FALCON 11's mission consisted of a single ship incentive ride from Kunsan AB. The mission was a reward to the passenger for outstanding service and conducted in accordance with (IAW) AFR 60-1, PACAF Sup 1, 8th TFW Sup 1, Incentive Flight Program.

c. Briefing and Preflight - The mission briefing, conducted IAW 8th TFW briefing guide, began at 0710L and lasted approximately 30 minutes. MP and passenger stepped one hour prior to takeoff. Preflight, start and taxi were normal.

INDIAN REGULATORY COMMISSION

Order No. \_\_\_\_\_ Official Exh. No. 130  
In the matter of PF7

Staff \_\_\_\_\_ IDENTIFIED /  
Applicant \_\_\_\_\_ RECEIVED \_\_\_\_\_  
Intervenor \_\_\_\_\_ REJECTED \_\_\_\_\_  
Other \_\_\_\_\_ WITHDRAWN \_\_\_\_\_  
DATE 7/1/02 Witness \_\_\_\_\_  
Clerk [Signature]

d. Flight Activity - FALCON 11 took off at 0856L, on a single ship, afterburner, IFR departure. VFR conditions were reached at approximately 5500 MSL. FALCON 11 cancelled his IFR clearance, climbed in VFR conditions and at approximately 0902L leveled at 11,500 MSL (R-1, pt A). FALCON 11 flew a medium altitude (11,500 MSL) subsonic cruise above an undercast to the southeastern portion of the ROK under flight following from the 621 Tactical Control Facility (AIRDALE). MP allowed passenger to fly the aircraft for a short period of time while cruising at 11,500 MSL. At 0914L, approximately 15 NM south of Taegu AB, the undercast began to dissipate. FALCON 11 descended in VFR conditions and entered low level flight in the vicinity of the Onyang Highway Strip. FALCON 11 proceeded north at low level for approximately 30 NM. At 0923L, the visibility started to decrease and FALCON 11 initiated a left 180 degree turn to the south (R-1, pt C). FALCON 11 continued south at low level for approximately 45 NM and again observed the visibility decreasing. At 0928L, FALCON 11 started a left turn to the east and climbed to approximately 3000 MSL and 280 KIAS (R-1, pt D). MP selected afterburner to demonstrate the rapid acceleration of the F-16 with the GE 110 motor. At approximately 3000 MSL and 420 KIAS, MP noticed the fire light was illuminated. IAW T.O. 1F-16C-1, MP initiated a climb, observed no unusual engine instrument indications and retarded the throttle out of afterburner and below military power. The fire light extinguished 3 seconds later and MP made a left turn to north, leveling at approximately 9000 MSL and 230 KIAS (R-1, pt E). After scanning the engine instruments, MP noted that the engine was operating satisfactorily out of afterburner and below military power. Rechecking his instruments, MP noticed multiple engine MFL's, and based on these indications, jettisoned external stores by pushing the emergency jettison button. The fuel tanks, SUU-20 and TER-9A were ejected from the aircraft on approximately the 140 degree radial, 35 NM from Taegu AB, near a helopad, in a nonpopulated area (AA-1). After jettison, MP used the inertial navigation system and TACAN to determine the closest suitable runway, Taegu AB or Pohang AB. Weather at Kimhae AB precluded its use. Taegu AB was one NM closer than Pohang AB and MP turned towards Taegu AB while contacting approach control with his position. At this time MP observed the oil pressure was down to 20 PSI. Due to poor weather and mountainous terrain surrounding Taegu AB, MP elected to turn towards Pohang AB. Enroute to Pohang AB, MP made a blind radio transmission on VHF to the Supervisor of Flying (SOF) at Kunsan AB. Additionally, MP made several Guard transmissions to AIRDALE. During this time the passenger informed MP that the oil pressure indicator was at zero. Twenty to thirty seconds later, MP and passenger heard a loud bang and felt the aircraft shudder. The engine failed and MP turned east for more favorable bailout conditions. At 0936L, both crew members ejected at 2500 MSL and 180 KIAS (AA-1).

