



# Aviation Accidents and Incidents in 21st Century

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# **Table of Contents**

Chapter 1 - Aviation Accidents and Incidents in 2000

Chapter 2 - Aviation Accidents and Incidents in 2001

Chapter 3 - Aviation Accidents and Incidents in 2002

Chapter 4 - Aviation Accidents and Incidents in 2003

Chapter 5 - Aviation Accidents and Incidents in 2004

Chapter 6 - Aviation Accidents and Incidents in 2005

Chapter 7 - Aviation Accidents and Incidents in 2006

Chapter 8 - Aviation Accidents and Incidents in 2007

Chapter 9 - Aviation Accidents and Incidents in 2008

Chapter 10 - Aviation Accidents and Incidents in 2009

Chapter 11 - Aviation Accidents and Incidents in 2010

Chapter 12 - Aviation Accidents and Incidents in 2011

## Chapter- 1

# Aviation Accidents and Incidents in 2000

## 2000 Australia Beechcraft King Air crash

Sierra Kilo Charlie	
Accident summary	
<b>Date</b>	September 4, 2000
<b>Type</b>	Crew incapacitation
<b>Site</b>	Mount Isa, Queensland, Australia
<b>Passengers</b>	7
<b>Crew</b>	1
<b>Fatalities</b>	8 (all)
<b>Survivors</b>	0
<b>Aircraft type</b>	Beechcraft 200 Super King Air
<b>Tail number</b>	VH-SKC
<b>Flight origin</b>	Perth, Western Australia
<b>Destination</b>	Leonora, Western Australia

**Sierra Kilo Charlie** was the call sign for chartered Beechcraft 200 Super King Air which, on September 4, 2000, crashed near Mount Isa, Queensland, Australia. The flight plan of the aircraft called for the pilot to fly between Perth, Western Australia, and the mining town of Leonora, Western Australia. During the flight, the aircraft climbed above its assigned altitude. When air traffic control (ATC) contacted the pilot, the pilot's speech had become significantly impaired and he was unable to respond to instructions. Three aircraft intercepted the Beechcraft but were unable to make radio contact. The aircraft continued flying on a straight heading for five hours before running out of fuel and crashing near Mount Isa, Queensland. The incident became known in the media as the "**Ghost Flight**"

A subsequent investigation concluded the pilot and the passengers had become incapacitated and had been suffering from hypoxia, a lack of oxygen to the body, meaning the pilot would have been unable to operate the aircraft. Towards the end of the flight, the left engine began to be starved of fuel and the aircraft impacted with the ground. The accident report said due to the damage to the aircraft upon impact with the ground, investigators were unable to conclude if any of the eight aboard used the oxygen system. The final report, issued by the Australian Transport Safety Bureau (ATSB) did not come to a conclusion as to what caused the occupants to become incapacitated. A number of safety recommendations were made following the accident.

## Background



A Beechcraft Super King Air, similar to the aircraft involved in the accident

The aircraft involved in the accident was a Beechcraft 200 Super King Air, registration VH-SKC, serial number BB-47, manufactured in 1975. The aircraft had been in service for a total for 18,771 hours before the accident. The amount of air passed into the cabin is controlled by bleed air valves on the engines. The positions of the bleed air valves can be altered on the flight deck. According to the accident report, "The aircraft was not fitted with a high cabin altitude aural warning device, nor was it required to be." The aircraft was fitted with an emergency oxygen system—an oxygen tank which could supply oxygen to the crew (through two masks located in the cockpit) and passengers (through masks which would drop down from the ceiling of the cabin).

Accident investigators concluded the aircraft was airworthy at the time the accident occurred, and a pilot who had flown the aircraft several hours before the accident flight took off said the aircraft functioned normally. "The maintenance release was current and an examination of the aircraft's maintenance records found no recurring maintenance problems that may have been factors in the accident," the accident report stated.

## Accident



The aircraft was flying to Gwalia Gold Mine, in Leonora, Western Australia

On September 4, 2000, the aircraft chartered by mining company Sons of Gwalia, departed Perth, Western Australia, for the mining town of Leonora, Western Australia, transporting seven workers to Gwalia Gold Mine. The aircraft took off from Perth at 1009 Coordinated Universal Time (UTC), and one minute later was cleared by ATC to climb to FL130 (13,000 feet (4,000 m)). Five minutes later, at 1015, the aircraft was cleared to ascend to its cruising altitude of FL250 (25,000 feet (7,600 m)); the pilot was told to ascend to FL160 by the time it was 36 nautical miles (Nm) from Perth. The pilot acknowledged this transmission.

Five minutes later, at 1020, as the aircraft passed through FL156 (15,600 feet (4,800 m)) it was cleared to waypoint DEBRA; the pilot acknowledged this. At approximately 1033 the aircraft ascended through FL256 (25,600 feet (7,800 m)) and ATC requested the pilot to confirm the altitude of the aircraft. "Sierra Kilo Charlie-um-standby," the pilot said.

This was the final spoken transmission from the aircraft, and the altitude of the aircraft continued to increase. According to the accident report, transmissions from the aircraft thereafter were only open-microphone transmissions, sounds of what is believed to be standard background noise produced by the engines, a person breathing, "one unintelligible syllable" and "two chime-like tones, similar to those generated by electronic devices." ATC attempted to regain contact with the aircraft as the transmissions occurred. "Sierra Kilo Charlie Sierra Kilo Charlie Melbourne Centre if receiving this transmission squawk ident" the controller in contact with the aircraft said at 1040. At 1041, the controller asked again, "Sierra Kilo Charlie only receiving open mike from you. Would you contact me on one two five decimal two."



The aircraft was sighted by the two aircraft in the Northern Territory, northwest of Alice Springs

The aircraft continued to ascend and left radar coverage at 1102, climbing through FL325 (32,500 feet (9,900 m)). Thirty-one minutes later, Australian Search and Rescue contacted a business jet to request the aircraft fly near the Beechcraft to observe the situation aboard. The flight crew of the jet said the Beechcraft had levelled off at FL343 (34,300 feet (10,500 m)), and there was no movement on the flight deck or in the cabin. They added the conditions made it difficult to make observations of the situation of the Beechcraft.

Two other aircraft were then told to intercept and monitor the Beechcraft; they sighted it in the Northern Territory, northwest of Alice Springs. The flight crews of the aircraft reported the Beechcraft was making a steady descent. Both aircraft followed the

Beechcraft during the descent. The airspeed of the Beechcraft increased during the descent. "Although its external lights were on, nothing could be seen inside the cabin" the accident report stated. "The crews of the chase aircraft attempted to contact the pilot of the Beechcraft by radio but they did not receive a response." At 1510, the aircraft turned left through 90 degrees as it descended through FL50 (5,000 feet (1,500 m)). The aircraft impacted with the ground near Mount Isa, Queensland. Upon impact the aircraft broke up; all seven passengers and the pilot were killed.

## Investigation

The accident was investigated by the Australian Transport Safety Bureau (ATSB), a federal body responsible for investigating transportation accidents in Australia. The final accident report was published in March 2001. The report was unable to make a definitive conclusion as to the cause of the crash.

The report found all those aboard the aircraft, including the pilot, had likely become incapacitated and begun suffering from hypoxia. Hypoxia is a lack of oxygen to body tissues and organs including the brain, heart and lungs, which can occur if an aircraft flying at high altitude becomes depressurized. When affected by hypoxia, a person may initially lose judgement and suffer impaired vision. "Simple tasks become extraordinarily difficult and performance fails," a report on hypoxia states. "As hypoxia continues, you become semiconscious. After you lose consciousness entirely, you have only minutes to live, depending on the altitude."

The accident report stated, "After the aircraft climbed above the assigned altitude of FL250, the speech and breathing patterns of the pilot, evidenced during the radio transmissions, displayed changes consistent with hypoxia." Investigators were, however, unable to conclusively dismiss toxic fumes as the cause. "The incapacitation of the pilot and passengers was probably due to hypobaric hypoxia because of the high cabin altitude and their not receiving supplemental oxygen" the report said, adding, "The reasons for the pilot and passengers not receiving supplemental oxygen [from the oxygen tank aboard the aircraft] could not be determined."

The ATSB found it likely that the autopilot was engaged, and this caused the aircraft to fly on a straight heading; the vertical path of the aircraft indicated climb power had been set before the occupants of the aircraft were incapacitated. "The design of the aircraft systems were such that, with the autopilot engaged, the engines would continue to operate and the aircraft would continue to fly without human input until it was disrupted by other events, such as collision or fuel exhaustion," according to the accident report. It was suggested that, towards to the end of the flight, the fuel tank for the left engine on the aircraft was almost empty. "The near exhaustion of fuel in the left wing tanks may have produced at least one, and probably several, momentary losses of left engine power shortly before all power was lost" the report said. "The aircraft yawed and rolled towards the left engine, as was observed shortly before the aircraft collided with the ground."

The accident report said due to the damage to the aircraft upon impact with the ground, investigators were unable to conclude if any of the eight aboard used the oxygen system. However, the report stated "The absence of a distress radio call, or an attempt to descend the aircraft, and the likelihood that the pilot did not don his oxygen mask, suggested that the pilot was unaware that the aircraft was unpressurised or depressurising." The passengers, the report added, were also likely not wearing their oxygen masks, as there was no noise recorded on the ATC transmissions indicating they were attempting to assist the pilot.

Investigators were not able to determine what caused the depressurisation of the aircraft, but stated likely causes included either an incorrect switch selection due to pilot error or a mechanical failure in the aircraft pressurization system. The air traffic control recordings suggested it was unlikely a rapid decompression had occurred. "During an explosive or rapid depressurisation of a pressurised aircraft, however, the noise, pressure changes, temperature changes and draughts within the cabin would have alerted the occupants that a substantial failure had occurred," the report added. The document listed the two main factors in the accident as,

1. The aircraft was probably unpressurised for a significant part of its climb and cruise for undetermined reasons.
2. The pilot and passengers were incapacitated, probably due to hypobaric hypoxia, because of the high cabin altitude and their not receiving supplemental oxygen.

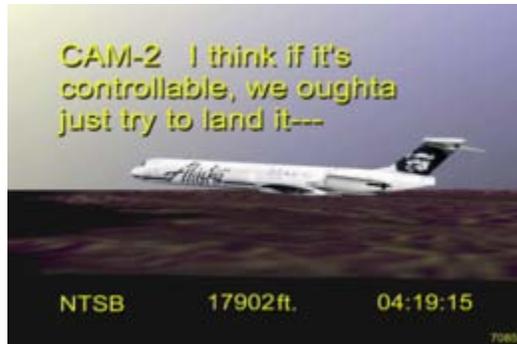
## **Aftermath**

The flight deck of the Beechcraft Super King Air has visual warning if cabin altitude is too high. It is likely the pilot of the accident aircraft was suffering from hypoxia and did not notice the visual warning. In the aftermath of the accident, the ATSB recommended an aural warning be fitted on the flight deck, in addition to the visual warning, on all Beechcraft Super King Air aircraft. The Civil Aviation Safety Authority (CASA) issued a notice to owners of pressurised aircraft registered in Australia recommending installation of an aural warning, but did not make it mandatory. The notice said, "The benefit to your pilots and passengers lies in the reduction in risk of an uncommanded depressurisation leading to an incident or fatal accident. The benefit is much greater than the cost of purchase and installation of one of these low-cost systems."

When the air traffic controller responsible for the Beechcraft received the open-microphone transmissions, he alerted his supervisor that he was concerned the pilot could be suffering from hypoxia. The controller and his supervisor completed the standard checklist which, at the time, did not include a procedure to follow in the case of incapacitation or hypoxia. In the aftermath of the accident, the checklist was changed to "incorporate procedures to be followed by air traffic controllers, when a controller suspects that a pilot has been affected by hypoxia."

# Alaska Airlines Flight 261

## Alaska Airlines Flight 261



Frame from NTSB animation of Alaska Airlines Flight 261

### Accident summary

<b>Date</b>	January 31, 2000
<b>Type</b>	Mechanical failure, maintenance error
<b>Site</b>	Pacific Ocean near Anacapa Island, California
<b>Passengers</b>	83
<b>Crew</b>	5
<b>Fatalities</b>	88 (all)
<b>Survivors</b>	0
<b>Aircraft type</b>	McDonnell Douglas MD-83
<b>Operator</b>	Alaska Airlines
<b>Tail number</b>	N963AS
<b>Flight origin</b>	Lic. Gustavo Díaz Ordaz International Airport
<b>Stopover</b>	San Francisco International Airport
<b>Destination</b>	Seattle-Tacoma International Airport

**Alaska Airlines Flight 261**, a McDonnell Douglas MD-83 aircraft, experienced a fatal accident on January 31, 2000 in the Pacific Ocean about 2.7 miles (4.3 km) north of Anacapa Island, California. The two pilots, three cabin crewmembers, and 83 passengers on board were killed and the aircraft was destroyed. It was the highest ever death toll of any aviation accident involving a McDonnell Douglas MD-83. Alaska 261 was a scheduled international passenger flight from Lic. Gustavo Díaz Ordaz International

Airport in Puerto Vallarta, Mexico, to Seattle-Tacoma International Airport in Seattle, Washington, with an intermediate stop planned at San Francisco International Airport in San Francisco, California.

The subsequent investigation by the National Transportation Safety Board determined that inadequate maintenance led to excessive wear and catastrophic failure of a critical flight control system during flight. The probable cause was stated to be "a loss of airplane pitch control resulting from the in-flight failure of the horizontal stabilizer trim system jackscrew assembly's acme nut threads. The thread failure was caused by excessive wear resulting from Alaska Airlines's insufficient lubrication of the jackscrew assembly."

## **Aircraft**

The aircraft, manufactured in 1992, had over 26,000 of hours of flight before the crash.

## **Accident flight**

### **Passengers**

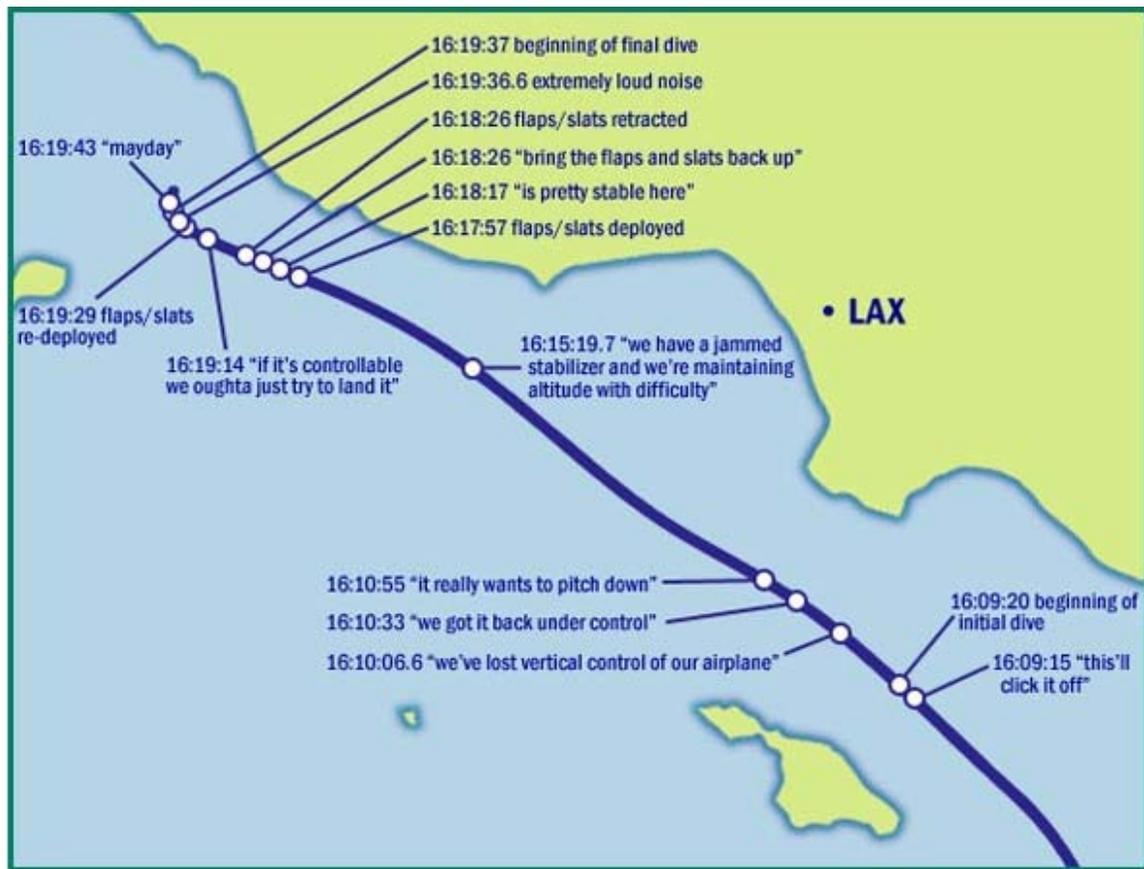
50 people on board the plane were bound for Seattle. They were 47 passengers and the three flight attendants. The remaining 36 passengers and the two pilots were headed for San Francisco. Of the passengers, 1 was Mexican and 1 was British; the rest were US citizens.

Of the occupants, at least 35, including 12 employees, were connected to Alaska Airlines or Horizon Air in some manner, leading many airline employees to mourn for the losses in the crash. Alaska Airlines stated that, during slower traveling days, it was common for employees to fill seats that would have otherwise been empty. Bouquets of flowers started arriving to the company's headquarters in SeaTac, Washington the day after the crash occurred.

### **Notable passengers**

- Jean Gandesbery, author of *Seven Mile Lake*, died with her husband Robert Gandesbery
- Morris Thompson, Commissioner of the Bureau of Indian Affairs in the late 1960s and early 1970s, died with his wife Thelma and daughter Sheryl.
- Tom Stockley, wine columnist for *The Seattle Times*.
- Cynthia Oti, a financial talk show host at San Francisco's KSFO-AM.

