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INTRODUCTION

On 5 June 1990, an F-16D, serial number (SN) 84-1331, assigned to the 50th Tactical Fighter Wing (TFW), Hahn Air Base (AB), Federal Republic of Germany (FRG), had a midair collision with a Hanle H 101 Salto glider, SN D-2195. The glider's home airport was Essweiler, FRG, and it was piloted by a German national who was a member of the Luftsportverein (Air Sport Club) Landstuhl. The glider crashed approximately 10 nautical miles north-northwest (NNW) of Sembach AB, FRG, near the town of Teschenmoschel. The glider pilot was a fatality. The F-16 pilots landed at Hahn AB, unharmed, and the F-16D sustained minor damage.

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INVESTIGATING OFFICER'S REPORT

I. AUTHORITY AND PURPOSE

A. Pursuant to Seventeenth Air Force Letter of Appointment, dated 21 June 1990 (Tab Y), Colonel Royce G. W. Wooddell, Allied Tactical Operations Center (ATOC) Sembach, was appointed to conduct an investigation into the circumstances surrounding an aircraft accident occurring near Teschenmoschel, FRG, on 5 June 1990, involving an F-16D, SN 84-1331, belonging to the 50TFW, Hahn AB, FRG, and a Hanle H 101 Salto glider, SN D-2195, whose home airport was Essweiler, FRG. Pursuant to the same letter of appointment, Captain Dawn E. B. Scholz, 66th Electronic Combat Wing, (ECW), Office of the Staff Judge Advocate, Sembach AB, FRG, was detailed as the legal advisor for the investigation.

B. Colonel Royce G. W. Wooddell conducted the investigation in accordance with Air Force Regulation (AFR) 110-14 and was guided by the provisions of AFR 120-4. The objective of this investigation was to obtain and preserve all available relevant facts and evidence pertaining to the accident, and to investigate the circumstances leading to the accident and subsequent damage, for use in claims adjudication and evaluation, litigation, disciplinary action, adverse administrative proceedings, or other purposes deemed appropriate by competent authority.

C. Portions of this investigation were conducted with the cooperation of Herr Kruse, Herr Bolz and Herr Buttner, German investigators from the Accident Investigation Bureau of the Luftfahrt-Bundesamt, Braunschweig, FRG.

D. A glossary of abbreviations used in this report follows this summary.

II. SUMMARY OF FACTS

A. HISTORY OF FLIGHT

1. On Tuesday, 5 June 1990, one F-16D and one F-16C, call signs Lima Golf (LG) 05 and LG 06 respectively, assigned to the 10th Tactical Fighter Squadron (TFS), Hahn AB, were scheduled to return to Hahn AB from Ramstein AB (Tab K-2). They had diverted to Ramstein earlier in the day while participating in a Local Salty Nation (LSN) exercise - a local wing exercise conducted in preparation for an upcoming NATO Tactical Evaluation (Tabs V-2.5, V-3.4, V-4.4, V-6.2). They were scheduled to depart Ramstein no later than 1640 Central European Summer Time (CEST) (Tab V-6.3). The pilots planned to fly directly back to their home station with single ship takeoffs, line abreast formation (6000 feet apart on parallel headings) enroute, and landing at Hahn (Tabs V-2.6, V-2.8, V-4.5, V-4.6). The pilots were Capt James C. Luithly, the instructor pilot (IP) and flight leader in the front cockpit of LG 05, Maj Julius L. Hargrove, an exercise evaluator in the rear cockpit (RCP) of LG 05, and 1st Lt Richard E. Smith, the pilot of LG 06 (Tabs A-1, C-2).

2. The sortie was the fourth of the day for Capt Luithly and Lt Smith and the third sortie of the day for Maj Hargrove. Maj Hargrove's two previous sorties had also been in the RCP of LG 05. He was assigned to the 526TFS at Ramstein and was on temporary duty (TDY) at Hahn for three days to assist the 50TFW as an exercise evaluator. He observed from the RCP of LG 05 on sorties two through four. Capt Luithly and Lt Smith flew all four sorties together on 5 June as a paired element (Tabs V-2, V-3, V-4).

3. The LSN scenario for that day called for LG 05/06 to expect to fly air-to-air type missions. The first sortie was a scramble to a Combat Air Patrol (CAP) point between Stuttgart and Sollingen. Takeoff was at 0720 CEST with a sortie duration of 0.9 hours (Tab V-2.3). Sortie number two was to be a Dissimilar Air Combat Tactics (DACT) sortie versus two F-15s in Temporary Reserved Airspace (TRA) 205B. Take off was at 1020 CEST with a sortie duration of 1.0 hours. Only one F-15 showed up and five engagements of two versus one were conducted (Tab V-2.3). The third sortie was again a scramble to a CAP in low fly training area seven (LFA7) near Ingolstadt. Takeoff was at 1320 CEST. The majority of this mission was conducted as a four ship with LG 52/53, two other F-16s from Hahn, as the second two ship element. After three engagements LG 05/06 had to return to Hahn due to fuel status and LG 52/53 remained in the area of LFA7. As LG 05/06 got within 10 miles of Hahn for landing, an exercise field condition (alarm red) closed the airfield and Capt Luithly was directed to divert his flight to Ramstein. Sortie duration was 1.3 hours (Tab V-2.4, V-2.5).