e. Impact - At approximately 0938L the aircraft impacted in the Sea of Japan, 25 NM south/southeast of Pohang AB. During parachute descent, MP observed the aircraft to be in a nonaccelerating, slightly nose low, shallow right bank attitude prior to impact. Impact coordinates were N 3538.3 W 12928.4.

f. Ejection - Both crew members ejected within the ACES II performance envelope at 2500 MSL and 180 KIAS. No problems or discrepancies were encountered or found on the front cockpit ejection system. Two problems were encountered with the rear cockpit ejection system: (1) left riser four line

jettison loop tacking and/or the left riser tacking did not break; (2) the life raft did not inflate on descent but did inflate upon retrieval by pulling the retainer lanyard.

g. Personal and Survival Equipment - All personal and survival equipment inspections were current. Both crew members landed in the Sea of Japan and were rescued by a local Korean fishing boat which was in close proximity. Due to the speedy recovery and subsequent minimal time in the water, limited equipment was used. The passenger did not manually inflate his life preserver during parachute descent; however, it functioned automatically upon water immersion. While awaiting recovery, MP boarded his life raft. The passenger held on to his raft but did not board.

h. Rescue.

(1) MP transmitted his first distress call at 0928L to AIRDALE. HOSER, a KC-135 from the 151st Air Refueling Group, Utah Air National Guard, deployed to Osan AB, heard FALCON 11's distress call and relayed the information to the Kunsan AB SOF. HOTBOX 21, two F-16s from the 35th TFS Kunsan AB, heard FALCON 11's distress calls and made contact with the Kunsan AB SOF. Shortly thereafter, FALCON 11 transmitted that he was ejecting. MP's last transmission was his position coordinates. This call was heard by HOSER who plotted the coordinates and passed the information to the Kunsan AB SOF. MP ejection/position call was also heard by AIRDALE and this information was passed to HOTBOX 21. After coordinating with the Kunsan AB SOF, HOTBOX 21 responded to the crash site. Upon arrival, HOTBOX 21 set up a high/low orbit to maintain radio contact with the Kunsan AB SOF. Neither pilot from HOTBOX 21 made visual or radio contact with FALCON 11.

(2) Both crewmembers of FALCON 11 were picked up by a local Korean fishing boat shortly after landing in the water. They were transported to a coastal Korean village and made contact with a Korean Army Officer. MP asked for a telephone and tried to contact Kunsan AB to no avail. The Korean Officer coordinated Korean Army helicopter support from Kimhae AB. The crewmembers were taken to a helicopter landing pad 2 to 3 miles west of the village (AA-1). Approximately 45 minutes later, both crew members were flown to Taegu AB. An Air Force H-60 helicopter, dispatched from Osan AB, picked up MP and passenger at Taegu AB and flew them to Osan AB for post-ejection examinations. MP and passenger returned to Kunsan AB via C-12 the following day.

i. Crash Response.

(1) The 8th TFW responded promptly to form the Disaster Control Group (DCG) to plan the initial response actions. The initial response force consisted of the Base Commander, security police personnel and medical representatives. Because the aircraft crashed into the Sea of Japan and both MP and passenger were transported via helicopter to Osan AB, Kunsan AB personnel were not required or dispatched to the crash site. The DCG was deactivated by the base commander on 17 July 1991 and the Safety Investigation Board (SIB) assumed responsibility. The SIB supervised the water recovery and overland return of the mishap aircraft wreckage to Kunsan AB on 10 August 1991.

(2) Media response to the accident was light. It received limited coverage in both the local and U.S. press. American Forces Korean Network personnel were on board the salvage vessel and recorded the aircraft recovery from the Sea of Japan. 8th TFW Public Affairs sent out two releases. Both were sent to HQ United States Forces Korea, HQ 7th Air Force (AF) and HQ Pacific Air Forces public affairs offices.