## Initial flight segment



Final flight path of Alaska 261

Alaska 261 departed from Puerto Vallarta at 1:37 p.m. PST, and climbed to its intended cruising altitude of flight level 310 (31,000 ft). Approximately 2 hours into the flight, the flight crew, consisting of captain Ted Thompson, 53 and first officer William "Bill" Tansky, 57, first contacted the airline's dispatch and maintenance control facilities in SeaTac, Washington, and on a shared company radio with operations and maintenance facilities at Los Angeles International Airport (LAX) discussed a jammed horizontal stabilizer and a possible diversion to LAX. The jammed stabilizer prevented operation of the trim system, which normally would make slight adjustments to the flight control surfaces to keep the plane stable in flight. At their cruising altitude and speed the position of the jammed stabilizer required the pilots to pull on their controls with approximately 10 pounds (44N) of force to keep level. Neither the flight crew, nor company maintenance, were able to determine the cause of the jam. Repeated attempts to overcome the jam with the primary and alternate trim systems were unsuccessful

During this time the flight crew had several discussions with the company dispatcher about whether to divert to Los Angeles, or continue on as planned to San Francisco. Ultimately the pilots chose to divert. Later the NTSB found that while "the flight crew's decision to divert the flight to Los Angeles...was prudent and appropriate", nonetheless

"Alaska Airlines dispatch personnel appear to have attempted to influence the flight crew to continue to San Francisco...instead of diverting to Los Angeles." Cockpit Voice Recorder (CVR) transcripts indicate that the dispatcher was concerned about the effect on the schedule ("flow") should the flight divert. It remains unknown whether the flight could have landed safely had it immediately diverted to Los Angeles, or conversely, if such an action would have caused additional casualties on the ground.

## **First dive and recovery**

At 4:09 p.m., the flight crew was able to unjam the horizontal stabilizer with the primary trim system, however, upon being freed, it quickly moved to an extreme "nose-down" position, forcing the aircraft into a dive. Alaska 261 went from about 31,500 feet to between 23,000 and 24,000 feet in around 80 seconds. Both pilots struggled together to regain control of the aircraft, and only by exerting a pulling force of 130 to 140 pounds (59.1 to 63.6 kg) on the controls were the flight crew able to arrest the 6,000 foot-per-minute descent of the aircraft and stabilize themselves at approximately 24,400 feet.

Alaska 261 informed air traffic control (ATC) of their control problems. After the flight crew stated their intention to land at LAX, ATC enquired if they wanted to proceed to a lower altitude in preparation for approach. The captain replied: "I need to get down to about ten, change my configuration, make sure I can control the jet and I'd like to do that out here over the bay if I may." Later, during the public hearings into the accident, the request by the pilot not to overfly populated areas was specifically commended by NTSB board members. During this time the flight crew considered, and rejected, any further attempts to correct the runaway trim. They proceeded to descend to a lower altitude and start to configure the aircraft for landing at LAX.

## **Second dive and crash**

Beginning at 4:19 p.m., the CVR recorded the sounds of at least four distinct "thumps", followed 17 seconds later by an "extremely loud noise". The aircraft rapidly pitched over into a dive. Several aircraft in the vicinity had been alerted by ATC to maintain visual contact with the stricken jet and they immediately contacted the controller. One pilot radioed "that plane has just started to do a big huge plunge"; another reported, "Yes sir, ah, I concur he is, uh, definitely in a nose down, uh, position descending quite rapidly." ATC then tried to contact Alaska 261. The crew of a Skywest airliner reported "He's, uh, definitely out of control" Although the CVR captured the co-pilot saying "Mayday", no radio communications were received from the flight crew during the final event.

The CVR transcript reveals the pilots' continuous attempts for the duration of the dive to regain control of the aircraft. At one point, unable to raise the nose, they attempted to fly the aircraft "upside-down". However the aircraft was beyond recovery; it descended inverted and nose-down about 18,000 feet in 81 seconds, a descent rate exceeding 13,300 feet per minute, before hitting the ocean at high speed. At this time, pilots from aircraft flying in the same area reported in, with one SkyWest Airlines pilot saying, "and he's just hit the water," meaning the plane had crashed into the ocean. Another reported, "Yeah sir,

he, uh, he, uh, hit the water, he's, uh, down." Everyone on board died when the plane struck the water, and the aircraft was destroyed upon impact.

## Investigation

### Wreckage recovery and analysis



Recovered jackscrew

Using side-scan sonar, remotely operated vehicles, and a commercial fishing trawler, workers recovered about 85% of the fuselage (including the tail section) and a majority of the wings. In addition, both engines, as well as the Flight Data Recorder (FDR) and CVR were retrieved. All wreckage was unloaded at Port Hueneme, California for examination

and documentation. Both the horizontal stabilizer trim system jackscrew (also referred to as "acme screw"), and the corresponding acme nut, which the jackscrew turns through, were retrieved. As the jackscrew rotates it moves up or down through the (fixed) acme nut. This up and down motion moves the horizontal stabilizer for the trim system. The jackscrew was found with metallic filaments wrapped around it; these were later determined to be remnants of the threads from the acme nut.

Later analysis estimated that 90% of the threads in the acme nut had been previously worn away, and that they were then completely sheared off during the accident flight. Once the threads failed, the horizontal stabilizer assembly was then subject to aerodynamic forces that it could not withstand, and ultimately failed. Based on the time since the last inspection of the jackscrew assembly, the NTSB determined that the wear had occurred at a much faster than average rate (0.012 inch per 1,000 flight hours, when the expected wear was 0.001 inch per 1,000 flight hours). The NTSB considered a number of potential reasons for this excessive wear, including the substitution by Alaska Airlines (with the approval of the aircraft manufacturer Boeing) of Aeroshell 33 grease instead of the previously approved lubricant, Mobilgrease 28. The use of Aeroshell 33 was found not to be a factor in this accident. Insufficient lubrication of the components was also considered as a reason for the wear. Examination of the jackscrew and acme nut revealed that no effective lubrication was present on these components at the time of the accident. Ultimately the lack of lubrication, and resulting excessive wear of the threads, were determined to be the direct causes of the accident.

## **Identification of passengers**

The following indicators were used to identify crash victims:

- Fingerprints
- Dental records
- Tattoos
- Personal items
- Anthropology examinations

## **Inadequate lubrication and end play checks**

The investigation then proceeded to examine why scheduled maintenance had failed to adequately lubricate the jackscrew assembly. In interviews with the Alaska Airlines SFO mechanic who last performed the lubrication it was revealed that the task took about 1 hour, whereas the aircraft manufacturer estimated the task should take 4 hours. This and other evidence suggested to the NTSB that "the SFO mechanic who was responsible for lubricating the jackscrew assembly in September 1999 did not adequately perform the task." Laboratory tests indicated that the excessive wear of jackscrew assembly could not have accumulated in just the 4 months period between the September 1999 maintenance and the accident flight. Therefore, the NTSB concluded that "more than just the last lubrication was missed or inadequately performed."

In order to monitor wear on the jackscrew assembly a periodic maintenance inspection called an "end play check" was used. The NTSB examined why the last end play check on the accident aircraft in September 1997 did not uncover excessive wear. The investigation found that Alaska Airlines had fabricated tools to be used in the end play check that did not meet the manufacturer's requirements. Testing revealed that the non-standard tools ("restraining fixtures") used by Alaska Airlines could result in inaccurate measurements, and that it was possible that if accurate measurements had been obtained at the time of the last inspection, these measurements would have indicated the excessive wear and the need for the replacement of the affected components.

## **Extension of maintenance intervals**

Between 1985 and 1996 Alaska Airlines progressively increased the period in between jackscrew lubrication as well as end play checks with the approval of the Federal Aviation Administration (FAA). Since each lubrication or end play check subsequently not conducted had represented an opportunity to adequately lubricate the jackscrew or detect excessive wear, the NTSB examined the justification of these extensions. In the case of extended lubrication intervals, the investigation was not able to determine what information, if any, was presented by Alaska Airlines to the FAA prior to 1996. Testimony from an FAA inspector regarding an extension granted in 1996 was that Alaska Airlines submitted documentation from Boeing as justification for their extension.

End play checks were conducted during a periodic comprehensive airframe overhaul process called a "C-check". Testimony from the director of reliability and maintenance programs of Alaska Airlines was that a data analysis package based on the maintenance history of five sample aircraft was submitted to the FAA to justify the extended period between C-checks. Individual maintenance tasks (such as the end play check) were not separately considered in this extension. The NTSB found that "Alaska Airlines' end play check interval extension should have been, but was not, supported by adequate technical data to demonstrate that the extension would not present a potential hazard."

## **FAA oversight**

A special inspection conducted by the NTSB in April 2000 of Alaska Airlines uncovered widespread significant deficiencies that "the FAA should have uncovered earlier." The investigation concluded that "FAA surveillance of Alaska Airlines had been deficient for at least several years." The NTSB noted that in July 2001, an FAA panel determined that Alaska Airlines had corrected the previously identified deficiencies. However several factors led the Board to question "the depth and effectiveness of Alaska Airlines corrective actions" and "the overall adequacy of Alaska Airlines' maintenance program."

Systematic problems were identified by the investigation in the FAA's oversight of maintenance programs, including inadequate staffing, its approval process of maintenance interval extensions, and the aircraft certification requirements.

## **Aircraft design and certification issues**

The jackscrew assembly was designed with two independent threads, each of which was strong enough to withstand the forces placed on it. Maintenance procedures such as lubrication and end play checks were to catch any excessive wear before it progressed to a point of failure of the system. The aircraft designers assumed that at least one set of threads would always be present to carry the loads placed on it, therefore the effects of catastrophic failure of this system were not considered, and no "fail-safe" provisions were needed.

In order for this design component to be approved ("certified") by the FAA without any fail-safe provision, a failure had to be considered "extremely improbable". This was defined as "having a probability on the order of  $1 \times 10^{-9}$  or less each flight hour." However the accident showed that certain wear mechanisms could affect both sets of threads, and that the wear might not be detected. The NTSB determined that the design of "the horizontal stabilizer jackscrew assembly did not account for the loss of the acme nut threads as a catastrophic single-point failure mode."

## **Jackscrew design improvement**

In 2001, NASA recognized the risk to its hardware (such as the Space Shuttle) attendant upon use of similar jackscrews. An engineering fix developed by engineers of NASA and United Space Alliance promises to make progressive failures easy to see and thus complete failures of a jackscrew almost impossible.

## **Conclusions**

In addition to the probable cause, the NTSB found the following contributing factors:

- Alaska Airlines's extended lubrication interval and the FAA's approval of that extension, which increased the likelihood that a missed or inadequate lubrication would result in excessive wear of the acme nut threads
- Alaska Airlines's extended end play check interval and the FAA's approval of that extension, which allowed the excessive wear of the acme nut threads to progress to failure without the opportunity for detection
- The absence on the McDonnell Douglas MD-80 of a fail-safe mechanism to prevent the catastrophic effects of total acme nut loss



Routine maintenance of the tail section a Northwest Airlines Douglas DC-9, the predecessor to the MD-80

During the course of the investigation, and later in its final report, the NTSB issued a total of 24 safety recommendations, covering maintenance, regulatory oversight, and aircraft design issues. More than half of these were directly related to jackscrew lubrication and end play measurement. Also included was a recommendation that pilots were to be instructed that in the event of a flight control system malfunction they should not attempt corrective procedures beyond those specified in the checklist procedures, and in particular in the event of a horizontal stabilizer trim control system malfunction the primary and alternate trim motors should not be activated, and if unable to correct the problem through the checklists they should land at the nearest suitable airport.

In NTSB board member John J. Goglia's statement for the final report, which was concurred with by all three other board members, he wrote:

"This is a maintenance accident. Alaska Airlines' maintenance and inspection of its horizontal stabilizer activation system was poorly conceived and woefully executed. The failure was compounded by poor oversight...Had any of the managers, mechanics, inspectors, supervisors or FAA overseers whose job it was to protect this mechanism done their job conscientiously, this accident cannot happen...NTSB has made several specific maintenance recommendations, some already accomplished, that will, if followed, prevent the recurrence of this particular accident. But maintenance, poorly done, will find a way to bite somewhere else."

## Aftermath



Memorial Sundial in Port Hueneme, California

After the crash occurred, the Alaska Airlines management said that it hoped to handle the aftermath in a manner similar to that done by Swissair after the Swissair Flight 111 accident, as opposed to the manner that TWA handled the aftermath of TWA Flight 800; in other words, to provide timely information and compassion to the families of victims.

The families of the victims approved the construction of a memorial sundial that was placed at Port Hueneme. The sundial was designed by Santa Barbara artist Bud Bottoms to cast a shadow on a memorial plaque at 4:22 p.m. each January 31.

For their actions during the emergency, Captain Ted Thompson and First Officer Bill Tansky were awarded the Airline Pilots Association Gold Medal for Heroism, the only time the award has been given posthumously.

Both Boeing and Alaska Airlines eventually conceded liability for the crash, and all but one of the lawsuits brought by surviving family members were settled out-of-court before going to trial. Candy Hatcher of the *Seattle Post-Intelligencer* said "Many lost faith in Alaska Airlines, a homegrown company that had taken pride in its safety record and billed itself as a family airline."

Two victims from Alaska 261 were falsely named in paternity suits as the fathers of children in Guatemala in an attempt to gain insurance and settlement money. DNA testing revealed these claims to be false.

This crash was featured in a 2004 episode of Discovery Channel (Canada)'s *Mayday* television program (also known as *Air Crash Investigation* and also known as *Air Emergency*), titled *Cutting Corners* or *Fatal Error*.

The Ted Thompson/Bill Tansky Scholarship Fund was named after the two cockpit flight crew members.

In the years following the crash, Alaska Airlines removed all of their MD-80 aircraft from service, and now have an all Boeing 737 fleet.

The cities of Seattle and San Francisco have both been affected by this disaster, however Seattle was more greatly affected, as more people on Flight 261 were bound for Seattle. As part of a memorial vigil in the year 2000, a column of light was beamed from the top of the Space Needle. Students and faculty at the John Hay Elementary School in Queen Anne, Seattle held a memorial for four Hay students who died in the crash. In April, 2001, John Hay Elementary dedicated the "John Hay Pathway Garden" which stands as a permanent living memorial to these students and their families. The City of Seattle public park Soundview Terrace was renovated in honor of the 4 Pearson and the 6 Clemetson family members, all Flight 261 victims from the same Seattle neighborhood of Queen Anne. The park's playground was named "Rachel's Playground" in honor of 6 year old Rachel Pearson who lived nearby and often played at the park.

The Alaska Airlines flight 261 crash has appeared in various advance fee fraud ("419") email scams. In these scams, a scammer uses the name of someone who died in the crash to lure unsuspecting victims into sending money to the scammer by claiming the crash victim left huge amounts of unclaimed money in a foreign bank account. The names of Morris Thompson and Ronald and Joyce Lake were used in schemes unrelated to them.

## Kenya Airways Flight 431

### Kenya Airways Flight 431

#### Accident summary

<b>Date</b>	30 January 2000
<b>Type</b>	Electrical fault combined with pilot error
<b>Site</b>	Off Côte d'Ivoire
<b>Passengers</b>	169
<b>Crew</b>	10
<b>Injuries</b>	10

<b>Fatalities</b>	169
<b>Survivors</b>	10
<b>Aircraft type</b>	Airbus A310-304
<b>Operator</b>	Kenya Airways
<b>Tail number</b>	5Y-BEN

**Kenya Airways Flight 431** on 30 January 2000 crashed into the sea at 21:09:24 GMT, shortly after takeoff from Abidjan (Port Bouet Airport) to Lagos (Murtala Mohammed International Airport) . There were 179 people on board the Airbus A310 jet aircraft, 169 passengers and 10 crew members. 10 passengers survived the crash. Of the 169 fatalities, 146 bodies were recovered. 103 of those bodies were identified.

The aircraft originated in Nairobi and was meant to stop over in Lagos but flew directly to Abidjan because of weather conditions over Lagos. Harmattan winds coming down from the Sahara to the north had made skies over Lagos unusually hazy on Sunday, and the airport stopped incoming flights. After a three-hour layover, the Kenya Airways Flight 431 took off for Lagos at 21:08 GMT and crashed into the Atlantic Ocean off Côte d'Ivoire one minute later. Kenya Airways Flight 431 has the highest death toll of any aviation accident involving an Airbus A310.

The Ministry of Transport of the Republic of Côte d'Ivoire published the original French language accident report. The Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile (BEA) of France published the English version of the report.

## Nationalities of passengers

Most of the passengers and crew were Nigerians. Two of the crew members on board worked for KLM.

## Crew

Captain Paul Muthee, First Officer Lazaro Muli, Flight Engineer Shem Aluma Metho, Flight Attendant Moses Kome, Flight Attendant Rogony Richard, Flight Attendant John Makio Wandera, Flight Attendant Vincent Mwasi, Flight Attendant Ann Waeni Makau, Flight Attendant Samira Suleiman, Flight Attendant Victor Thueri, Flight Attendant Janet Mwanjeni

## Order of crash

1. An errant stall warning sounds immediately after takeoff.
2. The pilot put the aircraft into a descent.
3. The crew did not apply maximum engine power.

4. The ground proximity warning did not sound because the stall warning took precedence.
5. Overspeed warning sounds.
6. The Captain gives the order to climb.
7. The aircraft collides with the sea.

## Rescue

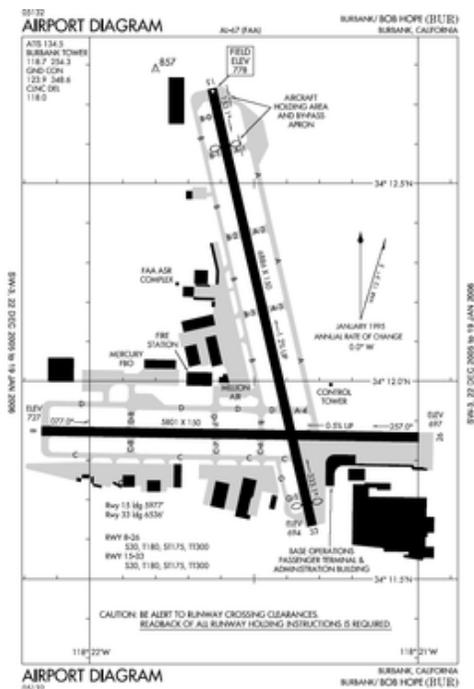
Samuel Ogbada Adje, a survivor, believes that the rescue effort contributed to the number of fatalities. He said that he waited for two hours to be rescued. Rescuers extracted at least seven of the survivors from the water while one swam almost 1 mile (1.6 km) to the shore.