4. At 1625 CEST, Capt Luithly's flight took off from Ramstein enroute to Hahn. Approximately 3 1/2 minutes after takeoff he saw a glider at about 500 feet in front of his aircraft on a collision course. He attempted to avoid collision but was unsuccessful (Tabs V-2.8, V-2.9, EE-4). Immediately after the collision Capt Luithly looked behind his aircraft to see more clearly what he had hit. He saw nothing; however, Maj Hargrove says he saw the glider spiraling down with one wing missing (Tabs V-2.10, V-3.9). Capt Luithly radioed to his squadron that he'd just had a midair with a glider and turned his aircraft directly toward Pferdsfeld AB while increasing his altitude due to a rough running engine with some erratic engine instrument indications. He had his wingman come closer to visually check for damage to his aircraft while deciding whether to attempt landing at Pferdsfeld or continue to Hahn. The engine continued to produce sufficient thrust to continue flying, so he elected to land at Hahn from a straight-in simulated flameout (SFO) approach (Tabs V-2.10, V-2.11). His wingman had "marked" his location on his initial navigation system (INS) which made latitude and longitude of the collision area available for rescue operations (Tab V-4.7). In addition Capt Luithly and Maj Hargrove selected 100 percent oxygen because of fumes in the cockpit (Tab V-2.11). Capt Luithly radioed Hahn tower and the supervisor of flying (SOF) with updates of his situation. He landed at approximately 1636 CEST (Tab DD-2).

5. The pilot of the glider, Herr Theophil F. Schappert had flown 3 flights earlier that day with takeoffs from Essweiler at 1330, 1349, and 1412 CEST for sortie durations of 8, 10, and 12 minutes respectively (Tab T-8.1). All of his launches were accomplished by a winch system, and on his fourth launch (incident sortie) he had sufficient thermal activity to remain airborne (Tabs V-15, V-16) . Six other Luftsportverein Landstuhl club members were airborne at the time of the impact with the F-16 but none of them saw the impact (Tab T-8.2). Sometime in the 15 minutes preceding the collision, Herr Schappert had made radio contact with Herr Henn who was one of the airborne glider pilots, and they decided to meet near Donnersberg (Tab V-16.1). At an unknown time after the midair all airborne glider club members were requested to check in with their glider port at Essweiler. All checked in except the deceased (Tab V-15.1). He took off on the accident sortie at 1449 CEST and had been in the air approximately 1.7 hours (Tabs C-3, T-8-1, V-15.1, V-16.1).

6. German news media interest/coverage was high following the accident with several newspaper articles appearing in the local press. Press inquiries were directed to 17th Air Force Public Affairs (Tab DD-6.1 thru 6.12).

B. MISSION

1. The mission of the incident flight for LG 05/06 was to return the aircraft and pilots from Ramstein to Hahn. No tactical events were planned (Tab V-2.6). The pilots anticipated a short and direct flight back to Hahn since they were nearing the last hour of their crew duty day. Shortly after takeoff, Capt Luithly contacted 10TFS operations for his flight's tasking. They were directed to land at Hahn as soon as possible (Tab V-5.2).

2. Herr Schappert's "mission" was to find thermal activity to permit him to remain airborne. An official of the Luftsportverein was contacted and he stated that a specific route had not been established for Schappert's flight (Tab DD-4.2). Shortly before the midair collision Herr Schappert had radioed that he was enroute to the vicinity of Donnersberg to meet with other airborne glider pilots from his club (Tabs V-15, V-16).

C. BRIEFING AND PREFLIGHT

1. Testimony indicates that all F-16 pilots' activities, from completing their duties and departing their squadrons on 4 June 1990, through their planned recovery from the mishap sortie, were within the required crew rest parameters established in AFR 60-1. The accident occurred at approximately 1628 CEST - eleven hours into the crew duty days of Capt Luithly and Lt Smith and ten and one half hours into the crew duty day of Maj Hargrove (Tabs V-2, V-3, V-4).

2. Capt Luithly and Lt Smith were to be paired together all day on 5 June and all exercise sorties were to be air-to-air training. Since time available between sorties for face-to-face briefing was unknown, they thoroughly briefed their procedures on the day prior, using Capt Luithly's own briefing guide (Tabs V-2, V-4). In addition there was a mass briefing for all pilots at 0530 CEST on the morning of
5 June (Tab V-2.2). Following an exercise evaluation meeting at 0600 CEST, Maj Hargrove arrived at the aircraft shelter to fly in Capt Luithly's RCP on his second and subsequent sorties. Capt Luithly briefed him on all pertinent aspects of the day's anticipated missions (Tabs V-2, V-3).