(3) Collateral damage - The jettisoned external stores landed in a remote, nonpopulated area. No injuries to civilians or property damage occurred as a result of the aircraft crashing into the Sea of Japan. To date, no claims have been received by 8th TFW Staff Judge Advocate (JA).

j. Maintenance Documentation.

(1) No maintenance documentation errors were noted in the AFTO Forms 781. There were six outstanding Time Compliance Technical Orders (TCTOs) and five engine TCTOs that had not been accomplished. None of these were grounding. The preflight was completed on 16 July 1991, the aircraft was ready for flight. As of 17 July 1991, airframe total time was 1259.9 hours and engine total time was 500.6 hours. Automated products indicated that all inspections were current.

(2) No change in Oil Analysis Reports were noted during the 16 hour period prior to the mishap.

(3) Time Changes were properly tracked and none were overdue.

(4) On 5 July 1991 the aircraft experienced an afterburner no-lite on take-off. Upon inspection, the flame sensor was found to be cracked and was replaced. In addition, the augmentor fuel tube and ignitor were replaced. The aircraft was ground run and the augmentor was selected a minimum of five times. No defects were noted. On 13 July 1991 the mishap aircraft received a birdstrike to the engine at the seven and nine o'clock positions (forward looking aft). The engine was borescoped and an engine operational check run was accomplished. No defects were noted.

(5) Change 8 to Technical Order (T.O.) 2J-F110-6-11, WP 053 00, was received by Quality Assurance and the Propulsion Branch on 2 May 1991. T.O. Change 8 was posted in the Propulsion Branch T.O.'s on 3 May 1991. Pages 6,7 and 8 of this change describes the application of silicone rubber adhesive, MIL-A-46106/RTV-106, commonly referred to as RTV (BB-18-2). Mishap engine number 509840 had RTV applied to the splitter panels during TCTO 640 accomplishment on 4 June 1991. The RTV sealant was not installed in accordance with T.O. 2J-F110-6-11, Change 8. Change 8 requires that the RTV not be applied to any surface on the splitter panel or inner fan duct unless specified. Specifically, the T.O. requires that RTV only be applied to the front of the splitter panel and the splitter panel/inner fan duct, where it meets the fan frame (BB-18-2). On 4 June 1991, RTV was applied to all four sides of the splitter panels (BB-18-4).

(6) Engineers evaluation of the mishap engine found that the probable cause for engine failure was a piece of RTV, approximately five inches in length by three quarters of an inch in width, found in the augmentor liner. Inspection of the RTV revealed a step on the bottom side that measured a tenth of an inch in height. This matched the circumferential step between splitter panel and inner fan duct. The piece of RTV showed burning on its edges revealing it was subject to high temperatures. Further examination of the mishap engine found either loose or missing RTV on several locations on the inner fan duct. Due to high water pressure from the aircraft impacting the water, the pre-impact condition of the RTV could not be determined (J1-J6).

k. Maintenance Personnel and Supervision - Required aircraft preflight and servicing actions were documented. Maintenance training records indicated that all personnel were trained to perform assigned tasks.

l. Engine, Fuel, Hydraulic and Oil Inspection Analysis - The mishap engine, serial number 509840, had accumulated 500.6 hours of engine operating time. The last 75 hour inspection was accomplished on 5 June 1991 with 1233.8 airframe hours and 474.5 engine operating hours.

(1) Engine Inspection Data: The aircraft engine AFTO Forms 95 showed no history of trends. Engine data was complete and properly documented. Engine maintenance summaries for the aircraft were complete.

(2) Fuel Test Report Data: Fuel lab test reports indicated no abnormalities.

(3) Hydraulic Fluid Test Report: Aircraft servicing cart and aircraft hydraulic fluid tests were normal.

