

**UNITED STATES AIR FORCE**  
**ACCIDENT INVESTIGATION REPORT**



**COMP AIR 7SL, AIRCRAFT NUMBER 2245**

**3rd SQUADRON, IRAQ AIR FORCE**  
**KIRKUK REGIONAL AIR BASE, IRAQ**

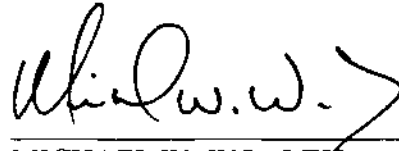


**LOCATION: NEAR JALULAH, IRAQ**  
**DATE OF ACCIDENT: 30 MAY 2005**

**INVESTIGATION TEAM PRESIDENT:**  
**BRIGADIER GENERAL CLAY T. McCUTCHAN**

ACTION OF THE CONVENING AUTHORITY

The report of the Command Directed Accident Investigation Board, conducted under my inherent authority as commander to investigate matters affecting my command and using the provisions of AFI 51-503 as guidance, that investigated the aircraft accident involving an Iraqi Air Force Comp Air 7SL, that crashed near Jalulah, Iraq on 30 May 05, complies with applicable regulatory and statutory guidance, and on that basis, is approved.



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MICHAEL W. WOOLEY  
Lieutenant General, USAF  
Commander

31 Aug 2005

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Date

## EXECUTIVE SUMMARY

### AIRCRAFT ACCIDENT INVESTIGATION

IRAQI AIR FORCE COMP AIR 7SL, TAIL NUMBER 2245

Near Jalulah, Iraq

30 May 2005

On 30 May 2005, at approximately 1030 Local Time (1030L), while attempting a low pass, landing, or "go-around" from an aborted landing, an Iraqi Air Force (IzAF) Comp Air 7SL, tail number 2245, impacted the ground and came to rest inverted on a dirt berm near Jalulah, Iraq. There was no evidence that hostile fire or major airframe or systems failure caused or contributed to the accident. The USAF Mishap Pilot (MP), the IzAF Mishap Co-pilot (MCP), two USAF Special Tactics Team officers, and one USAF Special Tactics Team enlisted member were killed in the mishap. The aircraft was totally destroyed upon impact with the estimated loss valued at (including on-board equipment) \$374,000. The crash happened in a remote area and caused no damage to civilian or other government property.

The MA departed controlled flight during an attempted low pass, landing, or "go-around" from an aborted landing on a road and came to rest inverted on an adjacent dirt berm. The impact forces of the crash created a localized debris field. Engineering analysis of the nose gear indicated it had been folded back under the fuselage, while engineering analysis of the engine and propeller indicate that these items impacted the ground nose-first at a high energy, inverted high-angle of impact, at or near full power. As a result, most of the damage to the engine casing was axial and transmitted through the one to three o'clock position, indicating the engine impacted the ground while upside-down. These technical analyses, in conjunction with the location of the debris, suggest an initial contact of the nose gear with the ground prior to final impact. The evidence clearly indicates death of the entire crew was instantaneous as a result of blunt force trauma from the impact of the aircraft with the ground, and the mishap aircraft was destroyed by the impact and post-mishap fire.

**SUMMARY OF FACTS**  
**COMP AIR 7SL ACCIDENT**

**30 MAY 2005**

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## COMMONLY USED ACRONYMS AND ABBREVIATIONS

AB	Air Base
AFI	Air Force Instruction
AFSOC	Air Force Special Operations Command
AGL	Above Ground Level
AST	Advisory Support Team
ATO	Air Tasking Order
BFT	Blue Force Tracker
CAA	Combat Aviation Advisor
CJSOAC	Combined Joint Special Operations Air Component
CFSOCC	Combined Forces Special Operations Component Command
CHOP	Change of Operational control
CMATT	Coalition Military Assistance Training Team
COIN	Counter Insurgency
CSAR	Combat Search and Rescue
EOD	Explosive Ordnance Disposal
ETD	Estimated Time of Departure
FAA	Federal Aviation Administration
FID	Foreign Internal Defense
FLIR	Forward Looking Infrared
FOB	Forward Operating Base
HLZ	Helicopter Landing Zone
ISR	Intelligence, Surveillance, and Reconnaissance
IZ	Iraq
IAF	Iraqi Air Force
ISB	Interim Safety Board
IzAF	Iraqi Air Force
JSOAC	Joint Special Operations Air Component
JSOAD	Joint Special Operations Air Detachment
KRAB	Kirkuk Regional Air Base, Iraq
L	Local Time
LOE	Letter of Exception
LZ	Landing Zone
MA	Mishap Aircraft
MC	Mishap Crew
MNSTC-I	Multi-National Security Transition Command – Iraq
MOD	Ministry of Defense
MP	Mishap Pilot
MPC	Mishap Copilot
NM	Nautical Mile(s)
OAD-A	Operational Aviation Detachment - Alpha
OAD-B	Operational Aviation Detachment - Bravo
ODA	Operational Detachment Alpha

OPCON	Operational Control
ORM	Operational Risk Management
PDSS	Predeployment Site Survey
RCT	Regimental Combat Team
RFF	Request for Forces
SIB	Safety Investigation Board
SITREP	Situation Report
SOG	Special Operations Group
SOP	Standard Operating Procedure
SOS	Special Operations Squadron
SOW	Special Operations Wing
STT	Special Tactics Team
STS	Special Tactics Squadron
TACON	Tactical Control
TOC	Tactical Operations Center
UAE	United Arab Emirates
UAEAF	United Arab Emirates Air Force
USAF	United States Air Force

The above list was compiled from the Summary of Facts, the Index of Tabs, and witness testimony (Tab V).