3. Shortly after landing at Ramstein Capt Luithly telephoned his squadron at Hahn to find out if he was to take his flight back to Hahn or remain at Ramstein. The primary considerations were length of their crew duty day and permission for a fourth sortie (Tabs V-2, V-3, V-4). Under USAFE Supplement 1 to AFR 60-1 waiver authority for a fourth flight during exercises rests with the wing commander. During this time, the primary Wing Operations Center at Hahn was simulated destroyed as part of the exercise scenario. Colonel Pilkington, 50TFW Deputy Commander for Operations (DCO), was the senior officer in charge of the Alternate Wing Operations Center (AWOC). After several phone calls among Capt Luithly, 10TFS Operations and the AWOC, Col Pilkington gave his permission for LG 05 flight launch from Ramstein provided they could be airborne no later than 1640 CEST (Tab V-6.2, V-6.3). Capt Luithly had stated they could be airborne by 1630 CEST, so the pilots continued to make preparations to fly (Tab V-2.6).

4. The mishap mission briefing took place in the 526TFS building at Ramstein. Because general flight procedures had been covered in detail the previous day and this was their 4th sortie together, Capt Luithly's briefing to his wingman was short

and covered only those items unique to this mission (Tab V-2.15). In addition, Maj Hargrove was very familiar with flying out of Ramstein and explained the visual flight rules (VFR) departure and local noise abatement procedures (Tab V-3.7). Just prior to proceeding to their aircraft the flight received an update from the 526TFS duty officer on applicable weather, Notices to Airmen (NOTAMs) and airfield information (Tabs V-2.20, V-3.6, V-4.5).

5. There was a slight delay while Transient Alert (TA) personnel at Ramstein were awaiting results of the Spectrometric Oil Analysis Program (SOAP) sample from the Ramstein laboratory (Tab V-4.5). Technical Order (T.O) 33-1-37 requires one of these oil samples be taken after every flight and analyzed to check for metal content which could indicate possible engine problems. Hahn maintenance policy (IAW Hahn Maintenance Operating Instruction 66-48) requires the results of the SOAP sample be known prior to each flight (Tab FF-4.1). Capt Luithly instructed TA personnel to complete the Air Force Technical Order (AFTO) Forms 781 and put them in the F-16 pylons as soon as the SOAP results were known. During his flight's taxi to the runway, ground control told him that TA wanted his flight to taxi back to the parking area to await the results. He stated that he would continue to the end of the runway (EOR) to await the results and requested TA bring the AFTO Forms 781 to the aircraft there. Upon notification of positive SOAP results, TA personnel entered the positive results in the AFTO Forms 781 and stowed them in the aircraft pylons at EOR (Tabs V-2.7, V-12.2). Post incident review of the AFTO Forms 781 showed them to be incomplete, however this was not considered to be a factor in this mishap. The preflight and pre-takeoff activities were otherwise normal (Tabs V-2, V-4).

D. FLIGHT ACTIVITY

1. A VFR flight plan was filed with Ramstein base operations. The flight plan called for a VFR departure from Ramstein, then direct to Hahn (Tab K-2). Takeoff was at approximately 1625 CEST. Capt Luithly and Lt Smith accomplished single ship afterburner takeoffs with fifteen seconds spacing. After flying the Ramstein VFR departure and departing the Ramstein control zone the flight turned to a heading of 050 degrees to avoid the Baumholder restricted area, climbed to 5500 feet MSL and went to line abreast formation (Tabs V-2, V-3, V-4).

2. Operations to this point were normal. All navigational aids were operating normally (Tabs V-2, V-3, V-4). Cloud cover was broken with cloud bases at approximately 6500 feet MSL. Visibility was very good but with some shadows caused by the sun shining through holes in the clouds (Tab V-2.14). Upon departing Ramstein's control zone Capt Luithly contacted the 10TFS at Hahn on the squadron's UHF frequency to let them know LG 05/06 were airborne and to request any instructions. LG 05 and 06 were told to land at Hahn as soon as possible (Tab V-5.2). Shortly thereafter Capt Luithly pushed his throttle to military power and accelerated to approximately 420 knots - a speed within the operating envelope of the F-16 aircraft which affords optimum maneuverability (Tabs J-3, V-2.9, FF-7, FF-8, FF-9).

E. IMPACT

1. At approximately 1628 CEST, 5 June 1990, near 49 degrees, 38 minutes, 30 seconds north latitude and 7 degrees, 44 minutes, 12 seconds east longitude (in unrestricted airspace) LG 05, an F-16D aircraft, SN 84-1331, piloted by Captain James C. Luithly

collided in mid-air with a Hanle H 101 Salto glider, SN D-2195. The glider was piloted by Herr Theophil F. Schappert at an altitude approximately 4000 feet above ground level (AGL) which was 5500 feet mean sea level (MSL) barometric altitude. The collision took place approximately ten (10) miles NNW of Sembach AB, FRG (Tabs A-1, EE-4, EE-5).