(4) Oil Test Report: Spectrographic Engine Oil Analysis showed no abnormal trends which would have affected the performance of the engine.

m. Airframe and Aircraft Systems - Analysis of engine and related components indicated the following: The exhaust duct and liner were burned through between the two and three o'clock position (aft looking forward). Probable cause for burn-through was blockage of the liner cooling flow, evidenced by RTV deposits found in the exhaust nozzle duct assembly directly forward of the exhaust nozzle assembly burn-through. This caused the liner and duct metal temperatures to rise above material capability during augmentor operation and resulted in burn through of the exhaust duct and liner. Over-temperature in this area weakened structural integrity of the hydraulic system and caused a rapid loss of oil. Because of oil system depletion, the number three ball bearing failed. The number three bearing failure caused the high pressure rotor to shift aft, allowing the compressor blade platforms to contact stationary vanes and wear off the forward inner rails. The shifting of the aft rotor caused the compressor rotating air seal to close its gap with the stationary honeycomb seal and combustor case/forward inner nozzle support flange. This reduced the cooling flow to the high pressure turbine (HPT) assembly and led to an over-temperature of the turbine shaft. The failed number three bearing coupled with the over temperature of the turbine shaft resulted in HPT failure and caused the engine to disintegrate. Main thrust

bearing failure resulted in engine seizure and restart was impossible (J1 - J6).

n. Operations Personnel and Supervision - The approving authority for the mission was the Operations Officer, 35th Tactical Fighter Squadron, Kunsan AB. The approving authority for the incentive flight was the Commander, 8th TFW. MP briefed the flight IAW 8th TFW briefing guide and all appropriate items were covered. The passenger was briefed on 16 July 1991, on life support systems and functional use of the equipment. The life support trainer used the 8th TFW consolidated checklist to brief appropriate items but failed to brief G-straining maneuvers.

o. Crew Qualifications - MP had 1,802.0 total flying hours including 1364.1 hours in the T-38 of which 1,011.7 were instructor pilot hours and 254.6 hours in the F-16. MP is a highly qualified mission ready wingman. MP's last two formal evaluations were rated qualified. Since arriving at Kunsan AB, MP has demonstrated above average performance. MP is in the Flight Lead Upgrade Program. IAW AFR 60-1, PACAF Sup 1, the pilot in command of an incentive flight must be experienced and highly qualified to perform the flight. IAW MCR 51-50, Vol 1, "experienced" is defined as a pilot having 1000 hours flying time (FP/IP for pilots) and 300 hours in the unit aircraft. By definition, MP was not experienced in the F-16 IAW MCR 51-50, Vol 1. IAW AFR 60-1, 8th TFW Sup 1, only highly qualified flight lead MR/MS pilot with no less than 60 days on station may fly incentive flights. IAW AFR 60-1, 8th TFW Sup 1, the 8th TFW Deputy for Operations exercised his authority to waive the 8th TFW flight lead requirement for this particular mission.

p. Medical

(1) Qualification

(a) MP was medically qualified to fly. His last long flying class II physical was completed 5 June 1991. The exam was within normal limits. The wear of glasses while performing flying duties is required. Contact lenses are authorized. MP was wearing contact lenses at the time of the mishap.

(b) Passenger was medically qualified to fly and was medically cleared 16 July 1991 not to exceed 18,000 feet. Medical clearance was valid for 30 days.

(2) Post-ejection

(a) MP sustained a minor bilateral paraspinal muscle strain as a result of ejection forces. MP was seen initially at Osan AB and required outpatient follow-up at Kunsan AB. MP was returned to flying status in 5 days. BAT and TOX test were negative.