## Investigation

The Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile, the accident investigation authority of France, assisted in the search for the flight recorders. The Transportation Safety Board of Canada analyzed the flight safety recorders.

# Southwest Airlines Flight 1455

## Southwest Airlines Flight 1455



Burbank-Glendale-Pasadena Airport runways at the time of  
incident

### Runway overrun summary

<b>Date</b>	March 5, 2000
<b>Type</b>	Overrun due to pilot error
<b>Site</b>	Burbank-Glendale-Pasadena Airport, Burbank, California
<b>Passengers</b>	137
<b>Crew</b>	5
<b>Injuries</b>	44
<b>Fatalities</b>	0
<b>Survivors</b>	142 (all)
<b>Aircraft type</b>	Boeing 737-3T5
<b>Operator</b>	Southwest Airlines
<b>Tail number</b>	N668SW

**Southwest Airlines Flight 1455** (N668SW) was a scheduled passenger flight from McCarran International Airport (LAS), Las Vegas, Nevada to Burbank-Glendale-Pasadena Airport (BUR), Burbank, California that overran the runway during landing on March 5, 2000. The aircraft came to rest on a city street adjacent to a gas station. The National Transportation Safety Board found that the incident was due to the pilots attempting to land with excessive speed. They also blamed the air traffic controller for placing them in a position when their only option was a go around. There were no fatalities either on the plane or on the ground. Two of the passengers were seriously injured, and there were many minor injuries. As a result of the incident, the airport installed an Engineered Materials Arrestor System (EMAS) at the east end of the incident runway.

## Flight details

Flight 1455 departed McCarran International Airport (LAS), Las Vegas, Nevada at 1650, more than 2 hours behind schedule due to inclement weather in the area. At 1804:02, when the aircraft was 19 nmi (35 km) north of the BUR outer marker, the SoCal approach controller instructed the aircraft to maintain 230 knots (430 km/h) or greater until further notice. The controller later indicated this was to place the aircraft into the approach pattern between two other flights. The captain acknowledged the instructions.

At 1804:42 the first officer informed the captain that the target airspeed for landing would be 138 knots (256 km/h). This value was based on standard procedures in the Southwest Airlines Flight Operations Manual (FOM). At 1805:13 the captain told the first officer that the air traffic controller had instructed them to remain at 230 knots (430 km/h) or greater "for a while."

At 1805:54 the controller cleared Flight 1455 to descend to 5,000 feet (1,500 m), and at 1807 cleared the flight to descend to 3,000 feet (900 m). At 1808 the controller cleared flight 1455 for a visual approach to runway 8 with a restriction to remain at or above 3,000 ft (above mean sea level) until passing the Van Nuys VOR beacon. This navigational aid is approximately 6 miles (10 km) from the runway. Radar data suggest that the flight began its descent from 3,000 ft (910 m) about 4 mi (6 km) from the runway.

According to the Aeronautical Information Manual Section 4-4-12f, this approach clearance automatically canceled any previous speed assignments. According to the final accident report, traffic conditions no longer warranted the speed assignment after the controller cleared the flight to descend to 3,000 ft (910 m), but the controller did not verbally cancel the speed assignment.

Southwest Airlines procedures instruct the pilot not flying to make altitude call-outs at 1000, 500, 400, 300, 200, 100, 50, 30, and 10 feet (3.0 m). Additionally, call-outs are required if certain parameters are not met, in this case flight speed and sink rate. At 1809:32, one minute and thirteen seconds after approach clearance was given, and at 3,000 feet (910 m) of altitude, the captain began to slow the aircraft by deploying the flaps.

At 1810:24 the ground proximity warning system (GPWS) began to sound a "sink rate" warning in the cockpit. The aircraft was descending at an angle of 7 degrees, when the angle of descent for most aircraft landing on that runway was 3 or 4 degrees. Both pilots ignored the warnings. At 1810:44 the warning system in the cockpit began to sound. The captain responded to these warnings with "that's all right."

The captain stated after the accident that he knew as the aircraft passed 500 feet (150 m) that he was not "in the slot," meaning the conditions had not been met for a safe landing, in this case because of an excessive airspeed. The captain further stated that he understood that if he was not "in the slot," procedures demanded a go-around maneuver to abort the landing. He could not explain why he did not perform a go-around maneuver. The first officer likewise indicated after the accident that he was aware that they were not "in the slot," but said he believed the captain was taking corrective action.

The aircraft touched down on the wet runway at 44 knots (81 km/h) over the target airspeed. Furthermore, it touched down 2,150 feet (660 m) from the runway threshold, 650 feet (200 m) beyond the 1000–1500 ft range established by the Southwest Airlines FOM. The captain deployed the thrust reversers and then he and the first officer applied manual brakes, but according to the NTSB findings, under those conditions even

maximum braking would not have prevented the aircraft from overrunning the end of the runway.

The NTSB released a transcript of the cockpit voice recorder, in which the flight's captain, Howard Peterson, was quoted as saying, "Well, there goes my career" moments after the accident.

## **NTSB accident summary**

The SWA Boeing 737-3T5, overran the end of Runway 8 while landing at Burbank-Glendale-Pasadena Airport. "The airplane touched down at approximately 182 knots, and about 20 seconds later, at approximately 32 knots, collided with a metal blast fence and an airport perimeter wall." It finally came to rest on Hollywood Way, a four-lane city street, near a Chevron gas station.

The NTSB concluded that the probable cause for the accident was excessive flight speed and the steep angle of the glidepath (7 degrees, as opposed to the 3 degrees normally used for both visual and instrument approaches), and the flight crew's failure to abort the approach when conditions were not met for a stable approach and landing. The action of the flight controller was listed as a contributing factor in the accident: "Contributing to the accident was the controller's positioning of the airplane in such a manner as to leave no safe options for the flight crew other than a go-around maneuver."

Months later, the pilots were fired as a result of this incident. Southwest Airlines admitted the pilots' actions were negligent.

At the time, a Southwest spokesperson termed it "the worst accident" in the airline's history. Air safety experts and pilots suggested the accident was an example of a situation where "fast, steep, unstabilized approaches" are dangerous, and of how inadequate the safety margins around the Burbank runways are (as well as similar U.S. airports).

The gas station missed by the aircraft was later closed and demolished due to safety concerns. The lot is now a dedicated green space.

## **Injuries**

Of the 142 persons on board, 2 passengers sustained serious injuries; 41 passengers and the captain sustained minor injuries; and 94 passengers, 3 flight attendants, and the first officer sustained no injuries. The airplane sustained extensive exterior damage and some internal damage to the passenger cabin. During the accident sequence, the forward service door (1R) escape slide inflated inside the airplane; the nose gear collapsed; and the forward dual flight attendant jumpseat, which was occupied by two flight attendants, partially collapsed.

The inflated escape slide blocked both forward doors from being used to evacuate the aircraft, and prevented two flight attendants seated on the forward jumpseat from assisting the evacuation. There was no fire, but had there been a fire, this malfunctioning slide would have dramatically affected the survivability of the occupants. As a result of this occurrence, the NTSB issued a safety recommendation to replace the slide cover latch brackets on forward slide compartments of all older Boeing 737 models with the latch brackets installed on later models.

As with runway 4R/22L at the Little Rock National Airport, site of the American Airlines Flight 1420 overrun accident, runway 8/26 in Burbank was exempt from the 1,000-foot (300 m) runway safety area standard. The NTSB cited this accident in a recommendation for installing the Engineered Materials Arrestor System (EMAS) at airports where it is not feasible to establish the 1,000-foot (300 m) runway safety area (RSA). A US\$4,000,000 EMAS subsequently installed as a result of this accident at this airport, now the Bob Hope Airport, stopped a private jet on Friday, October 13, 2006 with no injuries or aircraft damage.

## **Dispute with city of Burbank**

Burbank city officials demanded that Southwest Airlines pay their \$40,000 bill for services, including overtime for police officers and firefighters, related to the March 5 accident. Southwest refused to pay stating that the airline is entitled to emergency services since the airline pays taxes to the city.

## Chapter- 2

# Aviation Accidents and Incidents in 2001

## 2001 Avjet Aspen crash

### 2001 Avjet Aspen crash



A Gulfstream III jet similar to N303GA.

#### Accident summary

<b>Date</b>	March 29, 2001
<b>Type</b>	Controlled flight into terrain due to pilot error
<b>Site</b>	Aspen, Colorado, USA
<b>Passengers</b>	15
<b>Crew</b>	3
<b>Fatalities</b>	18 (all)
<b>Survivors</b>	0
<b>Aircraft type</b>	Gulfstream III
<b>Operator</b>	Avjet Corporation
<b>Tail number</b>	N303GA
<b>Flight origin</b>	Los Angeles Int'l Airport

**Destination** Aspen-Pitkin County Airport

The **2001 Avjet Aspen crash** occurred on March 29, 2001 when a chartered Avjet Corporation Gulfstream III business jet, registration N303GA, crashed into terrain while on instrument approach to Aspen-Pitkin County Airport, Aspen, Colorado. The three crew members and fifteen passengers on board all perished.

The subsequent National Transportation Safety Board (NTSB) report concluded that the accident was caused by the captain's premature descent below the minimum descent altitude without visual reference to the runway.

The accident's investigation also brought into focus several generic safety issues, such as pressure applied on charter pilots by customers; night flight into airports near mountainous terrain; and the ambiguity of some Federal Aviation Administration (FAA) rules.

# Flight history

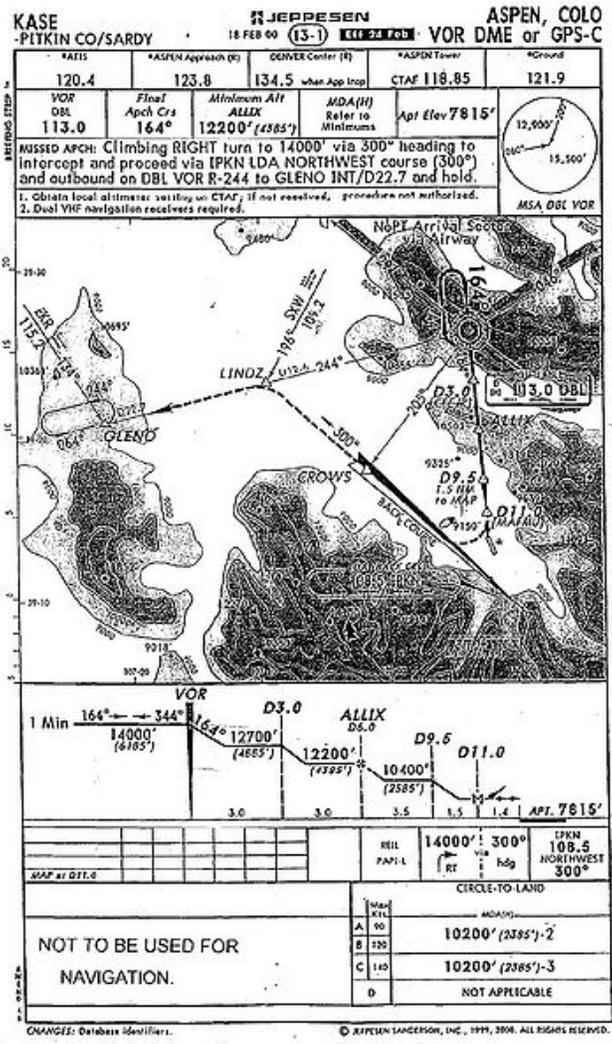


Chart for VOR/DME-C instrument approach at Aspen (from NTSB report).

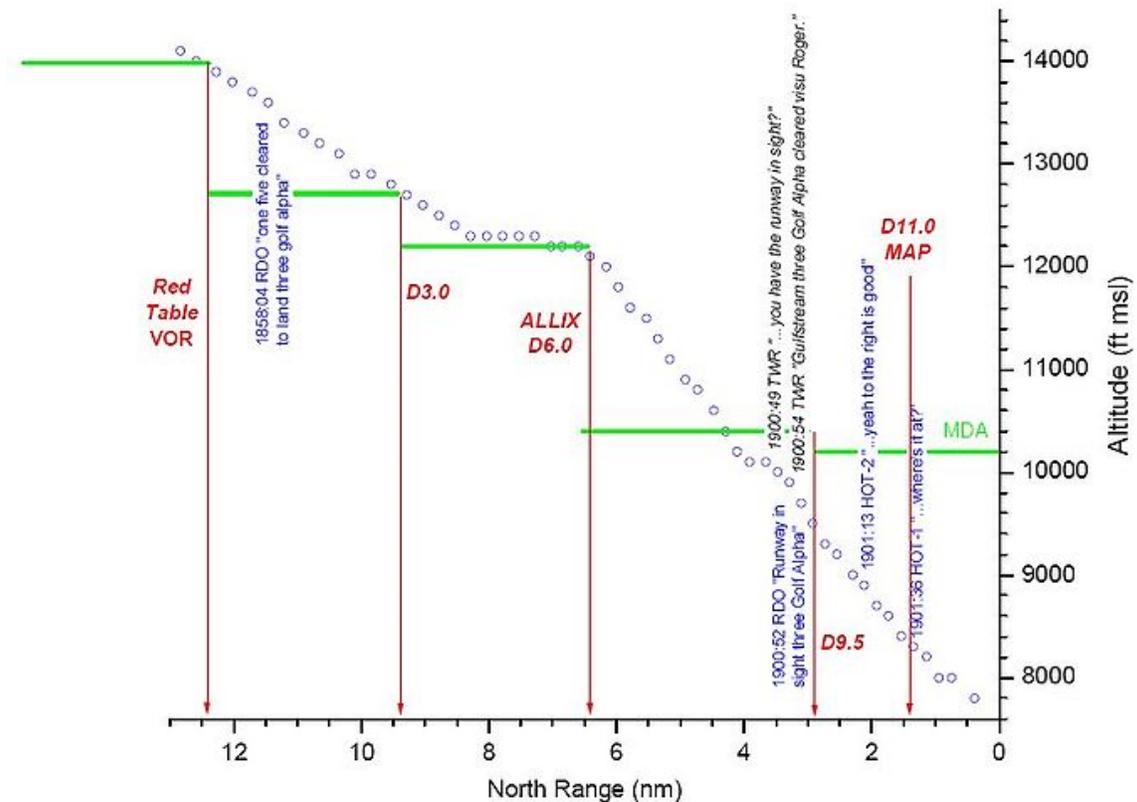
The captain and first officer reported for duty at Avjet's Burbank, California facility around noon on the day of the accident. After checking the weather and the aircraft, they embarked on an 11-minute repositioning flight to Los Angeles International Airport (LAX) to pick up their passengers. The flight was originally scheduled to leave LAX at 16:30 MST, but departed after a 41-minute delay for late passengers at 17:11 MST.

Earlier in the day, an FAA specialist had informed the crew that it would be illegal to land at night in Aspen under instrument flight rules. In addition, the crew were aware that due to noise abatement restrictions, their jet aircraft was required to land at Aspen by the 18:58 MST night curfew. Following the delayed departure from LAX, their estimated arrival time was 18:46 MST, twelve minutes before the curfew took effect.

As the flight approached Aspen-Pitkin County Airport, it became evident that some of the other inbound flights were performing missed approaches, as they had been unable to complete an instrument approach to the airport's runway. The airport is surrounded by high terrain on all sides and a fairly steep descent is required in order to land.

At 18:56:06 MST, the flight was cleared for the VOR/DME-C instrument approach to the airport, whereupon it proceeded to the Red Table VOR, executed a sequence of designated step-down maneuvers and began final approach to the runway. As it continued its descent past the missed approach point – where the runway must be in sight to continue – the pilots had still not visually located the runway in the increasing darkness and snow showers. At 19:01:57 MST, while in a steep left bank, the aircraft crashed into the terrain, killing all 18 persons on board.

## Investigation and final report



RDO, radio communication transmitted to and from N303GA; TWR, radio transmission from ASE local controller; HOT-2, first officer's audio panel information; MAP, missed approach point; HOT-1, captain's audio panel information; MDA, minimum descent altitude.

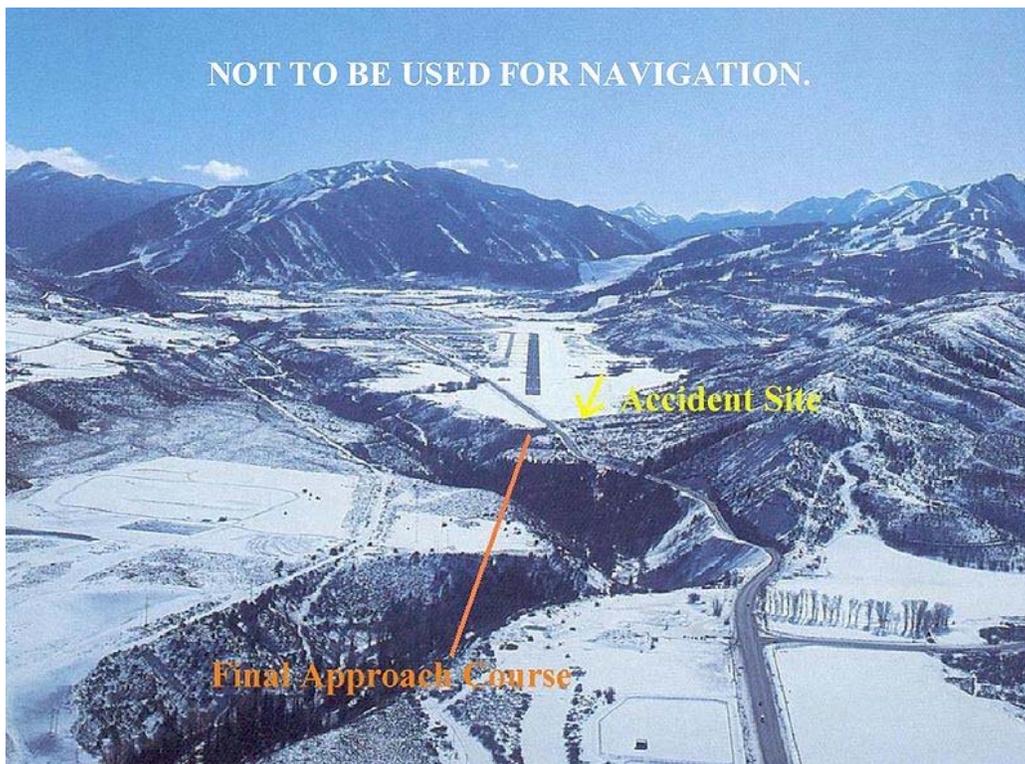
Profile view of N303GA's approach to Aspen (NTSB report)

Following the crash, the aircraft's cockpit voice recorder was recovered from the wreckage and the data recorded found to be intact and usable. Under Code of Federal Regulations (CFR) Part 135 Air Taxi rules, no flight data recorder was required for this type of flight and one had not been installed.