## SUMMARY OF FACTS

### I. AUTHORITY, PURPOSE, AND CIRCUMSTANCES

#### a. Authority.

On 1 July 2005, Lieutenant General Michael W. Wooley, Commander, Air Force Special Operations Command, appointed Brigadier General Clay T. McCutchan to conduct an aircraft accident investigation of the 30 May 2005 crash of a Comp Air 7SL aircraft in a rural area near Jalulah, Iraq (Tab Y). The investigation began at Hurlburt Field, Florida, on 5 July 2005 and concluded at Hurlburt Field on 31 August 2005. Technical advisors were: (b)(3);10 USC §130b.(b)(6)

(b)(3);10 USC §130b.(b)(6) Combat Aviation Advisor member; (b)(3);10 USC §130b.(b)(6) Combat Aviation Advisor member; (b)(3);10 USC §130b.(b)(6) Medical member; (b)(3);10 USC §130b.(b)(6) Iraqi Air Force Pilot Representative; (b)(3);10 USC §130b.(b)(6) Iraqi Air Force Engineering Representative; (b)(3);10 USC §130b.(b)(6) Pilot member; (b)(3);10 USC §130b.(b)(6) Maintenance member; (b)(3);10 USC §130b.(b)(6) Legal Advisor; (b)(3);10 USC §130b.(b)(6) Recorder; and (b)(3);10 USC §130b.(b)(6) Assistant Recorder.

#### b. Purpose.

This aircraft accident investigation was convened under the inherent authority of a commander to investigate matters or incidents under his or her jurisdiction or command. The decision to investigate the mishap was made with close coordination with and consent of U.S. Central Command and the Chief of Staff of the Iraqi Air Force. Although the investigation could not be formally convened as an Accident Investigation Board (AIB) because the mishap aircraft (MA) did not belong to the Department of Defense, the investigation team was directed to use Air Force Instruction (AFI) 51-503 as guidance. The primary purpose of this investigation is to set forth factual information concerning the accident. Because the MA was not owned by the Department of Defense, the protections of 10 U.S.C. 2254(d) regarding Statements of Opinion do not apply to this mishap. Therefore, there will be no Statement of Opinion in this report. This accident investigation is separate and apart from the previous safety investigation, which was conducted pursuant to AFI 91-204 for the purpose of mishap prevention. This report is available for public dissemination under the Freedom of Information Act (5 United States Code (U.S.C.) §552) and AFI 37-131.

#### c. Circumstances.

The accident investigation was convened to investigate the fatal accident involving a Comp Air 7SL aircraft, assigned to the 3rd Iraqi Squadron, Kirkuk Regional Air Base (KRAB), Iraq, which crashed on 30 May 2005 in rural Iraq. The aircraft was destroyed in the mishap, and an American pilot, an Iraqi pilot, and three American Special Tactics personnel were killed.

## 2. ACCIDENT SUMMARY

On 30 May 2005, at approximately 1030 Local Time (1030L), while attempting a low pass, landing, or "go-around" from an aborted landing, an Iraqi Air Force (IzAF) Comp Air 7SL, tail number 2245, impacted the ground and came to rest inverted on a dirt berm near Jalulah, Iraq. There was no evidence that hostile fire or major airframe or systems failure caused or contributed to the accident. The Mishap Pilot (MP), (b)(3):10 USC §130b.(b)(6) USAF; the Mishap Co-pilot (MCP), (b)(3):10 USC §130b.(b)(6) IzAF; Special Tactics Team member (b)(3):10 USC §130b.(b)(6) USAF; Special Tactics Team member (b)(3):10 USC §130b.(b)(6) USAF; and Special Tactics Team member (b)(3):10 USC §130b.(b)(6) USAF, were killed in the mishap (Tab X). The aircraft was totally destroyed upon impact with the estimated loss valued at (including on-board equipment) \$374,000 (Tab P-3). The crash happened in a remote area and caused no damage to civilian or other government property.

## 3. BACKGROUND

The 6th Special Operations Squadron (SOS) is assigned to the 16th Special Operations Group (SOG), 16th Special Operations Wing (SOW), Air Force Special Operations Command (AFSOC). It is located at Hurlburt Field, Florida. The 6 SOS is the only designated Combat Aviation Advisory (CAA) squadron in the United States Air Force (USAF) and Special Operations Command (SOCOM). The 6 SOS has a wartime mission to assess, train, advise, and assist foreign aviation forces in airpower employment and sustainment. There are three interrelated mission areas: Foreign Internal Defense (FID), Unconventional Warfare (UW) and Coalition Support (CS).

On 07 February 2005, the 6 SOS was tasked by SOCOM to provide eight individuals for deployment to Iraq. The only career fields requested were for fixed wing pilots, rotary wing pilots and maintenance personnel to support fixed wing and rotary wing operations. This was not the standard procedure for a 6 SOS Request for Forces (RFF.) An established 6 SOS Unit Type Code (UTC) was not requested. The established 6 SOS UTCs deploy team members as an Operational Aviation Detachment - Alpha (OAD-A), with an Operational Aviation Detachment - Bravo (OAD-B) to support them. An OAD-A is comprised of 13 advisors and an OAD-B consists of a five-person command and control element. Both the OAD-A and OAD-B teams can be task-organized to fit a particular RFF. This deployment was unusual because the 6 SOS personnel did not deploy as a cohesive team. Instead, they were tasked to fill individual billets on the Aviation Support Teams (AST). This RFF did not allow for a dedicated Mission Commander or other support staff, i.e., communications, force protection, and logistics. These particular functions were to be provided by the Coalition Military Assistance Training Team (CMATT). The eight-man team consisted of three fixed-wing and five rotary-wing personnel. Additionally, one of the eight advisors was to serve as a Combat Aviation Advisor to the CMATT commander.