2. The following sequence took place in Capt Luithly's cockpit in the seconds just prior to impact. He checked his radar, had only one contact and locked on to it. It was 22 miles away, 20 degrees left of the nose and at 11,000 feet. He assumed it was traffic going into Frankfurt International Airport, looked up to see if he could acquire it visually but his view was obstructed by cloud cover. In sequence he then checked his 12 o'clock (forward), checked LG 06 at his 3 o'clock position (directly over his right wing) to see if Lt Smith had detected his recent power increase (ref para D.2), checked LG 06's 6 o'clock (rear) and then looked forward. He saw the glider at approximately 500 feet on a collision course. He immediately pulled the control stick all the way back to cause the aircraft to climb in an attempt to avoid the collision (Tabs V-2.9, V-2.10). Capt Luithly estimated the glider to be at 60 to 70 degrees left aspect in a left bank with an upward vector (Tab V-2.9). He felt a mild double thump as the F-16 impacted the glider (Tab V-2.10).

3. Maj Hargrove did not see the glider prior to impact. At the time of impact he was looking to the right at the wingman when he felt the aircraft go into an abrupt left-hand slightly upward turn. It was in the next instant that he felt the "bump and thump" of the collision. He saw a white blur go by the right side of the aircraft while in the turn. He originally thought they had hit a large bird but as he looked behind the aircraft he saw a glider in a spiral with one wing missing (Tab V-3.9). Lt Smith did not see the glider prior to, during or after the impact. Immediately after the collision he looked at his leader and saw him in a steep bank. Shortly thereafter, Capt Luithly radioed that he'd had a midair so Lt Smith marked the spot on his INS and then concentrated on providing any assistance required by LG 05 (Tab V-4.6, V-4.7). An eyewitness on the ground heard the impact and observed the F-16s flying away from her position and a white glider spiraling in left circles toward the ground and does not remember one of its wings missing (Tab V-14.6).

4. All members of LG 05 flight had seen light aircraft and/or gliders on previous sorties (Tabs V-2.14, V-4.8). On the incident sortie Capt Luithly testified that he had not seen other traffic prior to the incident glider (Tab V-2.14), Lt Smith did not recall whether he did or not (Tab V-4.7, V-4.8), and Maj Hargrove recalls seeing a light aircraft or glider about one minute prior to the incident. This traffic was 1000 to 2000 feet below and in the vicinity of the wingman, but he stated it was no factor (Tab V-3.8).

5. There are no specific readouts of flight parameters at the time of impact, because the Electronic Component Assembly (ECA) and the Flight Control Computer (FLCC) only update every 64 seconds or whenever one of 96 data inputs indicates a "failed state". These components were down loaded after the incident and the memory printouts were read. The data revealed no equipment failures during the incident flight (Tab CC-2). Because this aircraft is an earlier model of the F-16D, it does not provide more sophisticated data in an accident such as this (i.e. when the aircraft does not sense the impact or experience a serious system malfunction). The

flight control system seat data recorder (SDR) only duplicates the data on the ECA and FLCC in an effort to preserve this data. The SDR, attached to the ejection seat is more likely to survive an aircraft crash than the ECA and FLCC which are located in the forward part of the aircraft (Tab FF-6.1, FF-6.2). In addition the Airborne Video Tape Recorder (AVTR) was not turned on due to the non-tactical nature of the flight (Tab V-2).

6. Examination of the F-16D indicated scratches at the engine inlet duct as well as damage to the centerline tank, centerline tank pylon, left horizontal stabilator, tail hook, tail hook fitting, left and right ventral fins and engine (Tabs M-2, S-1 thru S-5). Preliminary investigation by the German national Luftfahrt-Bundesamt Accident Investigation Bureau as well as reconstruction from testimony and radar plots indicate that the glider was on a heading of approximately 085 degrees and was overtaken from behind by the F-16D which was heading 050 degrees (Tabs CC-5.1, CC-5.2, CC-5.3, EE-4, EE-5). At this time the German investigators believe the glider was impacted by the F-16D at the left vertical tail fin and left wing by the F-16D engine intake and centerline pylon (Tab CC- 5.1). The glider was approximately 19.5 feet long with a wing span of 44.6 feet (Tab EE-3). It was painted completely white with no contrasting colors except for a blue tail number and a clear canopy (Tab Z-5).

7. Analysis of the glider wreckage is ongoing by German authorities. The crash site covered an area approximately 40 X 15 meters (Tabs R-2, EE-2.1).

8. AFR 66-16, paragraph 5.5, discusses right-of-way rules and may be applicable in this case. "Usually, right-of-way is given to the aircraft least able to maneuver and normally permits that aircraft to maintain course and speed; however, visibility permitting, each pilot must take whatever action is necessary to avert collision, regardless of who has the right-of-way". It also states that when one aircraft is overtaken by another, the overtaken aircraft has the right-of-way. When aircraft are converging at approximately the same altitude, right-of-way is prioritized by aircraft category. The order of priority is: (1) balloons, (2) gliders, (3) aircraft towing or refueling other aircraft, (4) airships, and (5) rotary or fixed wing aircraft (Tab FF-3.1). According to his testimony Capt Luithly did not see the glider in time to yield right-of-way (Tab V-2.9, V-2.10) and it is unknown if Herr Schappert saw the F-16 prior to collision.

F. EJECTION SEAT

The glider was not equipped with an ejection seat and the F-16D ejection seats were not used (Tabs V-2, Z-4).