Part of the subsequent NTSB investigation focused on the fact that the instrument approach at the destination airport was not legal for night landing, and the overall pressure applied on the charter company and flight crew by the charter customer to complete the flight into the original destination. According to witnesses, the charter customer, upon learning that the flight might have to be diverted to an alternate airport due to the night landing restriction, had his business assistant call Avjet management, to "let them know that the airplane was not going to be redirected".

In addition, witnesses claimed that when the charter customer learned that the captain had discussed the possible diversion with some of the passengers waiting for the late arrivals, he had his assistant call Avjet to instruct the captain to "keep his comments to himself."

The Avjet charter department scheduler subsequently testified that "the captain felt that it was important to land at [Aspen] because of the substantial amount of money that the [charter] customer spent for a dinner party."



A daytime fair weather view of the approach to runway 15 at Aspen airport, depicting accident site of N303GA (NTSB report)

Based on information obtained from the cockpit voice recorder, the flight attendant had escorted an unidentified male passenger to the flight deck's jump seat during the approach sequence. According to the NTSB's analysis, "the presence of this passenger in the cockpit, especially if it were the charter customer, most likely further heightened the pressure on the flight crew to land at [Aspen]."

The NTSB issued its final report on June 11, 2002, with the following Probable Cause:

The National Transportation Safety Board determines that the probable cause of this accident was the flight crew's operation of the airplane below the minimum descent altitude without an appropriate visual reference for the runway.

The NTSB added the following Contributing Factors:

Contributing to the cause of the accident were the Federal Aviation Administration's (FAA) unclear wording of the March 27, 2001 Notice to Airmen regarding the nighttime restriction for the VOR/DME-C approach to the airport and the FAA's failure to communicate this restriction to the Aspen tower; the inability of the flight crew to adequately see the mountainous terrain because of the darkness and the weather conditions; and the pressure on the captain to land from the charter customer and because of the airplane's delayed departure and the airport's nighttime landing restriction.

## **Aftermath**

After the accident, Avjet decided to prohibit airport operations at Aspen and three other mountainous airports between sunset and sunrise. It also issued the following memorandum to its flight crews and schedulers:

"[I]f you cannot accomplish a landing and be on the ground at one of these airports before sunset you must divert to a suitable alternate. All passengers for one of these destinations must be informed of this policy. Flight crew members must report any violation of this policy or pressure from passengers to violate this policy to the Director of Operations or Chief Pilot."

Avjet also added the following policy to its Operations Manual after the accident:

"Only an Avjet assigned crewmember, check airman, or FAA observer may occupy the observer's seat (jump seat) in any Avjet aircraft. Charter passengers shall never be allowed to occupy the observer's seat at any time."

## **Litigation**

A wrongful death lawsuit was filed by the families of three of the victims in Los Angeles, CA. After a jury found the captain and Avjet Corporation negligent, an out of court

settlement was reached, where Avjet agreed to pay the plaintiffs a total of US\$11.7M in damages. There were reportedly also other settlements for other victims.

## Air Transat Flight 236

### Air Transat Flight 236



Air Transat A330-200 C-GITS

#### Incident summary

<b>Date</b>	August 24, 2001
<b>Type</b>	Fuel exhaustion in flight, from fuel leak and maintenance error
<b>Site</b>	Lajes Air Force Base, Terceira Island, Azores, Portugal
<b>Passengers</b>	293
<b>Crew</b>	13
<b>Injuries</b>	18 (only minor)
<b>Fatalities</b>	0
<b>Survivors</b>	306 (all)
<b>Aircraft type</b>	Airbus A330-243
<b>Operator</b>	Air Transat
<b>Tail number</b>	C-GITS
<b>Flight origin</b>	Toronto Pearson International Airport, Toronto, Ontario, Canada
<b>Destination</b>	Portela Airport, Lisbon, Portugal

**Air Transat Flight 236** was an Air Transat route between Toronto, Canada and Lisbon, Portugal flown by Captain Robert Piché and First Officer Dirk DeJager. On August 24, 2001, the flight ran out of fuel over the Atlantic Ocean with 306 people (293 passengers and 13 crew) aboard. The flight crew managed to successfully glide the plane, and safely landed in the Azores with no loss of life.

Most of the passengers on the flight were Canadians visiting Europe and Portuguese expats returning to Portugal.

## **Incident**

Unknown to the pilots, the aircraft had developed a fuel leak in a fuel line to its right engine. During the course of the flight, the pilots had noticed a fuel imbalance between the fuel tanks in the left and right wings of the aircraft and had attempted to remedy this by opening a cross-feed valve between the tanks. This caused fuel from the operational tank to be wasted through the leak in the engine on the other side.

Without fuel, an aircraft's engines cannot provide thrust or electrical power. On the Airbus A330, as with most large modern passenger aircraft, an emergency ram air turbine is deployed automatically to provide essential power for sensors and instruments to fly the aircraft.

When the engines suffered a flame out, important systems became unavailable. Specifically, the aircraft lost its main hydraulic power which operates the flaps, brakes, and spoilers. Additionally, an aircraft without operating engines cannot use its thrust reversers to slow the plane after touchdown.

The pilots of the Airbus A330 were able to glide the aircraft to a landing at Lajes Air Base, Terceira Island in the Azores. The reported landing speed was about 200 knots (370 km/h) indicated airspeed (IAS), which is higher than the normal speed of 130 to 145 knots (240 to 269 km/h) IAS. There were no fatalities, but there were minor injuries. The favourable outcome was also due to the flight being rerouted on a more southerly route across the Atlantic to prevent congestion, bringing them closer to the Azores.

## **Sequence of events**

Flight TS 236 took off from Toronto at 0:52 (UTC) on Friday August 24, 2001 (local time: 8:52 p.m. (EST) on Thursday August 23, 2001). It made an emergency landing at 6:46 a.m. (UTC) on August 24, 2001, at Lajes Airport, Terceira, Azores, Portugal.

There were 293 passengers and thirteen crew members on board. The aircraft was an Airbus A330 manufactured in 1999, configured with 362 seats and placed in service by Air Transat in April 1999. Leaving the gate in Toronto, the aircraft had 47.9 tonnes of fuel on board, 5.5 tonnes more than required by regulations.

At 04:38 UTC (estimated), a fuel leak started in the area of engine no. 2 (right engine).

At 05:16 UTC, a cockpit warning system chimed and told of low oil temperature and high oil pressure on engine no. 2. There is no obvious connection between an oil temperature or pressure problem and a fuel leak. At first, Captain Piché and co-pilot DeJager suspected these warnings were computer bugs and communicated with their Maintenance control center. As a result of the leak, which averaged at 1 gallon per second, the fuel flow through the fuel-oil heat exchanger (FOHE) was higher than normal. The FOHE is designed to transfer heat from engine oil to fuel for both cooling and efficiency purposes. The increased fuel flow resulted in both a drop in oil temperature, as well as a rise in oil pressure due to increased viscosity.

At 05:36 UTC, the pilots received a warning of fuel imbalance and diverted fuel from the port (left side) wing tanks to the starboard tanks, which were showing close to empty. Because the fuel leak in the starboard engine had still not been diagnosed, this diversion had the effect of sending fuel to the leak and causing further loss.

At 05:45 UTC, as it became clear that fuel was dangerously low, the crew decided to divert to Lajes Air Base in the Azores.

At 05:48 UTC, an emergency was declared with Santa Maria Oceanic air traffic control because of fuel shortage.

At 06:13 UTC, 28 minutes after the emergency declaration and 135 miles (217 km) from Lajes, engine no. 2 on the right wing flamed out, exhausted of jet fuel. Captain Piché then ordered full thrust from engine no. 1 on the left wing, and the plane descended to 33,000 feet (10,000 m), unable to stay at its 39,000 feet (12,000 m) cruising altitude with only one engine operating.

At 06:23 UTC, Mayday was declared with Santa Maria Oceanic air traffic control.

At 06:26 UTC, engine no. 1 flamed out at about 65 nautical miles (120 km) from Lajes Air Base.

Without engine power, control of the aircraft depended on the last backup, a ram air turbine, which supplied limited power to hydraulic and electrical systems. While Piché flew the plane, DeJager monitored its descent rate — around 2000 feet (600 metres) per minute — and calculated that the plane had about 15 to 20 minutes left before they had to ditch the plane in the water.

The crew flew the plane a few more minutes, until sighting the air base. Piché then had to execute a series of 360 degree turns to lose altitude. Although they successfully lined up with Runway 33, they faced a new danger. The plane was on a final descent, going faster than normal. Although they had unlocked the slats and deployed the landing gear, the airspeed was 200 knots (370 km/h), compared to the preferable 140 to 160 knots (260 to 300 km/h).

At 06:45 UTC, or 02:45 EST, after 19 minutes without engine power, the plane touched down hard 1,030 feet (310 m) down Runway 33 with about 200 knots (370 km/h). The aircraft bounced back into the air but touched down again 2,800 feet (850 m) from the approach end of the runway and came to a stop 7,600 feet (2,300 m) from the approach end of the 10,000 feet (3,000 m) runway. With the operation of the emergency brakes, several tires burst. Fourteen passengers and two crew members suffered minor injuries during the evacuation of the aircraft. Two passengers suffered serious, but not life-threatening injuries.

## Investigation

The Portuguese Gabinete de Prevenção e Investigação de Acidentes com Aeronaves (GPIAA) investigated the incident along with Canadian and French authorities.

The investigation revealed that the cause of the incident was a fuel leak in the number two engine, caused by an incorrect part installed in the hydraulics system by Air Transat maintenance staff. The part did not maintain adequate clearance between the hydraulic lines and the fuel line. This allowed vibration in the hydraulic lines to degrade the fuel line and cause the leak. Air Transat accepted responsibility for the incident and was fined CAD 250,000 by the Canadian government, which as of 2009 is still the largest fine in Canadian history.

Although pilot error was listed as one of the lead causes for the incident, it was the skill of the pilots, and of the military Air Traffic Controller in service at the time, 1st Sgt. José Ramos, that allowed the flight to land without fuel, causing only minor injuries to the passengers and minor damage to the airplane, which is still in service. The pilots returned to a heroes' welcome from the Québec press.

The incident also led to the Direction Générale de l'Aviation Civile (DGAC) and Federal Aviation Administration (FAA) issuing an Airworthiness Directive, forcing all operators of Airbus model A318-100, A319-100, A320-200, A321-100, and A321-200 Series aeroplanes; and Model A320-111 aeroplanes to change the flight manual, stressing that crews should check that any fuel imbalance is not caused by a fuel leak before opening the cross-feed valve. The French Airworthiness Directive (AD) required all airlines operating these Airbus models to make revisions to the Flight Manual before any further flights were allowed. The FAA gave a 15-day grace period before enforcing the AD. Airbus also modified its computer systems; the on-board computer now checks all fuel levels against the flight plan. It now gives a clear warning if more fuel is being lost than the engines can consume. Rolls-Royce also issued a bulletin advising of the incompatibility of the affected engine parts.

## Dramatization

A documentary in the *Mayday* television series (also known as *Air Crash Investigation* and as *Air Emergency*) was made about this incident. The episode's name is "Flying on Empty".

MSNBC also produced a report on the incident, entitled "A Wing and A Prayer".

The story of Robert Piché is depicted in the 2010 French Canadian biographical drama film *Entre ciel et terre* ("Between Sky and Earth") culminating with the events on Flight 236. Captain Piché is portrayed by both Genie Award-winning actor Michel Côté and his son Maxime LeFlaguais.

## Similar Incidents

Year	Flight	Description
1963	Tupolev 124 ditching in Neva River	A Tupolev 124 ran out of fuel and ditched in the Neva River.
1978	United Airlines Flight 173	A Douglas DC-8 ran out of fuel near Portland International Airport.
1982	British Airways Flight 9	A volcano's dust temporarily stopped all four engines on a Boeing 747.
1983	Air Canada 143	An Air Canada Boeing 767-200 was forced to make an emergency landing without fuel (Gimli Glider).
1989	Varig Flight 254	A Boeing 737-241 was forced to land in the Amazon jungle after fuel exhaustion due to a pilot navigational error.
1996	Ethiopian Airlines Flight 961	A hijacked Boeing 767-260ER was forced to ditch in the Indian Ocean due to fuel exhaustion.

# 2001 Japan Airlines mid-air incident

## 2001 Japan Airlines mid-air incident (JAL 907 and JAL 958)



Artist's conception of JA8904 (below) diving under JA8546 (above). The planes were less than 100 meters from each other at the moment of the near miss.

### Accident summary

<b>Date</b>	January 31, 2001
<b>Type</b>	Near miss, ATC error
<b>Site</b>	near Yaizu, Shizuoka, Japan
<b>Total injuries</b>	99 (9 serious)
<b>Total fatalities</b>	0
<b>Total survivors</b>	677 (all)

### First aircraft

<b>Type</b>	Boeing 747-446D
<b>Operator</b>	Japan Airlines
<b>Tail number</b>	JA8904
<b>Flight origin</b>	Tokyo Int'l Airport
<b>Destination</b>	Naha Int'l Airport, Okinawa
<b>Passengers</b>	411
<b>Crew</b>	16
<b>Injuries</b>	99 (9 serious)

**Survivors** 427 (all)

**Second aircraft**

**Type** Douglas DC-10-40D  
**Operator** Japan Airlines  
**Tail number** JA8546  
**Flight origin** Gimhae International Airport  
Busan, South Korea  
**Destination** Narita International Airport  
**Passengers** 237  
**Crew** 13  
**Injuries** 0  
**Survivors** 250 (all)



A Japan Airlines 747-400, similar to this Japan Airlines that nearly collided with JA8546.



A Japan Airlines Douglas DC-10-40, similar to this Japan Airlines Douglas DC-10-40D, nearly collided with JA8904.

On Wednesday, January 31, 2001, **Japan Airlines Flight 907**, using a Boeing 747-446 Domestic bound from Tokyo International Airport (Haneda Airport) in Ōta, Tokyo, Japan to Naha International Airport in Naha, Okinawa, Japan and **Japan Airlines Flight 958**, using a Douglas DC-10-40D bound from Gimhae International Airport in Busan, South Korea to Narita International Airport in Narita, Chiba Prefecture, Japan, nearly collided over the Suruga Bay near Yaizu, Shizuoka Prefecture due to human error.

## Flight information

Japan Airlines Flight 907, registration JA8904, was a 747-446 Domestic with 411 passengers and 16 crew making a domestic flight from Tokyo Haneda International Airport to Naha Airport. Japan Airlines Flight 958, registration JA8546, was a McDonnell Douglas DC-10-40 with 237 passengers and 13 crew bound from Gimhae International Airport to Narita International Airport. Flight 907, using an aircraft registered as "JA8904," left Haneda at 3:36 PM.

According to the flight plan, JAL907 and JAL958 would pass each other while 2,000 feet apart.

## Mid-air incident

JA8904's TCAS sounded 20 minutes after its departure as the jet climbed towards 39,000 feet. The DC-10, JA8546, cruised at 37,000 feet.

The mid-air incident occurred as flight attendants began to serve drinks onboard Flight 907.

The two planes were on a collision course towards each other. The pilots of both planes had received conflicting instructions from their RJAA and the flight controller at the Tokyo Area Control Center in Tokorozawa, Saitama Prefecture. Flight 907, headed by 40-year-old pilot Makoto Watanabe (渡辺 誠 *Watanabe Makoto*), followed an order to descend issued by the flight controller while Flight 958, headed by pilot Tatsuyuki Akazawa (赤沢 達幸 *Akazawa Tatsuyuki*), descended as instructed by the TCAS, meaning that both planes remained on a collision course. The trainee for the aerospace sector, 26-year-old Hideki Hachitani (蜂谷 秀樹 *Hachitani Hideki*), handled ten other flights at the time of the near miss. Hachitani intended to tell Flight 958 to descend. Instead, at 3:54 p.m, he told Flight 907 to descend. When the trainee noticed that JAL 958 cruised at a level altitude instead of descending, the trainee asked JAL 958 to turn right; the message did not get through to the JAL 958 pilot. The trainee's supervisor, Yasuko Momii (籾井 康子 *Momii Yasuko*), ordered "JAL 957" to climb, intending to tell JAL 907 to climb. There was no "JAL 957" in the sky.

Watanabe avoided disaster when he abruptly forced the aircraft to dive based on a visual judgment, saving a total of 677 people on the two aircraft. If the collision had occurred, it would have been the deadliest civil aviation accident in history in terms of passenger lives, surpassing the Tenerife disaster in which two Boeing 747s collided on a runway and killed 583 people in 1977. It also would have been the deadliest mid-air collision, surpassing the 1996 Charkhi Dadri mid-air collision in which 349 people were killed. The aircraft missed each other by less than 100 meters. Watanabe said that the aircraft were 35 feet apart. An unidentified passenger told NHK "I have never seen a plane fly so close. I thought we were going to crash." Alex Turner, a passenger on Flight 907 and a student at Kadena High School, a school for children with parents stationed at Kadena Air Base in Okinawa Prefecture, estimated that the avoidance maneuver lasted for two seconds.

Seven passengers and two crew members of the 747 sustained serious injuries; additionally, 81 passengers and 10 crew members reported minor injuries. Some unbelted passengers, flight attendants, and drink carts hit the ceiling, dislodging some ceiling tiles. The maneuver threw one boy across four rows of seats. Most of the injuries to occupants consisted of bruising. The maneuvers broke the leg of a 54-year-old woman. In addition, a drink cart spilled, scalding some passengers. No passengers on the DC-10 sustained injuries. Flight 907, with the 747's cabin bearing minor damage, returned to Haneda, landing at 4:45 PM.