The missions of the ASTs were as follows:

*(U) Mission/justification: Recent decisions have further defined the future structure of the Iraqi Air Force. The resultant requirements are based on the fielding of five types of aircraft at the end of this year. The Iraqi Air Force intends to integrate these aircraft into five squadrons that will together provide theater-wide capabilities for reconnaissance; helicopter support; air transport; and VIP transport. All of these capabilities will promote Iraqi independence from coalition support and will enhance the ability of the IAF to respond quickly to internal threats. To support these squadrons during creation and subsequent work-up into a coherent capability, ASTs will need to be embedded to instruct the pilots, crewmen and maintenance personnel on the various aircraft types that are being introduced. ASTs will also be required to mentor their respective Iraqi squadron commanders on personnel and operational aspects, as each squadron progresses through initial operating capability to full operating capability.*

The MP arrived in Iraq in February 2005 and was assigned to the 3rd Squadron, Iraqi Air Force, Kirkuk AB, Iraq. The 3rd Iraqi Squadron's mission is infra-structure security (pipelines, refineries, etc), VIP transport, and aerial reconnaissance. The 3rd Squadron's aircraft inventory consisted of seven Comp Air 7SL aircraft. The aircraft in the 3rd Squadron were assembled in the UAE and gifted to the IZAF in November 2004. The 3rd Squadron began flying the aircraft in January 2005. The Comp Air 7SL is a high-wing, turbo-prop, fixed tricycle gear experimental kit aircraft with a maximum gross weight of 5200 pounds. It has a useful load of up to 2050 pounds, and can cruise at approximately 150 knots. It is a relatively low-maintenance aircraft which is well suited to the experience level of the maintenance cadre and the limited capability of the developing logistics system. The MA was powered by a Walter M601 turboprop engine.

#### **4. SEQUENCE OF EVENTS**

##### **a. Mission.**

On 30 May 2005, the Mishap Crew (MC) arrived at the squadron at 0845L for a 0900L briefing. The mission was briefed as an aerial survey of two potential Landing Zones (LZs) followed by a landing at Forward Operating Base (FOB) Cobra. The Special Tactics Team (STT) personnel were to be off-loaded at FOB Cobra, where they would survey that LZ for future use. It should be noted that FOB Cobra did not have a published LZ survey at the time of the mishap.

##### **b. Planning.**

The MP and the two STT officers were seen discussing the particulars of the mission in the 3rd Squadron building, but since these individuals were the only people participating in the planning, no details are available. On the day of the mishap, the MC was scheduled for two two-hour sorties. The first sortie was scheduled for a 0930L takeoff. The second sortie was scheduled for a 1200L takeoff.

### **c. Preflight.**

Prior to deployment, the 6 SOS Director of Operations signed a blanket AF Form 4327a, *Crew Flight Authorization*, on 11 February 2005. The flight order was valid from 15 February 2005 until 31 July 2005. The 3rd Squadron Commander authorized all flights by signing the schedule of the day, which was essentially the Iraqi equivalent of the USAF Form 4327a. Prior to each flight, the aircraft commander would fill in the Aircraft Tail Number, Call Sign, and initial the Aircraft Commander Review on the AF Form 4327a. All available evidence indicates the flight was approved and authorized by the appropriate authorities.

There were no procedures in place at the 3rd Squadron to calculate weight and balance for the aircraft. It is not known if CG calculations were conducted by the MC. Post-mishap analysis indicates the aircraft was within Center of Gravity (CG) limits but was approximately 510 pounds over the published maximum gross weight at takeoff (Tab O-11 and Tab S-4).

The forecast weather called for clear skies, light winds, and unrestricted visibility. Temperature is the only factor that would have negatively affected the MA's performance (see para. 12(a)(2) below). The forecasted temperature in the region at the time of the mishap was between 90 and 100 degrees Fahrenheit.

The MC's first recorded preflight activity was at 0850L when the MP and STT personnel arrived at the 3rd Squadron building. It is unclear when the MCP arrived at the squadron, but it was prior to the mission brief at 0900L. The mission brief was completed at 0915L, after which the MC and STT stepped immediately to the aircraft. The MCP was considered one of the best pilots in the 3rd Squadron and was handpicked by the MP for this mission (Tab V-13.2). The MCP was scheduled to fly in the left seat and the MP in the right, but the MP switched the seating arrangement prior to takeoff and flew the mission from the left seat (Tab S-4, Tab V-13.3). Traditionally, the majority of flying duties are performed from the left seat, and most fixed wing pilots prefer to accomplish challenging landings from this seat. The aircraft preflight and engine start were uneventful.

### **d. Flight.**

Kirkuk Tower radio transcripts indicate the MA taxied at 0931L and was cleared for takeoff at 0933L (Tab N-6, Tab N-7.) The MA took off and departed KRAB airspace to the south. There is no radar data to indicate the MA's exact route of flight.

The MA arrived overhead Naft Khaneh Helicopter Landing Zone (HLZ) approximately one hour after takeoff. According to Iraqi eyewitness testimony, the MA orbited the HLZ once and then shifted its orbit southwest over an adjacent road (Tabs V-1, V-5, and V-6). The MA completed one orbit over the road at approximately 100 feet above ground level (AGL). It then appeared to enter a landing pattern, lined up with the road, and descended. At that point, the MA either entered a low observation pass or attempted to land on the road. It did not appear to be experiencing any mechanical difficulties, and no enemy action was observed prior to the MA dropping out of the eyewitness' sight (Tabs V-1, V-5, and V-6). Terrain and trees obscured the

actual impact site from the eyewitnesses, but they reported seeing a large fireball shortly after the MA disappeared from view (Tabs V-1, V-5, and V-6).