G. PERSONAL AND SURVIVAL EQUIPMENT

Since no ejection was attempted, no F-16 personal or survival equipment was used during the mishap. The glider pilot was equipped with a parachute. It is unknown if he attempted to parachute from the glider, however, the German investigators believe he did make this attempt (Tab CC-6).

H. RESCUE

The impact between the F-16 and the glider occurred at approximately 1628 CEST (Tab EE-5). The first notification of the incident was made by Capt Luithly to his

squadron operations immediately after the midair collision. Squadron operations notified Hahn tower by telephone at approximately 1631 CEST. Hahn tower initiated their crash response checklist at approximately 1633 CEST after receiving the telephone call from 10TFS operations followed immediately by a radio call from Capt Luithly (Tab DD-2). Rockenhausen police were notified of the incident by Sembach AB at 1747 CEST. At 1809 CEST police from the city of Lauterecken called the Rockenhausen police to report a glider missing from the Essweiler glider port, and shortly thereafter a local farmer found the glider wreckage between 1810 and 1815 CEST while he was driving in the area and telephoned Rockenhausen police at 1827 CEST with this information (Tab DD-7).

I. CRASH RESPONSE

1. German police and emergency vehicles from the town of Rockenhausen were sent to the crash site (Tab DD-7). The F-16D was met at Hahn AB by US Air Force crash recovery vehicles and personnel (Tab DD-2).

2. German helicopters from the search and rescue center at Goch, FRG, had been scrambled to search the general area. Two search and rescue helicopters landed at the scene at approximately 1840 CEST. Ground personnel reported that the glider pilot was a fatality at 1843 CEST. The Luftfahrt-Bundesamt was notified at 1930 CEST and sent 3 representatives to the crash site from Braunschweig (Tab DD-7).

3. A small disaster response force directed by Lt Col Frank Trenary, Deputy Commander, 66th Combat Support Group, departed Sembach at approximately 2000 CEST. This response force included representatives from the wing safety office, the legal office, a photographer, a flight surgeon with medics and an ambulance. Upon arrival at the scene, local police had already secured the crash site and Rockenhausen police had assumed control of the scene. Search and clean up operations were suspended until the following day due to lack of daylight (Tab DD-7).

J. MAINTENANCE DOCUMENTATION

1. No maintenance discrepancies were noted in the Air Force Technical Order (AFTO) Forms 781 that could have affected the accident. The aircraft completed a phase inspection on 30 May 1990 and had flown five sorties (all Code 1) prior to the mishap sortie. Three of these sorties were flown on the day of the mishap (Tabs H-2, U).

2. There were a total of seven F-16 Time Compliance Technical Orders (TCTO) open against the aircraft, none of which were overdue or could have affected this mishap. There were three routine delayed discrepancies awaiting completion (Tabs U-2.12, U-4.1, U-4.2).

3. The F-16 had all scheduled inspections satisfactorily completed, and there were no discrepancies which could have been a factor in this mishap (Tab H-2).

4. No discrepancies were noted for the mishap aircraft on review of Oil Analysis Records. A pre-accident oil analysis was taken at Ramstein, and the pilot was advised before takeoff that the results were within standards (Tabs U-7.1, U-7.2, U-7.3, V-2.8).

5. All Time Change requirements were completed on time with no discrepancies (Tab H-2).

6. A review of the Equipment Transfer Report (ETR) indicated timely component inspections for the aircraft.

7. There was no unscheduled maintenance performed on the aircraft since the completion of the last scheduled inspection that could have had a relationship to the mishap. Review of previous flights' data indicates no history of significant systems failures (Tab U).

8. All indications from testimony and document reviews are that F-16 maintenance procedures, practices and manner of performance had no bearing on this mishap (Tab H-2, U).

K. MAINTENANCE PERSONNEL AND SUPERVISION

1. All preflight servicing procedures were reviewed and there was no indication of any performance by maintenance personnel that would have a bearing on this mishap. All aircraft servicing personnel were adequately trained for their assigned tasks (Tabs V-12, V-13).

2. There is no evidence of any irregularity in maintenance practice or procedure that may have been a contributing factor in this accident (Tabs H, U).

L. ENGINE FUEL, HYDRAULIC AND OIL INSPECTION ANALYSIS

The following items were reviewed and all found to be within normal specified limits.

1. A review of engine inspection data was accomplished. The equipment review report prepared 5 June 1990 for installed engine serial number 705241 has no documentation relevant to the accident. The outstanding TCTO listing has eleven TCTOs in status code 01, 02 and 22. These status codes are completed, previously completed or not applicable, respectively (Tab U-4.1, U-4.2) .

2. Aircraft 84-1331 was last serviced with JP-8 fuel at Ramstein AB, FRG, on 5 June 1990 prior to the mishap flight. The fuel test report prepared by 316 AD/LGSF details fuel sample testing directed for two 86TFW assigned aircraft that were serviced from the same refueling unit. The report identifies a sample taken from 86TFW aircraft 85-1511 which was tested and cleared as within limits. The initial sample for 86TFW aircraft 85-1446 failed the initial test and was resampled. The first test failed due to improper flushing of the sump prior to sampling. The second test identified the fuel to be within specifications for weight color and water content. From the results of the sampling and testing of aircraft, refueled from the same refueling unit, it was determined that aircraft 84-1331's fuel was within technical order specifications and was not contributory in any manner to this mishap (Tab U-5.1 thru U-5.6).