Thirteen students at Kadena High School had boarded Flight 907 after returning from a school-sanctioned ROTC competition. Two students from Michigan, United States, 15-year-old Meggan Wesche and 14-year-old Allison Ambrose, sustained some minor injuries and became hospitalized for a short time. Wesche, who had slipped out of her seat during the descent and became disoriented from the incident, received an X-ray and other examinations at Toho University Hospital. She said that her body felt like "the plane is going down again" even though she was on land. The following day the students left on another Japan Airlines flight and arrived in Okinawa.

American Airlines Flight 157, traveling from Dallas-Fort Worth International Airport to Kansai International Airport near Osaka, Japan, communicated with the air traffic controller and flew in close proximity to the Japan Airlines planes around the time of the near miss.

## Aftermath

By 18:00 on February 1 eight Flight 907 passengers remained hospitalized while 22 injured passengers had been released. Two passengers remained hospitalized at Kamata General Hospital (蒲田総合病院 *Kamata Sōgō Byōin*<sup>?</sup>). Two passengers remained hospitalized at Ichikawa No. 2 Hospital (市川第2病院 *Ichikawa Daini Byōin*<sup>?</sup>). In addition the following hospitals each had one passenger remaining: Takano Hospital (タカノ病院 *Takano Byōin*<sup>?</sup>), Kitasato University, Horinaka Hospital (堀中病院 *Horinaka Byōin*<sup>?</sup>), and Tokyo Rosai Hospital (東京労災病院 *Tōkyō Rōsai Byōin*<sup>?</sup>). All injured passengers recovered.

JAL sent apology letters to the passengers on the 747; injured passengers directly received messages, and uninjured passengers received messages via the mail.

The International Civil Aviation Organization (ICAO) did not take action based on the occurrence of the near-miss. Japanese authorities called for measures that would prevent similar accidents from happening, but ICAO did not further investigate the incident until after the 2002 Überlingen mid-air collision. The ICAO decided to fulfill Japan's request 18 months after the Japan Airlines incident.

## Criminal investigation and trial

Tokyo Metropolitan Police Department and the Ministry of Land, Infrastructure and Transport investigated the incident.

In May 2003 Tokyo police filed an investigative report concerning Hideki Hachitani, Yasuko Momii, and Makoto Watanabe, suspecting them of professional negligence. In March 2004 prosecutors indicted Hachitani and Momii for professional negligence.

Hachitani, then 30 years old, and Momii, then 35 years old, pleaded not guilty to the charges at Tokyo District Court in 2004. During the same year the lawyer for Hachitani and Momii said that the pilots of the aircraft bore the responsibility for the near miss.

By November 16, 2005, 12 trials had been held since the initial hearing on September 9, 2004. The prosecution argued that the two defendants neglected to provide proper separation for the two aircraft, the instructions issued were inappropriate, and that the supervisor failed to correct the trainee. The defense argued that the lack of separation would not immediately have led to a near miss, that the instructions issued were appropriate, that the TCAS procedure was not proper, and that the Computer Navigation Fix (CNF) had faulty data.

In 2006 prosecutors asked for Hachitani, then 31, to be sentenced to one year in prison and for Momii, then 37, to be sentenced to one and one half years. On March 20, 2006 the court ruled that Hachitani and Momii were not guilty of the charge. The court stated that Hachitani could not have foreseen the accident and that the mixup of the flight numbers did not have a causal relationship with the accident. Hisaharu Yasui, the presiding judge, said that prosecuting controllers and pilots would be "unsuitable" in this case. The Tokyo District Public Prosecutor's Office filed an appeal with the Tokyo High Court on March 31. During the same year the Japanese government agreed to pay Japan Airlines and Tokio Marine & Nichido Fire Insurance a total of 82.4 million yen to compensate for the near miss.

On April 11, 2008, on appeal, a higher court overturned the decision and found Hachitani and Momii guilty. The presiding judge, Masaru Suda (須田賢 *Suda Masaharu*?), sentenced Hachitani, then 33, to confinement for one year, and Momii, then 39, for one year and six months. Both were placed on probation. Each of the two sentences was suspended for three years. Suda described the mixing of the flight numbers as a "rudimentary error." The lawyers representing the controllers planned to file appeals.

## Chapter- 3

# Aviation Accidents and Incidents in 2002

## 2002 Jalandhar MiG-21 crash

### 2002 Jalandhar MiG-21 crash



MiG-21

#### Occurrence summary

<b>Date</b>	May 3, 2002
<b>Type</b>	Engine failure, Ejection
<b>Site</b>	Jalandhar, Punjab, India
<b>Passengers</b>	0
<b>Crew</b>	1
<b>Injuries</b>	17
<b>Fatalities</b>	8
<b>Survivors</b>	1
<b>Aircraft type</b>	Mig-21
<b>Operator</b>	Indian Air Force
<b>Flight origin</b>	Adampur

## Destination

Local practice

On May 3, 2002, an **Indian Air Force (IAF) MiG-21bis** crashed into a bank in Jalandhar, Punjab, India, killing eight and injuring 17 people on the ground. The pilot, who ejected from the aircraft, survived. A number of bystanders were also injured as they attempted to rescue people trapped in the buildings.

## Overview

The aircraft, piloted by Flt Lt SK Nayak, had taken off from Adampur Air Force airbase about 10:00am, five minutes prior to the crash. The pilot reported that he "he heard some unusual noise followed by an explosion in the engine", and ejected.

The aircraft crashed into the Bank of Rajasthan (Jalandhar Branch), located in a heavily-populated residential and commercial section of the city. The crash started a large fire in the bank and the adjoining lumber store. Pieces of the aircraft also landed on nearby homes. The first fire fighting units to respond could not find water sources with which to fight the blaze, which was not attacked until Indian Army trucks with foam arrived on scene. It took 40 fire units five hours to contain the fire.

At least one news source reported that a copilot had also ejected, however the MiG-21bis is a single seat aircraft. Following the crash, the IAF suspended all MiG-21 flight training operations.

## Safety record

The safety record of the IAF's MiG-21s has raised concern in the Indian Parliament and media, leading to the aircraft sometimes being referred to in the IAF as a "flying coffin". One source estimates that in the nine years from 1993 to 2002, the IAF lost over 100 pilots in 283 accidents. During its service life, the IAF has lost at least 116 aircraft to crashes (not including those lost in combat), with 81 of those occurring since 1990.

"Prior to discussion on the accident proneness or otherwise of the MiG-21 aircraft, the figures of loss of 221 aircraft and 100 pilots during the period 1991-2000 appear to be incorrect. During this period, 221 MiG-21 were never lost nor 100 pilots lost their lives in MiG-21 accidents. The figures as reported perhaps are the total loss of IAF aircraft involving all the types operated by the service. It is also possible that the figures were wrongly reported in the press. The age of the MiG-21s, and their safety record, led the Public Accounts Committee of Parliament to call for their immediate phase out in a March, 2002 report, and this crash added urgency to that recommendation. However, Chief of Air Staff, Air Chief Marshal S. Krishnaswamy and Air Chief Marshal A.Y. Tipnis have stated that the aircraft are "fit to fly". Besides the raw age of the aircraft, their maintenance and upkeep have been called into question.

Other sources blame the accident rate on failures in the pilot training system.

A similar crash occurred on June 14, 1986, when the pilot of a MiG-21 taking off from an air base in Bareilly, India, ejected. The aircraft crashed into nearby Rampurmasi Village, killing 13 people on the ground.

## 2002 Überlingen mid-air collision

### Bashkirian Airlines Flight 2937 DHL Flight 611



CGI rendering of DHL Flight 611 moments before colliding with Bashkirian Airlines Flight 2937

#### Accident summary

<b>Date</b>	1 July 2002
<b>Type</b>	Mid-air collision involving ATC/crew/training error
<b>Site</b>	Überlingen, Germany  <a href="#">47°46′42″N 9°10′26″E</a> / <a href="#">47.77833°N 9.17389°E</a> Coordinates:  <a href="#">47°46′42″N 9°10′26″E</a> / <a href="#">47.77833°N 9.17389°E</a>
<b>Total fatalities</b>	71
<b>Total survivors</b>	0

#### First aircraft

<b>Type</b>	Tupolev Tu-154M
<b>Operator</b>	Bashkirian Airlines
<b>Tail number</b>	RA-85816

<b>Flight origin</b>	Domodedovo Int Airport Moscow, Russia
<b>Destination</b>	Barcelona Int'l Airport Barcelona, Spain
<b>Passengers</b>	60
<b>Crew</b>	9

#### Second aircraft

<b>Type</b>	Boeing 757-23APF
<b>Operator</b>	DHL
<b>Tail number</b>	A9C-DHL
<b>Flight origin</b>	Bahrain Int'l Airport
<b>Stopover</b>	Orio al Serio Airport Bergamo, Italy
<b>Destination</b>	Brussels Airport, Belgium
<b>Passengers</b>	0
<b>Crew</b>	2

**Bashkirian Airlines Flight 2937** was a Tupolev Tu-154M passenger jet en route from Moscow to Barcelona. **DHL Flight 611**, registration A9C-DHL, was a Boeing 757-23APF cargo jet flying from Bergamo, Italy, to Brussels, Belgium. The two aircraft collided in mid-air on 1 July 2002, at 21:35 (UTC) over the towns of Owingen and Überlingen in Germany, (near Lake Constance), killing all 71 aboard both aircraft. The German Federal Bureau of Aircraft Accidents Investigation (BFU) determined on 19 May 2004, that the accident had been caused by problems within the air traffic control system and problems with the use of the collision warning system. On 24 February 2004, Peter Nielsen, the controller who was on duty at the time of the accident, was stabbed to death by Vitaly Kaloyev who had lost his wife and two children in the accident.

## Flights involved

Flight 2937 was a chartered flight carrying 60 passengers and 9 crew. Forty-five passengers were Bashkortostan schoolchildren on a school trip organized by the local UNESCO committee to the Costa Daurada area of Spain. Most of the parents of the children were high-ranking officials in Bashkortostan. The aircraft, a Tupolev Tu-154M with the registration RA-85816, was piloted by a Russian crew. The captain, Alexander Mihailovich Gross, and first officer Oleg Pavlovich Grigoriev, flew the Tupolev. Grigoriev, the chief pilot of Bashkirian Airlines, used the trip to evaluate Gross's performance. Murat Ahatovich Itkulov, normally the first officer, did not officially serve on duty because of this. The crew valued the opinions and guidance of Itkulov, who was

slated to be promoted to captain. Sergei Kharlov, a navigator, and a flight engineer joined the three pilots.

Flight 611 of DHL International Aviation ME was carrying a load of air freight and had two Bahrain-based crew members aboard, British Captain Paul Phillips and Canadian First Officer Brant Campioni.

### **Notable passengers on Flight 2937**

Fourteen-year old Kirill Degtyarev created paintings from age 4 to his death and had held two public exhibitions. After his death, Ufa hosted one exhibition and Überlingen hosted another exhibition. The family of future deputy North Ossetian housing minister Vitaly Kaloyev all died. Kaloyev would later go on to murder Neilsen.

## **Accident**

The two aircraft were flying at flight level 360 (approximately 36,000 feet (11,000 m) above Mean Sea Level) on a collision course. Despite being over Germany, the airspace was controlled from Zürich, Switzerland by the private Swiss airspace control company Skyguide. The only air traffic controller handling the airspace, Peter Nielsen, was working two workstations at the same time. He did not realise the problem in time and thus failed to keep the aircraft at a safe distance from each other. Only less than a minute before the accident did he realize the danger and contacted Flight 2937, instructing the pilot to descend by a thousand feet to avoid collision with crossing traffic (Flight 611). Seconds after the Russian crew initiated the descent, however, their Traffic Collision Avoidance System (TCAS) instructed them to climb, while at about the same time the TCAS on Flight 611 instructed the pilots of that aircraft to descend. Had both aircraft followed those automated instructions, it is likely that the collision would not have occurred.

Flight 611's pilots on the Boeing jet initially followed the TCAS instructions and initiated a descent, but could not immediately inform the controller due to the fact that he was dealing with Flight 2937. About eight seconds before the collision, Flight 611's descent rate was about 2,400 feet per minute (12 m/s), not as rapid as the 2,500 to 3,000 ft/min (13 to 15 m/s) range advised by TCAS. The Russian pilot on the Tupolev disregarded the TCAS instruction to climb and instead began to descend, as instructed by the controller, thus both planes were now descending.

Unaware of the TCAS-issued alerts, Nielsen repeated his instruction to Flight 2937 to descend, giving the Tupolev crew incorrect information as to the position of the DHL plane. Maintenance work was being carried out on the main radar system, which meant that the controllers were forced to use a slower system.

The aircraft collided at almost a right angle at an altitude of 34,890 feet (10,630 m), with the Boeing's vertical stabilizer slicing completely through Flight 2937's fuselage just ahead of the Tupolev's wings. The Tupolev exploded and broke into several pieces,

scattering wreckage over a wide area. The nose section of the aircraft fell vertically, while the tail section with the engines continued, stalled, and fell. The crippled Boeing, now with 80% of its vertical stabilizer lost, struggled for a further seven kilometres (four miles) before crashing into a wooded area close to the village of Taisersdorf at a 70 degree downward angle. Each engine ended up several hundred metres away from the main wreckage, and the tail section was torn from the fuselage by trees just before impact. All 69 people on the Tupolev, and the two on board the Boeing, died.

## **Other factors in the crash**

Only one air traffic controller, Peter Nielsen of ACC Zurich, was controlling the airspace through which the aircraft were transitioning. The other controller on duty was resting in another room for the night. This was against the regulations, but had been a common practice for years and was known and tolerated by management. Due to maintenance work, Nielsen had a stand-by controller and system manager on call. Nielsen was either unaware of this or he chose not to use either of the two additional air traffic controllers available to him. When Nielsen realised that the situation had subtly increased beyond his span of control, it was too late to summon assistance.

In the minutes before the accident, Nielsen was occupied with an Airbus on a delayed Aero Lloyd Flight 1135 approaching Friedrichshafen Airport. Handling two workstations at once, Nielsen struggled with the malfunctioning phone system that he was trying to use to call the Friedrichshafen airport to announce the approaching Aero Lloyd. The main phone lines at Skyguide were down due to maintenance work, and the backup line was defective. This caused Nielsen to spend more time than he anticipated coordinating the Airbus late arrival into Friedrichshafen, and to miss several calls from aircraft. The faulty phone lines also prevented adjacent air traffic controllers at Karlsruhe from phoning in a warning. Due to these distractions he did not spot the danger until about a minute before impact. Had he been aware of the dangerous situation earlier, he could have kept the aircraft at a safe distance from each other. They would have been separated and their collision avoidance systems would not have issued instructions.

Additionally, after Nielsen instructed the Russian crew to descend, he returned to the situation with the Airbus bound for Friedrichshafen, and did not hear the DHL aircraft TCAS report of its descent.

Another factor was that the ground-based optical collision warning system, which would have alerted the controller to imminent collisions early, had been switched off for maintenance; Nielsen was unaware of this. There still was an aural STCA warning system, which released a warning addressed to workstation RE SUEW at 21:35:00 (32 seconds before the collision); this warning was not heard by anyone present at that time, although no error in this system could be found in a subsequent technical audit; whether this audible warning is turned on or not, is not logged technically. Even if Nielsen had heard this warning, he might have misinterpreted it until the next radar update 12 seconds later became visible or until the TCAS descent notice by the DHL crew came in; at that

time finding a useful resolution order by the air traffic controller is difficult to impossible.

### **Deviating statements in the official report**

All countries involved could add additional "deviating" statements to the official report. The Kingdom of Bahrain, Switzerland and the Russian Federation did submit positions that were published with the official report. The USA did not submit deviating positions. The comments were published as an appendix to the report but were not commented upon by the German federal investigators.

The statement by the *Kingdom of Bahrain*, the home country of the DHL plane, mostly agrees with the findings of the report. It says that the report should have put less emphasis on the actions of individuals and stressed the problems with the organisation and management more. Bahrain's statement also mentions the lack of crew resource management in the Tupolev's cockpit as a factor in the crash.

The *Russian Federation* states that the Russian pilots were unable to obey the TCAS advisory to climb; the advisory was given when they were already at 35500 feet while the controller wrongly stated there was conflicting traffic above them at 36000 feet. Also, the controller gave the wrong position of the DHL plane (2 o'clock instead of the actual 10 o'clock). Russia asserts that the DHL crew had a "real possibility" to avoid a collision since they were able to hear the conversation between the Russian crew and the controller.

*Switzerland* notes that the Tupolev was about 33 metres below the flight level ordered by the Swiss controller, and still descending at 1900 feet per minute. The Swiss say that this was also a cause of the accident. The Swiss position also states that in spite of the false information given (position and phraseology) by the Swiss controller the TCAS advisories would have been useful if obeyed immediately.

The change in magnetic bearing of the Russian aircraft by cumulatively 20 degrees (from 254 to 274) during the upcoming conflict is not assessed in the official report.

## Consequences



Skyguide memorial to the aviation accident and murder of Peter Nielsen

Nielsen needed medical attention due to traumatic stress caused by the accident. At Skyguide, his former colleagues maintained a vase with a white rose over Nielsen's former workstation. Skyguide, after initially having blamed the Russian pilot for the accident, accepted its share of the responsibility and has paid compensation to some of the Russian families.

On 19 May 2004, the official investigators found that managerial incompetence and systems failures were the main cause for the accident, so that Nielsen was surely not the

only one to be blamed for the disaster. As explained above, a series of coincidences of which Kaloyev and Nielsen were unaware precipitated the accident.

On 27 July 2006, a court in Konstanz decided that the Federal Republic of Germany should pay compensation to Bashkirian Airlines. The court found that it was illegal for the state to allow a foreign private company to provide air traffic control in German airspace. The government appealed the ruling, and a final decision is still pending as of 2008.

In another case before the court in Konstanz, Skyguide's liability insurance is suing Bashkirian Airlines for 2.5 million euro in damages. The case was opened in March 2008; the legal questions are expected to be difficult, as the airline has filed for bankruptcy under Russian law.

A criminal investigation of Skyguide began as of May 2004. On 7 August 2006, a Swiss prosecutor filed manslaughter charges against eight employees of Skyguide. The Winterthur prosecutor called for jail terms of 6 to 15 months, alleging "homicide by negligence". The verdict was announced in September 2007. Three of the four managers convicted were given suspended prison terms and the fourth was ordered to pay a fine. Another four employees of the Skyguide firm were cleared of any wrongdoing.