**e. Impact.**

The MA departed controlled flight during an attempted low pass, landing, or "go-around" from an aborted landing on a road and came to rest inverted on an adjacent dirt berm. The impact forces created a localized debris field (Tab S-3). Testimony and evidence indicates the propeller blades and engine mounts had been moved prior to the Interim Safety Board (ISB) photographically documenting the crash site. However, it appears other items in the debris field were undisturbed. The lower nose gear assembly was located on the western edge of the debris field approximately 15 feet from the bulk of the debris (Tab Z-1.1). At some point during the impact sequence, the nose wheel assembly separated from the lower nose gear assembly and came to rest five feet from the bulk of the debris field. The nose wheel tire was consumed by the post-impact fire, while the lower nose gear assembly was largely untouched by the fire. The engineering analysis of the nose gear indicated that it had been folded back under the fuselage (Tab CC-1.7). The engineering analysis of the engine and propeller indicate that these items impacted the ground nose-first at a high energy, inverted high-angle of impact, at or near full power (Tab J-12). As a result, most of the damage to the engine casing was axial and transmitted through the one to three o'clock position (references to clock positions are from the perspective of aft looking forward, a.k.a. pilot's perspective.) These technical analyses, in conjunction with the location of the debris, suggest an initial contact of the nose gear with the ground prior to final impact. The MA was destroyed by the impact and post-mishap fire.

**f. Life Support Equipment, Egress and Survival.**

The MP and MCP were wearing their issued survival vests. The aircraft was not equipped or outfitted with any additional survival equipment. No emergency egress procedures were initiated at the time of the mishap.

**g. Search and Rescue.**

The MC did not have a formal Combat Search and Rescue (CSAR) plan developed or on file. Several Iraqi nationals, who are members of the security detail for a nearby oil refinery, were at the crash site within minutes of the mishap. These individuals attempted to put out the fire with handheld extinguishers, but the heat was too intense. They were forced to withdraw approximately 300 meters and let the fire burn out. A US Army convy, I Troop, 3/278 Regimental Combat Team (RCT), was in the town of Khanaquin at the time of the mishap (Tab R-24 to R-25). Khanaquin is approximately 20 Nautical Miles (NM) north of Naft Khaneh HLZ. The I Troop Commander was notified of the crash by the 3/278 Tactical Operations Center (TOC) at approximately 1205L. They arrived on scene at 1230L and secured the crash site. The members of I Troop made two additional unsuccessful attempts to put the fire out with extinguishers from their vehicles. After the second attempt to extinguish the fire, a US Army Special Forces Operational Detachment Alpha (ODA) team and an additional patrol from the I/3/278 RCT arrived on scene. Control of the crash site was turned over to the ODA personnel. The two I/3/278 RCT patrols swept an area 1000 meters out from the crash looking for debris or

additional crewmembers. Finding nothing, they secured the area until the remains of all crewmembers had been recovered and Air Force ISB completed its work. Due to the lack of security at the crash site, the ISB had very limited time on-scene. The ISB secured as much relevant evidence as it could, then an Explosive Ordinance Disposal (EOD) team was directed to destroy the remaining wreckage.

#### **h. Recovery of Remains.**

The recovery of remains was carefully conducted by a Mortuary Affairs detachment from Balad AB, Iraq. The remains of all crewmembers and STT personnel were transported to the Balad AB morgue. The human remains were then flown directly to Dover AFB, Delaware, where autopsy and analysis was accomplished by pathologists assigned to the Armed Forces Institute of Pathology. Once the MCP's remains were properly identified, the IzAF was contacted to coordinate his repatriation to Iraq, which occurred on 12 July 2005.

### **5. MAINTENANCE**

The MA, serial number 027279/registration number 2245, was part of the 13 November 2004 aircraft transfer from the United Arab Emirates Air Force (UAEAF) as a gift to the IzAF. The MA had flown 256.8 hours as of the date of the mishap (Tab D-8).

#### **a. Forms Documentation.**

The IzAF has not matured to the point that a standardized system of aircraft forms and documentation has been developed. In lieu of this, the maintenance organization used documentation that the senior IzAF maintenance officer adapted from his experience working on Bell helicopters.

The Accident Investigation team Maintenance Member thoroughly reviewed all available aircraft forms documentation. There were no open discrepancies for the MA at the time of the mishap.

#### **b. Inspections.**

The company that fabricates and sells the Comp Air 7SL aircraft has a maintenance program based on two major inspections: the 100-hour and/or annual inspection and 300-hour inspection. The MA was in compliance with these major inspections, the last of which was a 100-hour inspection completed on 29 April 2005 at 208.1 aircraft hours.

The senior IzAF maintenance officer was establishing additional inspection requirements at the 50-hour and 25-hour intervals. The MA was overdue for a squadron-developed 50-hour inspection (Tab D-4). This inspection was a precautionary measure put in place by the IzAF maintenance officer as data was gathered on the effects of the local operating conditions on the aircraft. The over-flight beyond this inspection did not affect the airworthiness of the MA.

The last inspection for the MA was the "Before First Flight" inspection which was completed and signed off by a maintenance officer at 0830L on 30 May 2005 (Tab D-8). The MA was then signed for by the MP at 0919L (Tab D-8).

**c. Maintenance Procedures.**

A thorough review of all maintenance practices was conducted by the board. No deficiencies in the maintenance practices or procedures were found that may have contributed to the mishap.

**d. Maintenance Personnel and Supervision.**

The 3rd Squadron has adequate maintenance and supervisory personnel. The tools, technical data, equipment, and training of the personnel at the time of the mishap were sufficient to support a low-maintenance airframe such as the Comp Air 7SL.