3. A hydraulic fluid testing report was inadvertently misplaced between the unit and Safety Investigation Board. The aircraft remained under impoundment and restricted access until another testing of hydraulic systems A and B was directed on 31 July 1990. The resampling and testing was conducted/controlled by quality assurance personnel. The report details that the hydraulic fluid samples are within technical order specifications and were not contributory in any manner to this mishap (Tab U-6).

4. A review of the aircraft Joint Oil Analysis Program (JOAP) records was accomplished. The DD Form 2027 details the JOAP sampling test results by Julian date. This engine sampling record is very unremarkable from a trend analysis and the wear metals readings of 0 and 1 are well within the technical order limits (Tab U-7.1 thru U-7.3).

M. AIRFRAME AND AIRCRAFT SYSTEMS

A review of all pertinent component and accessory systems operation was conducted. An analysis of the F-16D ECA and the FLCC indicated that all aircraft flight control systems were functioning normally just prior to the collision as well as throughout the remainder of the flight (Tabs J-2, J-3, CC-2 thru CC-4).

N. OPERATIONS PERSONNEL AND SUPERVISION

1. The mission was properly authorized on DD Form 1801-DOD International Flight Plan (Tab K-2). As the flight leader, Capt Luithly was authorized to sign as the approving authority. Since this was the fourth mission of the day for Capt Luithly and Lt Smith, permission was required from the home station wing commander. The permission was telephonically received from the acting wing commander and passed to Capt Luithly prior to launch from Ramstein AB. (Tabs V-2.6, V-6.2, V-6.3)

2. Capt Luithly briefed the mission with none of his supervisors present. However, the exercise evaluator testified to the adequacy of the briefing (Tab V-3.12).

O. CREW QUALIFICATIONS

1. Pilot qualifications were examined and all members of LG 05 flight were qualified for flight. Capt Luithly's training records reveal that he was an experienced IP in air-to-air as well as air-to-ground missions. He was also a qualified functional check flight (FCF) pilot in the F-16 wherein he often flew the first sortie on an aircraft following significant maintenance work done to that aircraft. Prior to entry on active duty he was a glider pilot instructor with 500 hours of glider flying time (Tab V-2.1, V-2.2). He had flown 895.4 hours in the F-16 of which 309.2 hours were instructor hours. He had 927.6 hours of fighter time and 1103.0 hours total time (Tab T-2). His 30/60/90 day flying totals preceding the mishap were respectively 26.0 hours (20 sorties)/50.7 hours, (37 sorties)/82.5 hours (64 sorties) (Tab T-3).

2. Maj Hargrove was an experienced pilot who was first qualified in the F-16 in October 1988 and had a total of 293.3 hours in the aircraft. He had previously flown 784.3 hours in the F-4 with 152.8 hours as an IP and evaluator. He was also an IP in the T-38 with 1438.3 hours (1222.4 as an IP). He had 1095.5 hours of fighter time and 2737.5 hours total time (Tabs G-7, T-6.1, T-6.2). His 30/36/90 day flying totals preceding the mishap were respectively 19.3 hours (14 sorties)/43.0 hours (32 sorties)/ 61.3 hours (44 sorties) (Tab T-5).

3. Lt Smith was first qualified in the F-16 in January 1989 and had a total of 270.7 hours in the aircraft. He had previously flown helicopters in the Army (Tab V-4.2). He had 296.0 hours of fighter time and 1278.1 hours total time (Tabs G-5, T-4.1 thru T-4.3). His 30/60/90 day flying totals preceding the mishap were respectively 20.6 hours (15 sorties)/35.4 hours (26 sorties)/69.9 hours (56 sorties) (Tab T-4.1 thru T-4.3).

4. Herr Schappert had been a member of the glider club at Landstuhl, FRG, since 1969 and had attended the glider school in Horberg that same year (Tab T-9). His log book indicates 480 hours, 23 minutes of glider time (Tab G-8).

P. MEDICAL

1. The mishap pilot and other two flight members were medically qualified for flight at the time of the accident. Maj Hargrove was required to wear glasses and was wearing Air Force issue sunglasses which corrected his vision to at least 20/20 (Tab V-3.15). Herr Schappert was also required to wear glasses and have a second pair available (Tab T-7.1). It's unknown whether he was wearing glasses on the incident flight, however it is reported that he generally did not wear them when he flew (Tab CC-6).

2. All post-mishap toxicology and medical reports indicated there was no drug or alcohol substance affecting either of the F-16 pilots in the mishap aircraft (Tab GG). According to the Ramstein AB German Legal Advisor, a toxicology report on Herr Schappert was ordered by the Rheinland Pfalz prosecutor's office but has not yet been received.