## **Murder of Peter Nielsen**

Grieved by the loss of his family, Vitaly Kaloyev held Peter Nielsen responsible for their deaths. He killed Nielsen at his Kloten home, near Zürich, on 24 February 2004. Police arrested Kaloyev at a local motel not long after the murder, and he was subsequently convicted of the crime in 2005. He was released on 8 November 2007 because his mental condition was not sufficiently considered in the initial sentence. After his release, Kaloyev was infamously dubbed a "hero" in North Ossetia. In January 2008, he was appointed deputy construction minister of North Ossetia.

## **TCAS and conflicting orders**

The accident raised questions on how pilots must react when they receive conflicting orders from the TCAS and from air traffic control (ATC). The TCAS is programmed to assume that both crews will promptly follow the system's instructions. The operations manual clearly states that TCAS should always take precedence over any ATC commands: *If an instruction to manoeuvre is received simultaneously from an RA (resolution advisory, the command issued by the TCAS) and from ATC, the advice given by RA should be followed.*

It is not required to notify the ATC prior to responding to an RA. This manoeuvre does not require any ATC clearance since TCAS takes into account the position of all other aircraft with transponders in the surrounding area.

## Prior incidents

About a year before the Bashkirian-DHL collision there had already been another incident involving confusion conflicting TCAS and ATC commands. During the 2001 Japan Airlines mid-air incident, two Japanese airliners nearly collided with each other in Japanese skies. Both aircraft had received conflicting orders from the TCAS and ATC; one pilot followed the instructions of the TCAS while the other did not. Disaster was only averted because one of the pilots made evasive manoeuvres based on a visual judgement. The aircraft missed each other by less than 100 metres (330 ft), and the abrupt manoeuvre necessary to avert disaster left about 100 occupants hurt on one aircraft, some seriously. As a consequence Japan called for measures to prevent similar incidents. However, the International Civil Aviation Organization (ICAO) did not take action until after the crash over Germany. In addition four near misses in Europe occurred before the German disaster, because one set of pilots obeyed the air traffic controllers while the other obeyed TCAS. The ICAO decided to fulfill Japan's request 18 months after the Japan Airlines incident.

## Unclear instructions for the Bashkirian crew

The Bashkirian pilots were using the Tu-154 Flight Operations Manual, which contained a section that emphasizes the role of the ATC and describes the TCAS as an additional aid:

“ *For the avoidance of in-flight collisions is the visual control of the situation in the airspace by the crew and the correct execution of all instructions issued by the Air Traffic Controller to be viewed as the most important tool. TCAS is an additional instrument which ensures the timely determination of oncoming traffic, the classification of the risk and, if necessary, planning of an advice for a vertical avoidance manoeuvre.* ”

—TU154M Flight Operations Manual

The same flight manual, on a different page, also contains a passage that strictly forbids manoeuvres contrary to the TCAS under any circumstances. Nevertheless, the official investigation found that the pilots seemed unaware that the TCAS RA should take precedence.

## **Technical solutions**

Before this accident a change proposal (CP 112) for the TCAS II system had been issued. This proposal would have created a "reversal" of the original warning - asking the DHL plane to climb and the Tupolev crew to descend. According to an analysis by Eurocontrol this would have avoided the collision if the DHL crew had followed the new instructions and the Tupolev had continued to descend.

Additionally, an automatic downlink for the TCAS - which would have alerted the air traffic controller - had not been deployed worldwide at the time of the accident.

## **Recommendations after the accident**

The investigation report contains a number of recommendations concerning TCAS, calling for upgrades and for better training and clearer instructions to the pilots.

## **Dramatization**

The Discovery Channel Canada documentary series *Mayday* featured this accident in the episode titled *Deadly Crossroads*, which was released in 2004.

"Flug in die Nacht - Das Unglück von Überlingen" (2009), (*Flight into the night - the accident at Überlingen*) produced by German and Swiss TV stations SWR and SF, is a motion picture based on the crash and the subsequent killing of the air traffic controller.

## Chapter- 4

# Aviation Accidents and Incidents in 2003

## 2003 Iran Ilyushin Il-76 crash

### 2003 Iran Ilyushin Il-76 crash

#### Accident summary

<b>Date</b>	February 19, 2003
<b>Type</b>	disputed
<b>Site</b>	22 mi SE of Kerman, Iran
<b>Passengers</b>	284
<b>Crew</b>	18
<b>Injuries</b>	0
<b>Fatalities</b>	302 (all)
<b>Survivors</b>	0
<b>Aircraft type</b>	Ilyushin Il-76
<b>Operator</b>	IRGC (Iranian Revolutionary Guard)
<b>Flight origin</b>	Zahedan
<b>Destination</b>	Kerman

The **2003 Iran Ilyushin Il-76 crash** was the deadliest aircraft accident in Iran. The crash, on February 19, 2003, killed 302 people, most of them members of the Iranian Revolutionary Guard. That crash marked the third Il-76 crash in Iran.

## Cause

The official report says bad weather brought the aircraft down; high winds and fog were present at the time of the crash. Some sources speculate that the accident may also have been the result of a mid-air collision, of structural failure, or a terrorist act following a claim of responsibility from the Abu-Bakr Brigades, a terrorist organization.

# 2003 Baghdad DHL attempted shootdown incident

## European Air Transport OO-DLL



### Occurrence summary

<b>Date</b>	22 November 2003
<b>Type</b>	Missile attack, loss of flight controls
<b>Site</b>	Baghdad International Airport, Baghdad, Iraq
<b>Passengers</b>	0
<b>Crew</b>	3
<b>Injuries</b>	0
<b>Fatalities</b>	0
<b>Survivors</b>	3 (all)
<b>Aircraft type</b>	Airbus A300B4-203F
<b>Operator</b>	European Air Transport ("DHL")
<b>Tail number</b>	OO-DLL

On 22 November 2003, shortly after takeoff from Baghdad, Iraq, an Airbus A300 cargo plane owned by European Air Transport ("DHL") was struck on the left wing tip by a surface-to-air missile. Severe wing damage resulted in a fire and complete loss of hydraulic flight control systems. Because outboard left wing fuel tank 1A was full at

takeoff, there was no fuel-air vapour explosion. Liquid jet fuel dropped away as 1A disintegrated. Inboard fuel tank 1 was pierced and leaking.

Returning to Baghdad, the 3-man crew made an unprecedented injury-free landing of the crippled aircraft, using differential engine thrust as the only pilot input.

Paris Match Reporter Claudine Vernier-Palliez accompanied a Fedayeen commando unit on their strike mission against the DHL aircraft.

Sara Daniel, a French weekly newsmagazine journalist claimed receipt, from an unknown source, of a video that showed insurgents, faces concealed, firing a missile at the A300. Daniel was researching a feature about Iraqi resistance groups but she disclaimed any specific knowledge of the people who carried out the attack, regardless of being present at the moment of attack.

## **Destination and crew**

The aircraft took off from Baghdad International Airport en route to Bahrain International Airport at 06:30 UTC with an experienced crew of three: two Belgians, Captain Eric Gennotte and First Officer Steeve Michielsen, and a Scot, flight engineer Mario Rofail.

## **Moments following the strike**

To reduce exposure to ground attack, the aircraft was executing a rapid climbout. At about 8,000 feet (2,450 metres), a 9K34 Strela-3 (SA-14 Gremlin) surface-to-air missile struck the left wing tip. The warhead damaged trailing edge surfaces and structure and caused a fire. All three hydraulic systems lost pressure and flight controls were disabled. The aircraft pitched rapidly up and down in a roller-coaster phugoid, oscillating between a nose-up and a nose-down position, trying to re-establish the angle of attack from which it was disturbed.

As in the case of the 1989 United Airlines Flight 232 disaster in the USA, Captain Gennotte could only use thrust to modify pitch, speed and altitude and vary throttles asymmetrically to control yaw and turn the aircraft. Flight engineer Mario Rofail executed a gravity drop to extend the landing gear, a procedure normally accomplished with hydraulic power. Early deployment of the gear was critical to a safe outcome because increased drag helped reduce speed and stabilize the Airbus.

In about 10 minutes of experimentation, the crew learned to manage turns, climbs and descents. After a meandering trajectory, they executed a right turn and initiated a descent path to Baghdad International Airport.

## Final approach and emergency landing



The crew applies reverse thrust



Left wing damage from the missile strike



Damaged turbofan front fan blades due to ingestion of debris

Because of left wing damage and fuel loss, Rofail had to monitor the engine closely. If fuel flow was lost from the left side, the flight engineer would have to feed fuel from a right tank without losing thrust. Crew survival was dependent on accurate power control of each jet engine.

Gennotte and Michielsen set up for a final approach to runway 33R. Because the aircraft drifted to the right, away from the intended course, Gennotte decided to use the shorter 33L runway. Visibility was excellent and the pilots managed a controlled descent. They knew that, counter-intuitively, they could not retard throttles before touchdown without risking the nose or a wing smashing disastrously into the ground.



Air Force Tech. Sgt. Steven Klunk

At about 400 feet (120 meters), when the airplane entered ground effect, turbulence upset the aircraft balance and the right wing dipped. With thrust adjustments, the roll was controlled but the aircraft touched down off the runway centerline. Rofail immediately deployed full reverse thrust but the Airbus veered off the paved runway. Running through rough soft ground, throwing up a huge plume of sand and dragging a razor wire barrier, the aircraft stopped after about 1,000 meters.

The crew exited down the left emergency slide. Fearing an explosion, the crew started to move away from the crash site, but US Air Force Security Forces Technical Sergeant Steven Klunk stopped them from doing so as there were mines left by Saddam Hussein's forces that had not been cleared after Operation Iraq Freedom. The crew was later safely evacuated from the runway by TSgt Klunk.

## **Awards and aftermath**

The Guild of Air Pilots and Air Navigators jointly honored crewmembers with the *Gordon-Burge Memorial Award*. This is awarded to flight crew whose action contributed outstandingly by saving their aircraft or passengers, or made a significant contribution to future air safety. This annual award is made only if a nomination is considered to be of significant merit.

The Flight Safety Foundation's *FSF Professionalism Award in Flight Safety* was presented to the crewmembers for their “extraordinary piloting skills in flying their aircraft to a safe landing after a missile strike following takeoff from Baghdad, Iraq.

In May 2006, Captain Eric Gennotte, together with Armand Jacob, an Airbus experimental test pilot, gave a presentation to the Toulouse branch of the Royal Aeronautical Society titled “Landing an A300 Successfully Without Flight Controls”.

In addition to severe wing and undercarriage damage, both jet engines suffered ruinous abuse by ingesting debris. The already aging aircraft has not flown again.

The incident became widely discussed. For Mario Rofail, the flight engineer, it was a point on which to retire.

## Colgan Air Flight 9446

**Colgan Air Flight 9446** was a repositioning flight operated by Colgan Air for US Airways Express. On August 26, 2003 a Beech 1900D on the route hit the water 100 yards off of the shore of Yarmouth, Massachusetts, United States shortly after taking off from Barnstable Municipal Airport in Yarmouth. Captain Scott Knabe and First Officer Steven Dea died. The plane was bound for Albany, New York, U.S.

The U.S. NTSB incident summary is as follows:

“ The accident flight was the first flight after maintenance personnel replaced the forward elevator trim cable. When the flightcrew received the airplane, the captain did not address the recent cable change noted on his maintenance release. The captain also did not perform a first flight of the day checklist, which included an elevator trim check. Shortly after takeoff, the flightcrew reported a runway trim, and manually selected nose-up trim. However, the elevator trim then traveled to the full nose-down position. The control column forces subsequently increased to 250 pounds, and the flightcrew was unable to maintain control of the airplane. During the replacement of the cable, the maintenance personnel skipped a step in the manufacturer's airliner maintenance manual (AMM). They did not use a lead wire to assist with cable orientation. In addition, the AMM incorrectly depicted the elevator trim drum, and the depiction of the orientation of the cable around the drum was ambiguous. The maintenance personnel stated that they had completed an operational check ”

of the airplane after maintenance. The Safety Board performed a mis-rigging demonstration on an exemplar airplane, which reversed the elevator trim system. An operational check on that airplane revealed that when the electric trim motor was activated in one direction, the elevator trim tabs moved in the correct direction, but the trim wheel moved opposite of the corresponding correct direction. When the manual trim wheel was moved in one direction, the elevator trim tabs moved opposite of the corresponding correct direction.

—NTSB

The National Transportation Safety Board determines the probable cause(s) of this accident as follows:

“ The improper replacement of the forward elevator trim cable, and subsequent inadequate functional check of the maintenance performed, which resulted in a reversal of the elevator trim system and a loss of control in-flight. Factors were the flightcrew's failure to follow the checklist procedures, and the aircraft manufacturer's erroneous depiction of the elevator trim drum in the maintenance manual. ”

—NTSB

# FedEx Express Flight 647

## FedEx Flight 647



### Accident summary

<b>Date</b>	December 18, 2003
<b>Type</b>	Pilot error
<b>Site</b>	Memphis International Airport, Memphis, TN
<b>Passengers</b>	5
<b>Crew</b>	2
<b>Injuries</b>	2
<b>Fatalities</b>	0
<b>Survivors</b>	7 (all)
<b>Aircraft type</b>	McDonnell Douglas MD-10-10F
<b>Operator</b>	FedEx Express
<b>Tail number</b>	N364FE
<b>Flight origin</b>	Metropolitan Oakland International Airport, Oakland, California
<b>Destination</b>	Memphis International Airport, Memphis, Tennessee

**FedEx Express (FedEx) Flight 647** was a flight between Metropolitan Oakland International Airport (OAK), Oakland, California and Memphis International Airport (MEM), Memphis, Tennessee that crashed during landing on December 18, 2003.

## **Final moments**

The flight touched down at about 12:26 central standard time on runway 36R, and almost immediately the right landing gear collapsed. The plane veered off the right side of the runway, catching fire as it did so. The co-pilot received minor injuries as she evacuated the aircraft, as did one of the five non-revenue FedEx pilots who were on board as passengers. It was later discovered that the non-revenue pilot who activated the slide for the emergency exit had not been adequately trained in its operation, and so accidentally pulled the handle that released the slide as a raft in the event of a landing on water, so that the slide detached from the airplane.

## **Investigation**

The NTSB conducted a full investigation of the accident. It found that although the aircraft had encountered a crosswind during landing, the conditions were well within the safe capabilities of the aircraft. However, it was discovered that the first officer did not properly line up the plane before touchdown, nor did she slow the plane adequately before touchdown, so that the plane came down excessively hard. As the plane came down, due to the crosswind, the right wing suddenly lowered approximately six degrees. This was beyond the design capabilities for the right main landing gear, and it snapped as a result. The NTSB also cited the captain for failing to check the work of the first officer.

The NTSB further found that FAA Order 8400.10 (Air Transportation Aviation Inspector's Handbook) was deficient in the section addressing assurance of evacuation training for the flight crew.



<b>Tail number</b>	N501RH
<b>Flight origin</b>	Concord, North Carolina
<b>Destination</b>	Blue Ridge Airport Martinsville, Virginia

The **October 2004 Martinsville plane crash** occurred on 24 October 2004 when a Beechcraft Super King Air 200 aircraft owned by Hendrick Motorsports crashed into Bull Mountain, seven miles from Blue Ridge Airport, Martinsville, Virginia. All ten aboard the plane were killed, among them members of the Hendrick family including John Hendrick, president of Hendrick Motorsports; and former NASCAR Busch Series driver and owner Ricky Hendrick.

## Crash

The King Air took off from Concord, North Carolina at 12 pm EST, carrying ten passengers. Among them were several key Hendrick Motorsports staff, including team president John Hendrick and his twin daughters, Kimberly and Jennifer Hendrick; Ricky Hendrick, son of Rick Hendrick; general manager Jeff Turner; and chief engine builder Randy Dorton. The other people on board were Joe Jackson, a DuPont executive; Scott Latham, a pilot for driver Tony Stewart; and pilots Richard Tracy and Elizabeth Morrison. The plane was en route to the Subway 500 Nextel Cup Series race at Martinsville, Virginia when it was reported missing at 3:00 pm. After an extensive search, the wreckage of the plane was found at Bull Mountain at 11 pm. No one on board survived.

NASCAR received word of the plane crash during the 2004 Subway 500 in Martinsville. After the race was over, NASCAR immediately summoned all the Hendrick Motorsports drivers– including race winner Jimmie Johnson– to the NASCAR hauler and all victory lane ceremonies were cancelled.

## Investigation

An investigation conducted by the National Transportation Safety Board (NTSB) followed soon after the crash.

### Weather

There were foggy conditions at the time of the plane crash.

### Pilot error as a cause

The NTSB suggested that pilot error was the cause of the crash, partly by:

- the plane missing its first landing attempt before veering off course and crashing;
- the plane not climbing to its temporarily assigned altitude of 2,600 feet; it instead descended to 1,800 feet before crashing.

The NTSB concluded its investigation by suggesting that the pilots failed to execute an instrument approach procedure and that both failed to use all navigational aids to confirm the airplane's position during its approach.

## **Aftermath**

### **Lawsuit**

On February 7, 2006 a lawsuit was filed against Hendrick Motorsports by the widows of two men killed in the plane crash. Dianne Dorton claimed "conscious and intentional disregard" for the life of her husband, Randy Dorton, the head engine builder for Hendrick Motorsports. The lawsuit places partial blame on John Hendrick, the President of Hendrick Motorsports. Her claim is based on a conversation with her husband shortly before the crash, as well as a conversation between John Hendrick and pilot Richard Tracy.

Dorton called his wife the morning of the crash. He told his wife that they were supposed to fly in a helicopter but the helicopter was delayed due to bad weather, and that they were going to fly in a Hendrick Motorsports plane instead. Dorton waited in the Hendrick Hangar for over an hour. He called Dianne and told her he didn't think they would go, only to call back 47 minutes later to tell her "we're going".

Pilot Richard Tracy allegedly suggested flying into Danville instead of Blue Ridge Airport, but Hendrick refused because Danville was further away and he didn't want to be late for the race. The grounded helicopter pilot witnessed the conversation and could be called to testify.