**e. Fuel, Hydraulic and Oil Inspection Analysis.**

No fluid analyses were performed.

**f. Unscheduled Maintenance.**

No unscheduled maintenance was performed on the MA prior to the mishap.

**6. AIRCRAFT AND AIRFRAME SYSTEMS**

**a. Condition of Systems.**

The MA was destroyed upon impact with the ground and post-impact fire. A few major components survived both the impact and fire and were recovered prior to the demolition of the mishap site. The items recovered for evaluation by the ISB were the engine mount, nose landing gear structure, main landing gear, engine, and the propeller hub with all three blades. Because there had been prior instances of trim tab failures on the 3rd Squadron aircraft, the SIB sent two non-MA trim tab actuators for analysis. The actuators from the MA were completely destroyed in the post-impact fire.

Due to the extent of the destruction, evaluation of the structures and systems was limited. Analyses of the engine mount and the nose landing gear assembly show ductile overstress and buckling associated with the impact (Tab CC-1.4). The nose landing gear strut was broken and folded back under the aircraft (Tab CC-1.7). A review of the aircraft's history revealed no evidence of pre-existing structural or system problems.

The main landing gear was analyzed by the Materials Integrity Branch at Wright-Patterson AFB, Ohio. There was no evidence of pre-existing defects in the main landing gear. There appeared to be gaps in the surface of the main landing gear. Analysis determined this to be cracking and skinning behaviors consistent with exposure to high temperatures from the post impact fire.

Fractures in the left main landing gear were also the result of the exposure to high temperatures (Tab J-18).

Because the MA is not in the USAF inventory and there is limited experience with the Walter M601 turboprop engine in the United States, the engine teardown analysis was performed at Diemech Turbines in Deland, Florida, under the observation of USAF engineers from the 327th Combat Systems Support Group, Air Force Safety Center, and Oklahoma City Air Logistics Center. They determined the engine was operating properly at a high power setting at the time of impact, and there were no indications of impending engine failure or signs of in-flight fire. Furthermore, damage to the engine casing indicated a high-energy, high-angle (between 70-90 degrees relative to the ground) impact prior to rotor spin-down (Tab J-12).

The team above also analyzed the propeller hub and blades. Two of the propeller blades had broken away from the propeller hub, and displayed characteristics of instantaneous failure (Tab J-6). The leading edges of the blades also exhibited uniform contact with the ground from the de-icer boots to the tips, which further indicated a high-angle impact. Lastly, the blade tips were curled in the direction of engine rotation; this indicates that the propellers were not feathered and were under load at the time of impact.

The sample trim tab actuators were sent to the Materials Integrity Branch at Wright-Patterson AFB for testing. One of the actuators was received in several pieces so the lab purchased an additional actuator directly from the manufacturer. The analysis of these actuators indicated that they did not perform to the manufacturer's specifications. They were observed to perform slower than required or to fail completely. The latter would result in an aircraft trim setting that could not be changed in flight. The USAF maintainer at KRAB had already duplicated and repaired a trim tab actuator malfunction on the MA prior to the mishap, and the MA had two consecutive flights without further trim tab discrepancies (Tab V-9.3).

The MA flight control systems were destroyed upon impact, but reviews of the maintenance records did not reveal any prior or existing flight control problems with the MA.

#### **b. Testing.**

Below are the mishap components and the organizations that conducted the analyses:

Powerplant and Propellers	Diemech Turbines, Deland, FL with USAF engineering personnel
Main Landing Gear	AFRL/MLS, Wright-Patterson AFB, OH
Nose Landing Gear	Oklahoma City Air Logistics Center, OK
Trim Tab Actuators	AFRL/MLS, Wright-Patterson AFB, OH

## **7. WEATHER**

#### **a. Forecast Weather.**

The weather forecast for KRAB at the MA's Estimated Time of Departure (ETD) was:

Wind: 010 degrees at 09 knots  
Visibility: 7 Statute Miles  
Sky Condition: Scattered clouds at 12000 feet  
Temperature: 27 degrees Celsius/81 degrees Fahrenheit  
Pressure Altitude: 1110 Feet  
Hazards: Light turbulence surface to 5000 feet

No specific weather forecast is available for the mishap site but the forecast for Balad AB, which is 50 nautical miles to the west, was:

Wind: 330 degrees at 12 knots  
Visibility: Unrestricted  
Sky Condition: Scattered clouds at 20000 feet  
Temperature: Unavailable  
Pressure Altitude: Unavailable  
Hazards: None

**b. Observed Weather.**

The actual weather observed at KRAB at the time of the MA's departure was:

Wind: Calm  
Visibility: Unrestricted  
Sky Condition: Few clouds at 800 feet  
Temperature: 30 degrees Celsius/86 degrees Fahrenheit  
Pressure Altitude: Unavailable  
Hazards: Few clouds at 800 feet caused by smoke

The actual weather observed at KRAB at the time of the mishap was:

Wind: Calm  
Visibility: Unrestricted  
Sky Condition: Few clouds at 1000 feet  
Temperature: 33 degrees Celsius/92 degrees Fahrenheit  
Pressure Altitude: Unavailable  
Hazards: Few clouds at 1000 feet caused by smoke

No specific weather observation is available for the mishap site. Satellite imagery indicates the weather was not significantly different from that at KRAB.

**c. Conclusions**

There is no evidence that weather was a significant factor in this mishap. However, increased temperature does decrease aircraft performance (see para 12(a)(2) below).