3. The autopsy report revealed that Herr Schappert had the following conditions "normal for his age: arteriosclerosis, pulmonary emphysema, mild pulmonary arteriosclerosis and enlargement of the thyroid" (Tab X-3). However, he did not die from natural causes prior to the collision (Tab X-2). The German investigators from the Luftfahrt-Bundesamt believe his fatal injuries occurred when he impacted the ground (Tab CC-6). The pathologist who performed the autopsy neither confirmed nor denied this (Tab X-3).

Q. NAVAIDS AND FACILITIES

All Navaids and facilities were functioning normally on 5 June 1990. There were no NOTAMs that were applicable to the mishap flight (Tabs BB-2, BB-3).

R. WEATHER

1. The forecast weather for Ramstein and vicinity called for broken cloud cover at 4000 feet and 25000 feet with a 4000 feet ceiling. Visibility was forecast to be 10 kilometers or greater (Tab K-3).

2. The actual weather was better than forecast. LG 05 and 06 noted that in-flight visibility was very good. The cloud bases were estimated at 6500-7000 feet MSL (5000-5500 feet AGL) with some holes in them and some shadows from the sun peeking through (Tab V-2.14).

S. DIRECTIVES AND PUBLICATIONS

The following directives, publications and technical orders were applicable to the operation of the mission and the maintenance performed on the mishap aircraft.

1. Regulations and Manuals:

a. AFR 60-1, Flight Management
b. AFR 60-2, Aircrew Standardization/Evaluation Program

c. AFR 60-16, General Flight Rules
d. USAFEM 51-50, Vols I & VIII, Tactical Fighter and F-16 Aircrew Training
e. USAFER 55-54, Control of Aircraft for Off Station Training/Diverts
f. USAFER 55-116, F-16 Pilot Operational Procedures
g. DOD Flight Information Publication, General Planning
h. DOD Flight Information Publication, Area Planning, Special Use Airspace, Europe - Africa - Middle East
i. Luftfahrt Handbuch Deutschland
j. 50TFW Pilot Aid
k. 86TFW Pilot Aid
l. 50TFW Maintenance Operating Instruction 66-48, Joint Oil Analysis Program
m. General Dynamic's F-16 Multirole Fighter Mishap Investigation Guide

2. Technical Orders (T.O.):

a. 1F-16C-1, F-16C/D Flight Manual
b. 1F-16C-1CL-1, F-16C/D Checklist
c. 1F-16C-6WC-1-11, Basic Postflight, Preflight, Launch Workcards
d. 1F-16C-6, Scheduled Inspections and Maintenance Requirements
e. 33-1-37, Joint Oil Analysis Program Laboratory Manual
f. 42B-1-1, Quality Control of Fuels and Lubricants

T. CLAIMS

As of 3 Aug 1990 several claims have been received by the Defense Cost Office (DCO), Koblenz, FRG. Specifically, the widow has submitted claims for burial costs (15,000DM) and loss of support (no amount stated), and the deceased's insurance company has filed an application for a 2,200DM death gratuity. Also, three German farmers had claimed for damage to their fields caused by the crash and clean up operations, these claims have already been settled for approximately 5,000DM. As the 90 day filing period has not expired, the DCO expects more claims will be filed.

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ROYCE G. W. WOODDELL, Colonel, USAF
Accident Investigation Officer

CERTIFICATION AND SIGNATURE PAGE

As the investigating officer appointed to conduct this aircraft accident investigation, I certify that I have conducted a complete investigation of the facts of this accident under AFR 110-14.

The following originals were not included in the accident investigation report. They can, if required be located as indicated:

1. Captain Luithly's and 1st Lieutenant Smith's Flight Records:

a. Flight Data Records and History - 50th TFW Base Flight Records Management Office, Hahn AB, Germany.

b. Flight Evaluation Folder - 50th TFW Standardization/Evaluation Office, Hahn AB, Germany.

c. Flying Training Records - 10TFS Training Office, Hahn AB, Germany.

2. Major Hargrove's Flight Records:

a. Flight Data Records and History - 86th TFW Base Flight Records Management Office, Ramstein AB, Germany.

b. Flight Evaluation Folder - 86th TFW Standardization/Evaluation Office, Ramstein AB, Germany.

c. Flying Training Records - 526th TFS Training Office, Ramstein AB, Germany.

3. Captain Luithly's and Lieutenant Smith's Medical and Dental Records can be located at the Hahn Air Force Hospital, Hahn AB, Germany.

4. Maj Hargrove's Medical and Dental Records can be located at the Ramstein Air Force Clinic, Ramstein AB, Germany.

5. All original maintenance documents of aircraft 84-1331 and all photo negatives used can be located in the 66th ECW office of the Staff Judge Advocate, Sembach AB, Germany.

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ROYCE G. W. WOODDELL, Col, USAF
Accident Investigation Officer

I have reviewed the above referenced originals and certify that the copies contained herein are true and accurate copies of the originals.

I have observed and reviewed all aspects of this investigation and found it was conducted in a legally sufficient manner, in accordance with AFR 110-14, AFR 120-4, and other applicable directives. Any information from the documents included in this report which would not be appropriate for release under provisions of the Privacy Act have been deleted.