In a separate lawsuit, Scott Lathram's widow Tracy claims that at least 27 other aircraft scratched plans to land at Blue Ridge Airport on October 24 due to bad weather. Lathram was a helicopter pilot for NASCAR driver Tony Stewart.

### **Impact on Hendrick Motorsports**

On February 18, 2005, Marshall Carlson, Rick Hendrick's son in law, signed on as new general manager.

### **Memorials**

The week following the crash, officials at the Atlanta Motor Speedway held a moment of silence before both the Busch and Nextel Cup races and lowered the flags to half staff. All the Hendrick Motorsports cars carried tributes on the hoods for those who were lost the week before. Jimmie Johnson (who won the Bass Pro Shops MBNA 500 race) and the

rest of his teammates and crew wore their caps backwards in victory lane as a tribute to Ricky Hendrick, who had a habit of doing the same. At the Hendrick museum in Concord, North Carolina, 300 people showed up for a candlelight vigil in honor of the ten victims.

The Randy Dorton Trophy now goes to the winner of the Mahle Engine Builders Challenge.

## Northwest Airlines Flight 327

**Northwest Airlines Flight 327** was a flight on June 29, 2004 from the Detroit Metropolitan Wayne County Airport in Romulus, Michigan to the Los Angeles International Airport in Los Angeles, California. This event happened aboard N543US, a Boeing 757-200. The suspicious behaviour of a party of 13 Syrian musicians, on their way to an engagement in San Diego, alarmed flight attendants and passengers. One passenger, journalist Annie Jacobsen, wrote a series of articles about the incident, bringing it to national attention. A redacted version of the Department of Homeland Security Inspector General's report was released in May 2007 as a result of a Freedom of Information Act request made by the *Washington Times*.

### The incident

Before takeoff, 14 men of Middle Eastern descent boarded the aircraft. Thirteen of the 14 men were Syrian nationals in the USA on short-term visas, using one-way tickets which they had paid for in cash. Their visas had expired on June 10, but they had filed for extensions, which were eventually granted.

During the flight, Annie Jacobsen, a writer for *WomensWallStreet*, believed that the men were acting suspiciously. She claimed that one of the flight attendants had previously notified an air marshal on board the flight that she thought the men were acting suspiciously, but the air marshals later said that a flight attendant had merely passed on Jacobsen's concerns. Jacobsen and her husband became increasingly vocal when they believed that their concerns were not being taken seriously, to the point that air marshals believed that the couple might themselves be terrorists, trying to draw them out to reveal their identities.

In a series of articles for *WomensWallStreet* titled "Terror in the Skies, Again?," Jacobsen claimed that several other Flight 327 passengers have corroborated her story. One was so frightened by what she witnessed that she no longer travels by air. Others said they were convinced they were about to die. One such passenger confirmed the story to the *Washington Times*.

Debate over what happened on the flight became an Internet phenomenon, according to CNN's Aaron Brown. Jacobsen's articles were translated into many languages including Chinese, Swahili and German as it circulated around the globe.

In the *WomensWallStreet* articles, Jacobsen detailed the activity she took to be suspicious. She claimed that before boarding, the men did not interact or seem to be part of a group. Further, she claimed that during boarding, each man made eye contact with each of the others and nodded as if in agreement. One man, who wore an orthopedic shoe, complained loudly, just before takeoff, that he needed to switch seats. Once in flight, one of the men took a large McDonald's bag to a lavatory, exiting with the bag nearly empty, and giving the thumbs up sign as he passed two others suspicious men. Some of the other men also took objects with them to the lavatory, such as a mass of cloth, a camera, and a cell phone. Throughout the flight, the men would get up in unison, walk to the lavatories, and congregate in the aisles in groups of two and three. One of the men, wearing a suit and sunglasses, stood a foot or so away from the cockpit door. When the captain announced clearance for landing, seven of the men stood in unison and went to the lavatory, each taking about four minutes. The last man to exit the lavatory supposedly dragged his forefinger across his neck as he passed one of the other men, mouthing the word "No."

Upon arriving in Los Angeles, the 14 men that Jacobsen saw were detained for questioning and identity verification. The Federal Air Marshal Service concluded that they were Syrian band members en route to a San Diego casino to perform. Jacobsen claims, however, that only two of the men were briefly investigated and nobody has determined where the men went after leaving the airport. The Sycuan Casino & Resort confirmed that Syrian singer Nour Mhanna performed there two days later, and that he brought his own backup band.

## **Reaction to reports**

In a later interview to TIME magazine, the lead air marshal aboard the flight stated, "there was never a time when my main partner or I felt there was an imminent threat to that airplane or the passengers." and "I understand why the passenger felt some anxiety about activity on Flight 327 but that kind of activity was unusual but not a security incident. There was never a threat to the plane." The Homeland Security report produced by the Inspector General revealed that this air marshal had noticed that the Syrians' travel visas were expired but the air marshal failed to report this information to his supervisors, claiming it was out of his jurisdiction.

Furthermore, the federal air marshals believed that Jacobsen "over-reacted" at the presence of persons of Middle Eastern appearance on the flight and "was in danger of panicking other passengers and creating a larger problem". They were also concerned that Jacobsen's actions were part of a terrorist plot to create a disturbance in order that the marshals be identified and that she "could have put the entire flight in danger".

The Department of Homeland Security, Office of the Inspector General, spent twenty-two months investigating flight 327; the report has been classified, but a redacted version reveals that the musical group's promoter, who was on the plane, had been involved in a similar incident in January 2004.

A *Washington Times* story claimed that some air marshals believed that Northwest flight 327 was a "dry run" for a future terrorist attack involving commercial planes, but did not quote any air marshal making that claim, either with attribution or anonymously. A followup story revealed the Freedom of Information Act request and promised more details to come.

Gary Boettcher, president of the Coalition of Airline Pilots Associations, however, said that Jacobsen had likely witnessed a dry run, and that he had many similar experiences himself. Federal Air Marshal P. Jeffrey Black confirmed that in his opinion, flight 327 was a terrorist probe or dry run. Mark Bogosian, An American Airlines pilot, said that incidents like the one Jacobsen described were a "dirty little secret" that airline crew members had known for some time.

Jacobsen's original article was distributed widely through emails, and the veracity of her claims was discussed and dismissed on the Snopes urban legend website.

After the August 2006 thwarted terrorist attack in England, one which allegedly involved ten commercial airplanes being blown up by bombs built in the aircraft bathroom, talk radio shows across the country referenced Northwest Flight 327 as likely being a dry run, in spite of differences between the two: The accused in the August 2006 case were British nationals with Pakistani connections, not Syrians (or band members), and no one was prosecuted due to events involving Flight 327.

## Chapter- 6

# Aviation Accidents and Incidents in 2005

## Lockhart River Air Disaster

The **Lockhart River Air Disaster** refers to the Controlled flight into terrain (CFIT) in Northern Australia of a Fairchild Swearingen Metroliner commuter aircraft at 1144 on 07 May 2005. The aircraft VH TFU, owned by Transair Ltd and operated by Aerotropics, struck the ridge known as South Pap, 11 km on approach in bad weather to Lockhart River Airport, Far North Queensland Australia. All fifteen on board died as the aircraft was completely destroyed by impact forces and subsequent fire. The flight was on the return run from Bamaga on Cape York to the regional centre of Cairns. It was the worst air crash in Australia in 36 years.

Those who lost their lives were: Brett Hotchin 40 (Pilot), Tim Down 21 (Co-Pilot), Constable Sally Urquhart 28 (Queensland Police Service Bamaga), Frank Billy 21 (Injinoo), Fred Bowie 25 (Injinoo), Gordon Kris 37 (Injinoo), Arden Sonter 44 (Bamaga), Mardie Bowie 30 (Bamaga), Helena Woosup 25 (Bamaga), Paul Norris 34 (Main Island), Dr David Banks 56 (Canberra), Noel Lewis 46 (Sunshine Coast), Edward Green, Rob Brady 36 (Cairns) Kenneth Hurst 55 (Brookwater.)

## Investigation

The Queensland Coroner's Inquest in 2007, found that, despite evidence that there were a number of issues leading up to the crash, pilot error was the prime cause. Families of those who lost their lives in the disaster have been highly critical of the Coroner's findings and the deficiencies in the operations of the regulator CASA, (Civil Aviation Safety Authority) and the poor company structure and practices of Transair Ltd. These issues are clearly and extensively explained in the report delivered by the Australian Transport Safety Bureau (ATSB) on 04 April 2007 and summarised in Appendix M. As the Cockpit Voice Recorder was inoperable, and had been for some time, the events and conversations occurring between the flight crew will never be known.

## Senate Inquiry

As a result of intense lobbying by the father of one of the victims, Constable Sally Urquhart, and others, the Australian Senate's Rural and Regional Affairs and Transport Committee resolved to conduct an inquiry into the Civil Aviation Safety Authority, its

operations and other matters. The Inquiry was convened on 02 and 03 July 2008 at Parliament House, Canberra. As well as Mr Shane Urquhart's submission, there were sixty others which were considered by the Inquiry. The vast majority of the submissions were highly critical of most aspects of CASA's operations. Several people and organisations, including Mr Urquhart, supported their submissions in person at the Inquiry. In September 2008, the Committee Chair, Senator Glenn Sterle, released the report of the inquiry to the Transport Minister Mr Anthony Albanese and the public.

The recommendations from the report are: 1. That the Australian Government strengthens CASA's governance framework and administrative capability by: a. introducing a small board of up to five members to provide enhanced oversight and strategic direction for CASA; and b. undertaking a review of CASA's funding arrangements to ensure CASA is equipped to deal with new regulatory challenges. 2. In accordance with the findings of the Hawke Taskforce, that CASA's Regulatory Reform Program be brought to a conclusion as quickly as possible to provide certainty to industry and to ensure CASA and industry are ready to address future safety challenges. 3. That the Australian National Audit Office audit CASA's implementation and administration of its Safety Management Systems approach.

**Further incidents:** Following the Lockhart River crash, Transair in Australia went into liquidation in late 2005. Aerotropics also no longer operates as the Civil Aviation Safety Authority cancelled its AOC due to ongoing safety breaches. Transair continued to operate its PNG business until 31 August 2010 when the company's Cessna Citation ran off the runway on landing at Misima Island near Milne Bay, Nuigini. The previous owner of Transair in Australia, Les Wright, died along with three others in the ensuing inferno. There was one survivor.

## 2005 Baney plane crash

### 2005 Baney plane crash



A Antonov 24 like the accident aircraft.

#### Accident summary

**Date** 16 July 2005

<b>Type</b>	Overloaded
<b>Site</b>	Near Baney, Equatorial Guinea
<b>Passengers</b>	54
<b>Crew</b>	6
<b>Injuries</b>	2
<b>Fatalities</b>	60
<b>Survivors</b>	0
<b>Aircraft type</b>	Antonov 24
<b>Operator</b>	Equatorial Express Airlines now Equatair
<b>Tail number</b>	3C-VQR
<b>Flight origin</b>	Malabo International Airport
<b>Destination</b>	Bata Airport

The **2005 Baney plane crash** happened on the 16 July 2005 after a Equatorial Express Airlines Antonov 24 crashed into a side of a mountain near Baney. The accident killed all 60 passengers and crew on board the flight.

## Aircraft

The aircraft that was used on this flight was a Antonov 24 registration 3C-VQR that had its first flight back in 1967.

## Accident

The flight took off from Malabo International Airport on a short haul flight to Bata Airport with 54 passengers and 6 crew on board. Just minutes into the flight the aircraft tilted and fell, skidded over trees for a distance of about half a mile and crashed into a side of mountainous jungle area near Baney at 10:00pm. An hour later the wreck of the aircraft was found and there were some conflicting reports regarding the number of persons on board. According to the airline, the flight manifest shows 10 crew and 35 passengers. Government sources reported 60 people were on the plane, after first reports of 55 occupants. The total bodies found at the crash site were 60 passengers and crew.

## Cause

A witness saw flames coming from the side of the plane shortly after take-off. The cause of the accident was that the aircraft was overloaded and the aircraft was only built to accommodate a maximum of 48 passengers and crew.

# Airwork Flight 23

## Airwork Flight 23

### Accident summary

<b>Date</b>	May 3, 2005
<b>Type</b>	Pilot error
<b>Site</b>	Stratford, New Zealand
<b>Passengers</b>	0
<b>Crew</b>	2
<b>Injuries</b>	0
<b>Fatalities</b>	2
<b>Survivors</b>	0
<b>Aircraft type</b>	Fairchild SA227-AC Metro III
<b>Operator</b>	Airwork
<b>Tail number</b>	ZK-POA

**Airwork Flight 23** was a New Zealand Post cargo flight between Auckland International Airport (AKL/NZAA) and Woodbourne Airport (BHE/NZWB) that disintegrated on 3 May 2005.

## History of the flight

The aircraft was scheduled for take off at 9:00 P.M. local time, but it was delayed while cargo was being loaded. During the delay the pilots ordered an extra 570 L (about 1,000 pounds) of fuel and told the person refueling to put all the fuel in the left wing fuel tank, instead of splitting the fuel exactly between the two tanks, as was company procedure. The flight eventually took off at 9:36 P.M. local time.

Immediately after take off the autopilot was engaged and it controlled the aircraft during its climb to flight level 220. The flight was continued at full power instead of cruise setting to make up for lost time for the next fifteen minutes. On powering down to cruise power, the captain noticed imbalance between the fuel tanks and initiated cross flow procedures. Shortly after, at 10:13 P.M. local time, the plane entered a spiral descent and broke up, killing both pilots.

## Investigation

The accident was investigated by the New Zealand Transport Accident Investigation Commission (TAIC). It found that when the captain noted the fuel imbalance, he said, "We'll just open the cross flow again... sit on left ball and trim it accordingly." He repeated the instruction five times in the next 19 seconds, to which the co-pilot replied, "I was being a bit cautious". The captain said, "Don't be cautious mate, it'll do it good".

This resulted in the plane being flown at a large sideslip angle while still under autopilot control, by means of the rudder trim mechanism. Forty-seven seconds after the cross flow was opened, the captain said, "Doesn't like that one mate... you'd better grab it." One second later they received a "bank angle" warning, followed by a warning chime that was presumably a warning they were straying from their correct altitude.

The investigation came to the conclusion that this was due to the autopilot disengaging, probably due to a servo reaching its torque limit. This meant that there was no compensation applied for the rudder trim input, and the plane entered a roll and steep descent, disintegrating around flight level 199. The investigation found poor visibility at night in low cloud was a factor in preventing the pilots realizing sooner.

## Aftermath

The following improvements were implemented as a result:

- On 30 May 2005, the operator issued a Notice to Pilots advising that forthwith the SOP was to give the refueled the volume of fuel to be put into each wing tank to achieve a balanced load prior to engine start, in accordance with the Pre-Start checklist, Metro Training Manual and AFM.
- On 30 June 2006 the operator amended the Metro checklist to add to the Line-up and Approach checklists the item "cross flow closed".
- On 4 July 2006 the operator amended the autopilot Standard Operating Procedures section of the company Metro Training Manual to include two cautions on the use of the fuel cross flow switch.
- On 27 February 2006 the TAIC recommended to the Director of Civil Aviation to amend the AFM, in concert with the United States Federal Aviation Administration, to include a limitation and caution that the autopilot and yaw damper must be disconnected while in-flight fuel balancing is done.

## Chapter- 7

# Aviation Accidents and Incidents in 2006

## 2006 Iran Air Tours crash

### 2006 Iran Air Tours crash

#### Accident summary

<b>Date</b>	September 1, 2006
<b>Type</b>	Runway overrun
<b>Site</b>	Mashad, Iran
<b>Passengers</b>	137
<b>Crew</b>	11
<b>Injuries</b>	?
<b>Fatalities</b>	28
<b>Survivors</b>	120
<b>Aircraft type</b>	Tupolev 154M
<b>Operator</b>	Iran Air Tours
<b>Tail number</b>	EP-MCF

On September 1, 2006, Iran Air Tours Tu-154 aircraft traveling from Bandar Abbas with 11 crew and 137 passengers on board burst into flames upon landing in Mashhad, Iran at 13.45 local time killing 28 of those onboard.

## Possible Causes

Immediately after the accident, Iranian state television reported that one of the tires had blown out upon landing, but this was soon discredited. No additional information is currently available.

## Aircraft

The aircraft had been in active service since 1988 and had approximately 19,000 hours of flight time over about 2,200 flights. It was originally owned by Aeroflot. The plane was leased by Iran Air Tours in August 2005 after having been operated by a number of other carriers.

## 2006 Morecambe Bay helicopter crash

### CHC offshore transport flight

#### Accident summary

<b>Date</b>	27th December 2006
<b>Type</b>	Descent into sea due to pilot error
<b>Site</b>	Morecambe Bay, Irish Sea
<b>Passengers</b>	5
<b>Crew</b>	2
<b>Injuries</b>	0
<b>Fatalities</b>	6 (6 confirmed, 1 missing)
<b>Survivors</b>	0
<b>Aircraft type</b>	Eurocopter SA-365N Dauphin 2
<b>Operator</b>	CHC Helicopter
<b>Tail number</b>	G-BLUN
<b>Flight origin</b>	Blackpool Airport
<b>Destination</b>	Morecambe Bay gas platforms

The **2006 Morecambe Bay Helicopter Crash** was a fatal air incident that occurred on 27 December 2006 at approximately 18:40 GMT, whilst transporting replacement crew between the Millom and Morecambe gas platforms situated approximately 24 miles from the shoreline of Morecambe Bay, Lancashire, England.

Rescue efforts recovered the bodies of six men, including those of the two pilots. A seventh passenger is still recorded as missing. The search for the missing man was called off on 24 January 2007.

The helicopter involved was a Eurocopter AS365N, registration *G-BLUN*, owned by CHC. The aircraft was contracted by Centrica, the company who manage the gas platform to which the helicopter was travelling.

Initial rescue was undertaken by a volunteer team of the local Royal National Lifeboat Institution (RNLI) rescue service, operating out of nearby Lytham St Annes and was co-ordinated by HM Coastguard.