## 8. CREW QUALIFICATIONS

### a. Mishap Pilot (MP) (b)(3):10 USC §130b.(b)(6) USAF)

The MP was a qualified C-130E Evaluator Pilot and was a recently qualified Comp Air 7SL Instructor Pilot. His Comp Air 7SL initial checkout was accomplished in-theater by US Navy (b)(3):10 USC §130b.(b)(6) His instructor certification in the Comp Air 7SL was documented on 1 March 2005 and signed by (b)(3):10 USC §130b.(b)(6) 3d Squadron Operations Officer, IzAF. It was also annotated in his USAF Flight Evaluation Folder on AF Form 1381, *USAF Certification of Aircrew Training*. The MP had 3327 total flight hours with 400 hours in the C-130E and 145 hours in the Comp Air 7SL (Tabs G-3 to G-11 and G-16 to G-21). It should be noted the MP had very little experience in light aircraft in the same category as the Comp Air 7SL. The majority of his flight time is in large, multi-engine transport aircraft.

A summary of the MP's recent flight time is as follows:

Days	Hours	Sorties
30	34.7	17
60	83.7	47
90	144.9	90

### b. Mishap Copilot (MCP) (b)(3):10 USC §130b.(b)(6)

The MCP was a qualified Comp Air 7SL Aircraft Commander. Records indicate that he was checked out as a copilot on 23 March 2005. His Aircraft Commander checkout occurred on 29 April 2005 (Tab G-13 to G-15).

His recent flight time is as follows:

Days	Hours	Sorties
30	20.3	9
60	41.4	22
90	63.8	39

## 9. MEDICAL

### a. Qualifications

The medical member of the investigation team reviewed the medical records of the MP. He completed an Air Force Flying Class II Preventive Health Assessment on 26 January 2005 at Hurlburt Field. The assessment showed no health concerns. His last physiological training was

on 19 January 2005. There is no evidence of medical visits during his deployment, and there is no evidence of active medical conditions at the time of the mishap.

The medical records available for the MCP consist of an undated, unsigned, incomplete flight physical. There is no evidence of the MCP having any chronic or acute medical conditions at the time of the mishap.

#### **b. Pathology**

Air Force Institute of Pathology autopsy reports for all mishap personnel were available to the board. In all reports, examination indicated death was instantaneous due to blunt-force trauma from the impact of the aircraft with the ground. Laboratory analysis of blood and urine specimens from involved personnel did not identify any substances that could have contributed to the mishap.

#### **c. Lifestyle**

There is no evidence that unusual habits, behavior, or stress on the part of the crewmembers contributed to the accident.

#### **d. Crew Rest and Crew Duty Time**

Evidence indicates the crew had adequate pre-mission rest. AFI 11-202, Volume 3, stipulates Air Force aircrew require at least 8 hours of continuous, uninterrupted rest during the 12 hours immediately prior to the beginning of the flight duty period. Rest is defined as the condition that allows an individual the opportunity to sleep. The MP was off-duty by 1900L the night prior, went to the gym at approximately 2100L, then bed between 2230L and 2300L. Normal wake-up was 0630L with squadron briefing at 0900L. Details of the MCP's schedule are not available, but there is no evidence that he was not allotted proper crew rest.

## **10. OPERATIONS AND SUPERVISION**

#### **a. Operations**

The operations tempo for 6 SOS personnel is high, primarily for rotary-wing aircrew. Operations tempo for fixed-wing crews is also relatively high due to the fact that over the last two years, they have been manned on average at only 60 percent of authorized strength. This deployment consisted of eight 6 SOS members, three fixed-wing and five rotary-wing personnel. One of the fixed-wing pilots was to act as an advisor to the CMATT commander. These eight individuals operated in three different locations throughout Iraq. Based on time constraints, 6 SOS was not allowed to conduct any planning conferences, pre-deployment site surveys, or maintenance/flying assessments prior to mission execution.

## **b. Supervision.**

This deployment of 6 SOS personnel was outside the normal Standard Operating Procedures (SOP) for the squadron. Normal deployment structure is an OAD-A and OAD-B. The OAD-B serves as the command and control element for the OAD-A. In this deployment, no dedicated mission commander was designated since no OAD-B was deployed. The 6 SOS personnel deployed to fill individual AST positions. Operational control (OPCON) was retained by AFSOC through the Combined Joint Special Operations Air Component (CJSOAC) at Qatar. Tactical control (TACON) was transferred to CMATT for daily operations upon arrival in Iraq. The CMATT Air Cell, which consisted of roughly 4 coalition military personnel and an Iraqi civilian Ministry of Defense (MOD) employee, was designed more for coordination of efforts between the Multi-National Security Transition Command - Iraq (MNSTC-I) and the Iraqi MOD than for the exercise of TACON over operational units (Tab V-3.1).

## **11. HUMAN FACTORS ANALYSIS**

According to AFI 51-503, the human factors section of an AIB report discusses various traits or behaviors by any personnel that may have led to the accident. As stated previously in paragraph 1(a), this investigation was not an AIB convened under AFI 51-503 and therefore lacks the statutory protections regarding statements of opinion normally afforded by 10 U.S.C. 2254(d). As any discussion of human factors is a *de facto* discussion of causal or contributory factors to the mishap, they cannot be addressed in this report.