(b) Passenger's examination, BAT and TOX test were all negative.

q. NAVAIDS and Facilities - There were no Notices to Airmen (NOTAMS) and no navigational facility outages which adversely affected this mission.

r. Weather - Prevailing conditions on the morning of 17 July 1991 were cloudy skies and isolated rain showers across the northern and western regions of the ROK. Southeastern ROK was free of precipitation. Layered clouds up to approximately 9000 MSL dominated the region. Forecast cloud coverages were 2500 foot ceiling/3 miles visibility at Kimhae AB, 3000 foot scattered/5 miles visibility at Taegu AB and no forecast was available for Pohang AB. Actual conditions were 4000 foot ceiling/4 miles visibility, with an additional cloud deck at 8000 feet at Kimhae AB, 4000 foot ceiling/4 miles visibility at Taegu AB and 4,000 foot ceiling/6 miles visibility at Pohang AB (W-1 - W-11).

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

Technical Orders:

T.O. 1F-16C-1, Change 4	F-16C/D Flight Manual
T.O. 1F-16C-34-1-1CL1, Change 4	Non Nuclear Weapons Delivery Flight Crew Procedures
T.O. 1F-16C-2-12JG-00-1	Aircraft Servicing
T.O. 1F-16C-2-32JG-40-1	Landing Gear Wheels and Brakes
T.O. 1F-16C-2-32JG-90-1	Arresting Hook
T.O. 1F-16C-2-70FI-00-11	Fault Isolation Power Plant
T.O. 1F-16C-6-11	Scheduled Inspection and Maintenance Requirements
T.O. 1F-16C-2-70JG-00-11	Engine Operation Low Power (Unrestrained)
T.O. 1F-16C-2-70JG-00-12	Engine Operation High Power (Restrained/Suppressed)
T.O. 1F-16C-6WC-1-11	Preflight/Postflight/Thru-Flight/Launch and Recovery
T.O. 2J-F110-6-11, WP 053 00	Intermediate F-110 Engine Maintenance

Air Force/PACAF:

AFM 51-37	Instrument Flying
AFR 60-1	Flight Management
AFR 60-16	General Flight Rules
AFR 60-1, PACAF Sup 1	Flight Management
MCR 51-50, Vol 1	Tactical Aircrew Training
MCR 55-116	F-16 Pilot Operations Procedures
MCR 55-116	Chapter 9, PACAF Operating Procedures
PACAFR 55-7	PACAF Life Support Program

8th TFW:

AFR 60-1, 8th TFW Sup 1	Flight Management
MCR 55-116	Chapter 8, 8th TFW Operating Procedures
Inflight Guide	8th TFW Inflight Guide



DEVIATIONS:

1. T.O. 2J-F110-6-11, WP 053 00, Change 8. Silicone rubber adhesive, RTV, was not applied to the mishap engine splitter panels IAW T.O. 2J-F110-6-11, WP 053 00, Change 8. RTV was applied to all four sides of the splitter panel as depicted in Atch BB-18-4. Change 8 requires the application of RTV only to the front of the splitter panel and where the splitter panel/inner fan duct meets the fan frame as depicted in Atch BB-18-2.

2. AFR 60-1, PACAF Sup 1

a. MP did not meet the qualification requirements to be pilot in command of an incentive flight. MP was not an experienced pilot in the F-16 as required by AFR 60-1, PACAF Sup 1 and defined in MCR 51-50, Vol 1. No waiver was approved.

b. The rear seat occupant must be a rated crewmember and the aircraft above 5,000 AGL to fly. The rear seat occupant flew the aircraft above 5,000 AGL but is not a rated crewmember. No waiver was approved.

3. AFR 60-1, 8th TFW Sup 1, Atch 2, and PACAFR 55-7, PACAF Life Support Program. Egress training must include G-straining maneuvers. G-straining maneuvers were not briefed by Kunsan Air Base Life Support Personnel.

All records and tapes not included in this report were transferred to 7th AF/JA. Mishap aircraft wreckage was transferred to 8th TFW/JA until disposition is authorized by HQ USAF/JACC. This report is respectfully submitted 4 September 1991.



DALE O. HASELHORST, Colonel, USAF  
Accident Investigation Officer