Dawn E. B. Scholz

DAWN E. B. SCHOLZ, Capt, USAF
Accident Board Legal Advisor

ABBREVIATIONS

AB - AIR BASE
AFR - AIR FORCE REGULATION
AFSC - AIR FORCE SPECIALITY CODE
AFTO - AIR FORCE TECHNICAL ORDER
AGL - ABOVE GROUND LEVEL
AMU - AIRCRAFT MAINTENANCE UNIT
ASAP - AS SOON AS POSSIBLE
ATOC - ALLIED TACTICAL OPERATIONS CENTER
AVTR - AIRBORNE VIDEO TAPE RECORDER
AWOC - ALTERNATE WING OPERATIONS CENTER
CAP - COMBAT AIR PATROL
CEST - CENTRAL EUROPEAN SUMMER TIME
CM - CENTIMETERS
CODE 1 - AIRCRAFT MAINTENANCE STATUS INDICATING NO MALFUNCTIONS
CODE A - AIRCRAFT MAINTENANCE STATUS INDICATING NO MALFUNCTIONS
COMM - COMMUNICATION
CSG - COMBAT SUPPORT GROUP
DACT - DISSIMILAR AIR COMBAT TACTICS
DCM - DEPUTY COMMANDER FOR MAINTENANCE
DCO - DEFENSE COST OFFICE OR DEPUTY COMMANDER FOR OPERATIONS
DM - DEUTSCHE MARK
DO - DIRECTOR OF OPERATIONS
DOD - DEPARTMENT OF DEFENSE
ECA - ELECTRONIC COMPONENT ASSEMBLY
ECW - ELECTRONIC COMBAT WING
EHR - EVENTS HISTORY RECORDER
EMS - EQUIPMENT MAINTENANCE SQUADRON
EOR - END OF RUNWAY
EPU - EMERGENCY POWER UNIT
ETR - EQUIPMENT TRANSFER REPORT
FCF - FUNCTIONAL CHECK FLIGHT
FLCC - FLIGHT CONTROL COMPUTER
FOD - FOREIGN OBJECT DAMAGE
FRG - FEDERAL REPUBLIC OF GERMANY
FTIT - FAN TURBINE INLET TEMPERATURE
HUD - HEAD UP DISPLAY
IFF - IDENTIFICATION FRIEND OR FOE
IFR - INSTRUMENT FLIGHT RULES
IM - INFORMATION MANAGEMENT
INS - INERTIAL NAVIGATION SYSTEM
IP - INSTRUCTOR PILOT
JA - JUDGE ADVOCATE
JFS - JET FUEL STARTER
JOAP - JOINT OIL ANALYSIS PROGRAM
LFA - LOW FLY AREA
LG - LIMA GOLF
LOX - LIQUID OXYGEN
LSN - LOCAL SALTY NATION
MAU - MUNITION ASSEMBLY UNIT
MEZ - MIDDLE EUROPEAN ZONE

MORT - FATALITY
MSL - MEAN SEA LEVEL
NATO - NORTH ATLANTIC TREATY ORGANIZATION
NCOIC - NON COMMISSIONED OFFICER IN CHARGE
NDI - NON DESTRUCTIVE INSPECTION
NM - NAUTICAL MILE(S)
NNW - NORTH NORTHWEST
NOTAM - NOTICE TO AIRMEN
PCS - PERMANENT CHANGE OF STATION
QA - QUALITY ASSURANCE
RCP - REAR COCKPIT
RPM - REVOLUTIONS PER MINUTE
RTU - REPLACEMENT TRAINING UNIT
SAR - SEARCH AND RESCUE
SDR - SEAT DATA RECORDER
SFO - SIMULATED FLAME OUT
SJA - STAFF JUDGE ADVOCATE
SN - SERIAL NUMBER
SOAP - SPECTROMETRIC OIL ANALYSIS PROGRAM
SOF - SUPERVISOR OF FLYING
TA - TRANSIENT ALERT
TACAN - TACTICAL AIR NAVIGATION
TAF - TACTICAL AIR FORCES
TCTO - TIME COMPLIANCE TECHNICAL ORDER
TD & E - TEST DEVELOPMENT AND EVALUATION
TDY - TEMPORARY DUTY
TFS - TACTICAL FIGHTER SQUADRON
TFW - TACTICAL FIGHTER WING
TO - TECHNICAL ORDER
TRA - TEMPORARY RESERVED AIRSPACE
UHF - ULTRA HIGH FREQUENCY (RADIO)
UPT - UNDERGRADUATE PILOT TRAINING
US - UNITED STATES
USAFE - UNITED STATES AIR FORCES IN EUROPE
USAFEM - UNITED STATES AIR FORCES IN EUROPE MANUAL
USAFER - UNITED STATES AIR FORCES IN EUROPE REGULATION
UTC - UNIVERSAL TIME CONSTANT
VHF - VERY HIGH FREQUENCY (RADIO)
WILLCO - WILL COMPLY
WOC - WING OPERATIONS CENTER
ZULU - GREENWICH MEAN TIME