## **12. ADDITIONAL RELEVANT INFORMATION**

The following concepts provide necessary background information for this mishap:

### **a. Airplane performance (as taken from *Pilot's Handbook of Aeronautical Knowledge AC 61-23C (Federal Aviation Administration (FAA) Edition)*)**

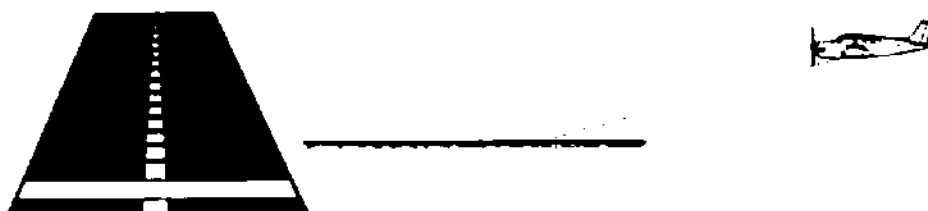
(1) Density Altitude. Air density is perhaps the single most important factor affecting airplane performance. It has a direct bearing on the power output of the engine, efficiency of the propeller, and the lift generated by the wings. As previously discussed in this handbook, when the air temperature increases, the density of the air decreases. Also, as altitude increases, the density of the air decreases. The density of the air can be described by referring to a corresponding altitude; therefore, the term used to describe air density is density altitude. To avoid confusion, remember that a decrease in air density means a high density altitude; and an increase in air density means a lower density altitude. Density altitude is determined by first finding pressure altitude, and then correcting this altitude for nonstandard temperature variations. It is important to remember that as air density decreases (higher density altitude), airplane

performance decreases; and as air density increases (lower density altitude), airplane performance increases.

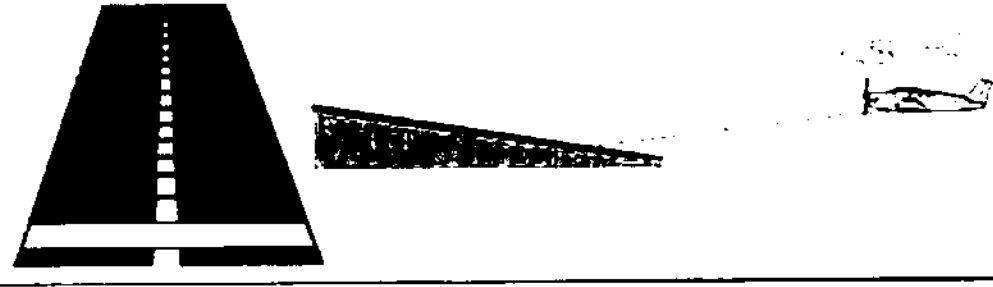
(2) Effect of Density Altitude on Engine Power and Propeller Efficiency. An increase in air temperature or humidity, or decrease in air pressure resulting in a higher density altitude, significantly decreases power output and propeller efficiency. The engine produces power in proportion to the weight or density of the air. Therefore, as air density decreases, the power output of the engine decreases. This is true of all engines that are not equipped with a supercharger or turbocharger. Also, the propeller produces thrust in proportion to the mass of air being accelerated through the rotating blades. If the air is less dense, propeller efficiency is decreased. The problem of high-density altitude operation is compounded by the fact that when the air is less dense, more engine power and increased propeller efficiency are needed to overcome the decreased lift efficiency of the airplane wing. This additional power and propeller efficiency are not available under high-density altitude conditions; consequently, airplane performance decreases considerably.

**b. Visual Illusions (from the FAA Civil Aviation Medical Institute).** Visual illusions are familiar to most of us. As children, we learned that railroad tracks - contrary to what our eyes showed us - don't come to a point at the horizon. Even under conditions of good visibility, you can experience visual illusions including:

(1) Aerial Perspective Illusions may make you change (increase or decrease) the slope of your final approach. They are caused by runways with different widths, upsloping or downsloping runways, and upsloping or downsloping final approach terrain. Pilots learn to recognize a normal final approach by developing and recalling a mental image of the expected relationship between the length and the width of an average runway (figure below).



(2) A final approach over a flat terrain with an upsloping runway may produce the visual illusion of a high-altitude final approach. If you believe this illusion, you may respond by pitching the aircraft nose down to decrease the altitude, which, if performed too close to the ground, may result in an accident (figure below).



(3) A final approach to an unusually narrow runway or an unusually long runway may produce the visual illusion of a high-altitude final approach. If you believe this illusion, you may respond by pitching the aircraft nose down to decrease the altitude, which, if performed too close to the ground may result in an accident (figure below).



**c. Aircraft Stall (from the FAA Airplane Flying Handbook, Chapter 4):**

A stall occurs when the smooth airflow over the airplane's wing is disrupted, and the lift degenerates rapidly. This is caused when the wing exceeds its critical angle of attack. This can occur at any airspeed, in any attitude, with any power setting. [Figure 4-2] The practice of stall recovery and the development of awareness of stalls are of primary importance in pilot training. The objectives in performing intentional stalls are to familiarize the pilot with the conditions that produce stalls, to assist in recognizing an approaching stall, and to develop the habit of taking prompt preventive or corrective action. Intentional stalls should be performed at an altitude that will provide adequate height above the ground for recovery and return to normal level flight. Though it depends on the degree to which a stall has progressed, most stalls require some loss of altitude during recovery. The longer it takes to recognize the approaching stall, the more complete the stall is likely to become, and the greater the loss of altitude to be expected.

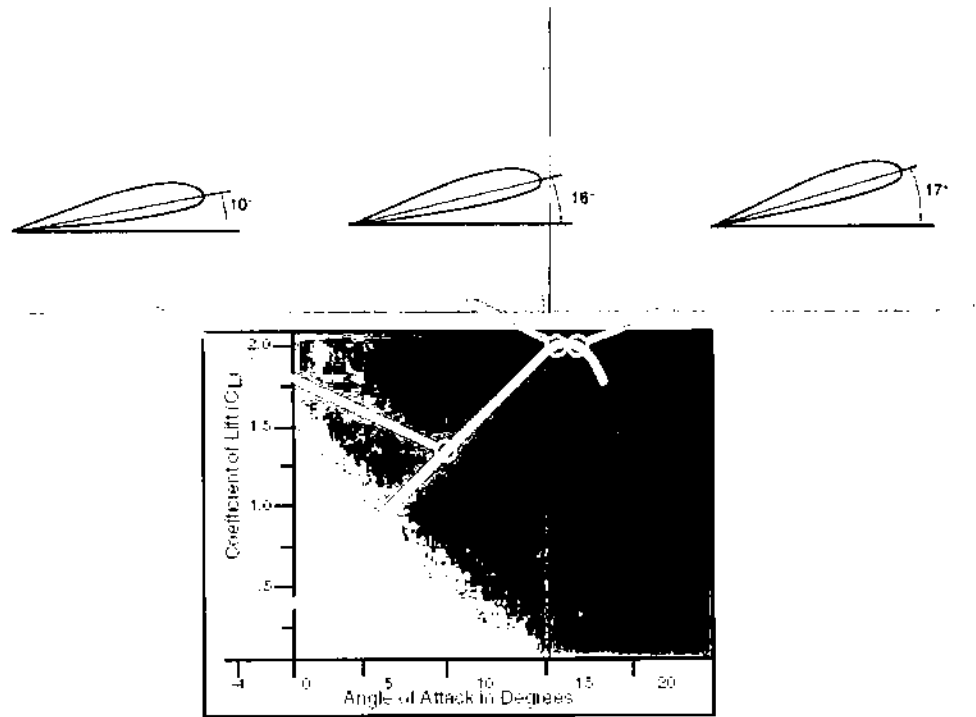
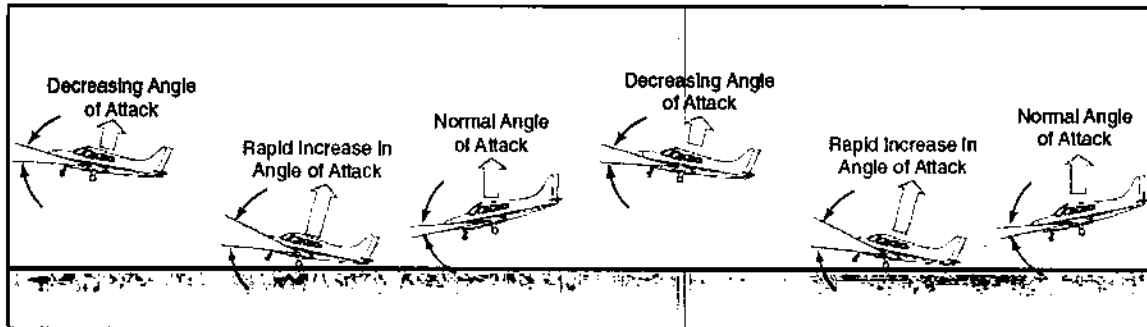


Figure 4-2. Critical angle of attack and stall.

**c. Pilot Induced Oscillations (aka Porpoising or Cameling) (from the FAA Airplane Flying Handbook, Chapter 7):**

In a bounced landing that is improperly recovered, the airplane comes in nose first setting off a series of motions that imitate the jumps and dives of a porpoise - hence the name (figure below). The problem is improper airplane attitude at touchdown, sometimes caused by inattention, not knowing where the ground is, mistrimming or forcing the airplane onto the runway. Ground effect decreases elevator control effectiveness and increases the effort required to raise the nose. Not enough elevator or stabilator trim can result in a nose-low contact with the runway and a porpoise develops. Porpoising can also be caused by improper airspeed control. Usually, if an approach is too fast, the airplane floats and the pilot tries to force it on the runway when the airplane still wants to fly. A gust of wind, a bump in the runway, or even a slight tug on the control wheel will send the airplane aloft again. The corrective action for a porpoise is the same as for a bounce and similarly depends on its severity. When it is very slight and there is no extreme change in the airplane's pitch attitude, a follow-up landing may be executed by applying sufficient power to cushion the subsequent touchdown, and smoothly adjusting the pitch to the proper touchdown attitude.



When a porpoise is severe, the safest procedure is to EXECUTE A GO-AROUND IMMEDIATELY (emphasis in original). In a severe porpoise, the airplane's pitch oscillations can become progressively worse, until the airplane strikes the runway nose first with sufficient force to collapse the nose gear. Pilot attempts to correct a severe porpoise with flight control and power inputs will most likely be untimely and out of sequence with the oscillations, and only make the situation worse. No attempt to salvage the landing should be made. Full power should be applied while simultaneously maintaining directional control, and lowering the nose to a safe climb attitude.

### 13. GOVERNING DIRECTIVES AND PUBLICATIONS

#### a. Joint Publications

3-07.1 JTTP for Foreign Internal Defense (FID)

#### b. Air Force Instructions

11-2MC-130 Vol 3, MC-130 Operations Procedures

13-217 Drop Zone and Landing Zone Operations

13-217 Drop Zone and Landing Zone Operations, AFSOC Sup 1

#### c. Air Force Tactics, Techniques, And Procedures

3-3 Vol 33, Combat Aircraft Fundamentals, HC-130 and MC-130E/H/P

#### d. AFSOC Instructions

16-101, Vol 1, Combat Aviation Advisor Training

16-101, Vol 3, Combat Aviation Advisor Operations

### 14. NEWS MEDIA INVOLVEMENT

In general, news media have shown moderate interest in the details of this mishap. Print and

internet media in the United States originally covered the crash itself, and both local and national media have been covering events such as memorial services for the deceased members. There have been several local media inquiries to the Air Force Special Operations Command Public Affairs office, as well as multiple national media inquiries. There have been no queries to either the Safety Investigation Board or Accident Investigation team, and there have been no official press releases made by either.



31 August 2005

CLAY T. McCUTCHAN  
Brigadier General, USAF  
President, Accident Investigation Team