## Investigation

The investigation into the crash started the same night as the accident. The flight data recorders were eventually recovered on 17 January 2007 after severe weather hampered recovery attempts. The storms also hampered efforts to find and recover those lost in the incident. A lot of speculation started to appear into the possible causes for the tragic crash. Because offshore helicopter operations are so crucial to the day to day running of offshore platforms, the AAIB felt it necessary to release a preliminary bulletin as soon as possible. A special bulletin released by the UK Air Accident Investigation Branch (AAIB) (S1/2007) stated "The conclusion of this preliminary examination is that there are no signs of pre-impact malfunction of any major mechanical components, including the tail rotor and its drive shaft"

The formal report into the accident, released in October 2008, stated that "human factors" were the cause of the crash. The co-pilot, who was the handling pilot at the time, complained he felt unwell and that he was running into difficulties. He asked the commander for assistance, whereupon the commander took control of the helicopter. However, the transfer of control from co-pilot to commander was roughly four seconds after the co-pilot had asked for assistance. The report found that the transfer of control wasn't smooth enough and that the commander wasn't "mentally primed to take control of the helicopter." The report concludes that:

"During the attempted recovery of the helicopter from its unusual attitude the commander was devoid of any external visual cues and was possibly distracted over concerns for the well-being of his co-pilot. Concerns for his co-pilot and some degree of disorientation possibly distracted the commander from his usual instrument scan to the extent that he did not notice the increasing angle of bank to the right and the helicopter's continuing descent into the sea."

—AAIB Report No: 7/2008

# 2006 Falsterbo Swedish Coast Guard crash

## 2006 Falsterbo Swedish Coast Guard crash

### Accident summary

<b>Date</b>	26 October 2006
<b>Type</b>	Wing failure caused by metal fatigue
<b>Site</b>	Falsterbo, Sweden
<b>Passengers</b>	0
<b>Crew</b>	4
<b>Fatalities</b>	4
<b>Survivors</b>	0
<b>Aircraft type</b>	CASA C-212 Aviocar
<b>Operator</b>	Swedish Coast Guard
<b>Tail number</b>	SE-IVF, s/n KBV 585
<b>Flight origin</b>	Ronneby Airport
<b>Destination</b>	Malmö Airport

The **2006 Falsterbo Swedish Coast Guard crash** was the crash of a CASA C-212 Aviocar turboprop airplane belonging to the Swedish Coast Guard in Falsterbo Canal, Sweden, on 26 October 2006.

## Background

The accident aircraft was one of three CASA C-212s to be operated by the Swedish Coast Guard. They were based at Stockholm-Skavsta Airport and regularly flew excursions to other parts of Sweden.

## Accident

The accident aircraft was performing a low-level fly-by of the Skanör-Falsterbo Coast Guard Station while en route from Ronneby Airport to Malmö Airport.

The accident was observed by a group of schoolchildren who reported that the port wing fell off during a turn, making the aircraft fall into the sea. All four crewmembers died. The wreckage was subsequently recovered.

The Swedish Coast Guard grounded its remaining fleet of CASA C-212s within days after the accident. The remaining aircraft were sold to Uruguay.

## **Cause**

The Swedish Accident Investigation Board determined the cause to be metal fatigue. The Swedish Coast Guard later replaced the aircraft with Bombardier Dash-8 Q300s because the remaining two aircraft were found to have the same issue.

## Chapter- 8

# Aviation Accidents and Incidents in 2007

## 2007 Bangalore plane crash

2007 Bangalore plane crash



Partenavia p.68 aircraft.

### Accident summary

<b>Date</b>	September 8, 2007
<b>Type</b>	wrong fuel
<b>Site</b>	Gowdanapalya Lake near Bangalore, INDIA
<b>Passengers</b>	0
<b>Crew</b>	4
<b>Survivors</b>	0
<b>Aircraft type</b>	Partenavia P.68C
<b>Operator</b>	Joy Alukkas Group
<b>Tail number</b>	VT-JOY
<b>Flight origin</b>	Jakkur Airfield Bangalore

**Destination**                      Cochin International Airport

The **2007 Bangalore plane crash** occurred on September 8, 2007, when a Partenavia P.68C aircraft, owned by Joy Alukkas Group, crashed into Gowdanapalya Lake, near Bangalore, INDIA. All four aboard the plane were killed. including three pilots: flying officer Santosh Kumar, Sunil Joseph and Mohammed Shabbeer who died instantaneously, and Co-pilot K Shanmugam who died in NIMHANS hospital.

## **Crash**

Partenavia P.68C aircraft took off from Jakkur Flying Club hangar to the HAL Airport for fueling. At 3.35 p.m(IST), the aircraft departed to Cochin International Airport. The six-seater Vulcanair Partenavia plane was coming to Kochi to pick Joy Alukkas, a Kerala based businessman and take him to Thiruvananthapuram for his business purposes. Five minutes after the take-off, the pilot reported the ATC about a technical snag and wanted to return immediately. The aircraft was flying low in bad weather conditions and hit a coconut palm before it nosedived into the lake bed.

## **Investigation**

ATC and Directorate-General of Civil Aviation (DGCA) officials inspected the crash site to procure the black box to determine the cause of the crash. The preliminary findings of the Director General of Civil Aviation (DGCA) team inquiring into the crash of the six-seater plane have revealed that an engine seizure was the cause of the crash. Avgas 100LL is the fuel for this twin-engine aircraft but investigation team found traces of Aviation Turbine Fuel from the wreckage. While ATF is used for turbine-powered aircraft, Avgas is the gasoline meant for reciprocating piston engine aircraft like this plane. The Aviation Turbine Fuel (ATF) is colourless while the Avgas 100LL is blue dyed. The aircraft was not equipped with a Flight Data Recorder.

The investigating team also inspected the Indian Oil Corporation (IOC) records at the HAL Airport. IOC supplies aviation fuel to the HAL airport.

This tragedy raised concerns regarding the absence of a proper safety culture and safety mentality of Indian aviation.

# Dash 8 landing gear incidents

## Scandinavian Airlines Flight 1209

### Accident summary

<b>Date</b>	September 9, 2007
<b>Type</b>	Landing gear failure
<b>Site</b>	Aalborg, Denmark
<b>Passengers</b>	69
<b>Crew</b>	4
<b>Injuries</b>	5
<b>Fatalities</b>	0
<b>Survivors</b>	73
<b>Aircraft type</b>	Dash 8-400 (Q400)
<b>Aircraft name</b>	<i>Ingrid Viking</i>
<b>Operator</b>	Scandinavian Airlines (SAS)
<b>Tail number</b>	LN-RDK
<b>Flight origin</b>	Copenhagen Airport
<b>Destination</b>	Aalborg Airport

## Scandinavian Airlines Flight 2748

### Accident summary

<b>Date</b>	September 12, 2007
<b>Type</b>	Landing gear failure
<b>Site</b>	Vilnius Airport, Lithuania
<b>Passengers</b>	48
<b>Crew</b>	4
<b>Injuries</b>	0
<b>Fatalities</b>	0
<b>Survivors</b>	52
<b>Aircraft type</b>	Dash 8-400 (Q400)
<b>Aircraft name</b>	<i>Göte Viking</i>

<b>Operator</b>	Scandinavian Airlines (SAS)
<b>Tail number</b>	LN-RDS
<b>Flight origin</b>	Copenhagen Airport
<b>Destination</b>	Palanga International Airport

## Scandinavian Airlines Flight 2867

### Accident summary

<b>Date</b>	October 27, 2007
<b>Type</b>	Landing gear failure
<b>Site</b>	Copenhagen Airport, Denmark
<b>Passengers</b>	40
<b>Crew</b>	4
<b>Injuries</b>	0
<b>Fatalities</b>	0
<b>Survivors</b>	44
<b>Aircraft type</b>	Dash 8-400 (Q400)
<b>Aircraft name</b>	<i>Asta Viking</i>
<b>Operator</b>	Scandinavian Airlines (SAS)
<b>Tail number</b>	LN-RDI
<b>Flight origin</b>	Bergen Airport, Norway
<b>Destination</b>	Copenhagen Airport, Denmark



SAS Dash 8-400 (Q400)



SAS Dash-8-400 after crash-landing in Vilnius airport

In September 2007, two separate incidents of similar landing gear failures occurred within four days of each other on Bombardier Dash 8-Q400 aircraft, all operated by

Scandinavian Airlines (SAS). A third incident, again with an SAS aircraft, occurred in October 2007, leading to the withdrawal of the type from the airline's fleet.

## Scandinavian Airlines Flight 1209



de Havilland Canada Dash-8-400 LN-RDK

**Scandinavian Airlines Flight 1209**, a de Havilland Canada Dash-8-400 (LN-RDK), took off from Copenhagen Airport, Denmark, on September 9, 2007. It was headed to Aalborg Airport, Denmark. SK1209 is a code-shared flight with Spanair flight JK9101, BMI flight BD3923 and Lufthansa flight LH6002.

Prior to landing, the right main landing gear failed to lock and the crew circled for an hour before attempting a prepared emergency landing. Upon touchdown, the right landing gear collapsed, the right wing touched ground, and a fire broke out. The fire went out before the aircraft came to rest and all passengers and crew were evacuated. Five people suffered minor injuries, some from propeller parts entering the cabin and others from the evacuation.

### Investigation

When the handle for lowering the landing gear was activated, the indicator showed two green and one red light. The red light indicated that the right main gear was not locked in

position. The landing was aborted. Attempts at lowering the gear manually were also unsuccessful. Investigation into the cause of the failure to deploy revealed that the right main gear hydraulics actuator top eyebolt was separated from the actuator. A further analysis of the actuator showed corrosion on the inside leading to reduced mechanical strength of the actuator and eventual failure.

On September 19, 2007, the prosecutor of Stockholm commenced a preliminary investigation regarding suspicion of *creating danger to another person*.

## **Maintenance procedures**

Scandinavian Airlines System (SAS) has been accused of cutting corners for maintenance. As the Swedish Civil Aviation Authority began an investigation of the accident, it brought renewed focus on SAS maintenance procedures. Only two weeks previously, Swedish authorities had levelled a scathing critique at the airline after an aircraft of the same model nearly crashed because its engine accelerated unexpectedly during landing. The airline reportedly made 2,300 flights in which safety equipment was not up to standard, although the airline has denied this.

Radio Sweden International reports that a security analyst for the Norwegian Civil Aviation Authority has sent a warning to other Scandinavian aviation bureaus concerning sub-standard SAS maintenance procedures, including one instance where an aircraft took off after the pilot reported a fuel leak. This warning, while just publicized, was apparently written before the recent spate of SAS accidents.

## **Scandinavian Airlines Flight 2748**

**Scandinavian Airlines Flight 2748**, a de Havilland Canada Dash-8-400 (LN-RDS), took off from Copenhagen Airport, Denmark, on September 12, 2007. It was headed to Palanga, Lithuania, but was diverted to Vilnius Airport when landing gear problems were discovered before landing. Upon touchdown, the right landing gear collapsed. All passengers and crew were evacuated safely. The local officials at the Vilnius International Airport noted that this was the most serious incident in recent years.

## **Scandinavian Airlines Flight 2867**

On October 27, 2007, a Dash 8-400 (LN-RDI), SAS flight SK2867 from Bergen, Norway, with 40 passengers and 4 crew members was enroute to Copenhagen, Denmark, when problems with the main landing gear were discovered. After waiting about two hours in the air to burn fuel and troubleshoot, the pilots attempted a prepared emergency landing. The pilots were forced to land the aircraft with the right main landing gear up. The right engine was shut off for the landing, because in the previous landings the propeller had hit the ground and shards of it ripped into the fuselage. This was not on the emergency checklist, rather it was the pilots making a smart quick decision. The aircraft stopped on the runway with the right wing touching the runway at 16.53 local time. It did

not catch fire and the passengers and the crew were evacuated quickly. There were no serious injuries. The aircraft in question was one of six that had been cleared to fly just a month before, following the grounding of the entire Scandinavian Airlines Dash 8-400 fleet due to similar landing gear issues. The entire fleet was grounded again following the incident.

The preliminary Danish investigation determined this latest Q400 incident is unrelated to the airline's earlier corrosion problems, in this particular case caused by a misplaced O-ring found blocking the orifice in the restrictor valve. Accordingly EASA announced that "...the Scandinavian airworthiness authorities will reissue the Certificates of Airworthiness relevant to this aircraft type in the coming days."

## **Aftermath**

After the second incident, Scandinavian Airlines System (SAS) grounded their entire Dash-8-400 fleet consisting of 27 aircraft, and a few hours later the manufacturer Bombardier Aerospace recommended that all the Dash-8-400 aircraft with more than 10,000 flights stay grounded until further notice, affecting about 60 of the 160 Q400 aircraft used worldwide. As a result, several hundred flights were cancelled around the world. Horizon Airlines grounded 19 of their aircraft and Austrian Airlines grounded eight.

On September 13, 2007, Transport Canada issued an Airworthiness Directive applicable to Bombardier Q400 turboprop aircraft instructing all Q400 aircraft operators to conduct a general visual inspection of the left and right main landing gear system and main landing gear retract actuator jam nut. This effectively grounded all Q400 aircraft until the inspection had been carried out.

On September 14, 2007, Bombardier issued an All-Operators Message (AOM) recommending new procedures concerning the landing gear inspection for all aircraft with more than 8,000 flights. Bombardier acknowledged the likelihood of corrosion developing inside the retract actuator.

Previous maintenance procedures mandated checking this component after 15,000 landings. The new maintenance schedule affects about 85 of the 165 Q400 aircraft worldwide. Some operators have found that spare parts for this unexpected actuator replacement program are not available, grounding their aircraft indefinitely.

Skandinavisk Tilsynskontor investigators detected corrosion inside the actuator on 25 of 27 aircraft they checked. Accordingly, SAS decided to continue the grounding of its Dash-8-400 fleet until all the affected parts have been replaced.

On October 28, 2007, SAS announced that it will remove all Dash-8-Q400 aircraft from service permanently.

On March 10, 2008, a multi-party agreement was announced, attempting to finalize the roles of maintenance and manufacture in causing the SAS incidents; as settlement the airline and its partners ordered a replacement set of short-haul planes from Bombardier, and in turn received a US \$164 million discount.

It has been speculated that a November 2007 shakeup of Bombardier management has been spurred by the Dash-8-Q400 issues.

## **Similar incidents with Dash 8s**

- On 9 June 1995, Ansett New Zealand Flight 703 from Auckland Airport to Palmerston North crashed west of the Tararua Ranges and 16 km east of Palmerston North airport during an instrument approach in inclement weather. A landing gear failure distracted the pilot and co-pilot, failing to notice the aircraft had descended into danger. This was complicated by a ground proximity warning not sounding until immediately before the crash. Four people were killed and most other passengers injured. The official investigation by Air Transport regulators found that the pilot and co-pilot should have abandoned the approach and dealt with the gear failure before attempting a new approach.
- 17 April 2005 Tobago Express 534 made an emergency landing at Piarco International Airport Trinidad following a failure of the nose gear.
- On 28 January 2002, a wheel detached from the starboard side of the undercarriage at an aircraft owned by Tyrolean Airways while taxiing before takeoff from Frankfurt Airport. The missing wheel was detected by visual inspection of the aircraft after landing in Salzburg Airport, and the wheel was later recovered. A probable cause was a displaced outer bearing grease seal, causing overheating.
- In 2004, an All Nippon Airways flight made an emergency landing with a failure of the right landing gear at Kōchi Ryōma Airport.
- On 13 March 2007, All Nippon Airways Flight 1603, a Q400 nose-landed safely at Kōchi Ryōma Airport after the front wheel of the aircraft failed to deploy. Bombardier advised all operators to inspect the nose landing-gear mechanism of the aircraft. On November 11, it was reported that the Japanese Transport Ministry is preparing to blame Bombardier for improper assembly procedures, in this case forgetting a necessary bolt. In Japan, this incident was followed only a week later when a Dash-8-100 made an emergency landing at Kumamoto Airport after extending its gear manually.
- 20 April 2007: a Dash 8 operated by Bahamasair suffered a port side landing gear collapse on landing at Governor's Harbour Airport, Bahamas; no injuries were reported but inquiries continue. The aircraft suffered left wing and propeller damage, and was dismantled and shipped off-site.
- In August 2007 A previously repaired Dash-8 had to return to Copenhagen 10 minutes after departure due to problems with the indicator lights of the landing gear.

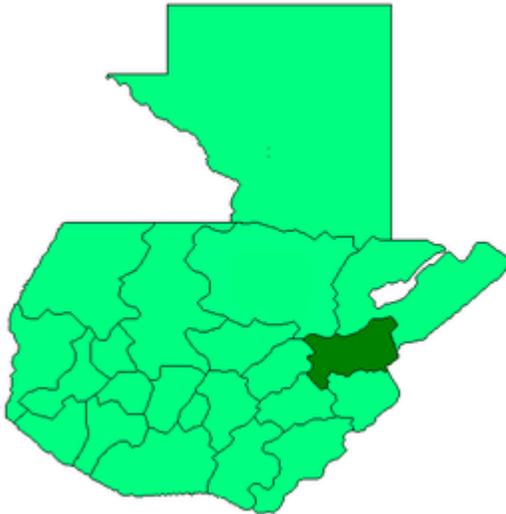
- On 12 August 2007, at 9:37 local time, a Dash 8 Q400 aircraft skidded off the runway at Gimhae International Airport, Busan, South Korea, injuring 6 people and damaging the aircraft, particularly the left propeller.
- On September 21, 2007, Lufthansa Flight LH4076 (tail number D-ADHA) with 68 passengers and four crew members was on flight to Florence, Italy when problems with the front landing gear were identified. The pilots were forced to make an emergency landing at Munich Airport. The aircraft landed with its front landing gear up. There were no injuries. The aircraft is owned by Augsburg Airways.
- 10 October 2007: A SAS Denmark Q400 headed for Poland returned to Copenhagen when the pilots got problems with the indicator lights of the front landing gear. The pilots got a yellow indication that the front landing gear hatch didn't close after taking off. Then they heard the hatch closing, then opening and closing again.
- On 12 October 2007, a Scandinavian Airlines flight scheduled for Copenhagen returns to Warsaw due to problems with the landing gear.
- On 15 November 2008, Flight PR272, operated by PAL Express, landed at its destination, Davao International Airport, from Zamboanga International Airport after declaring an emergency due to a problem with the aircraft's left main landing gear. No one onboard was injured and the aircraft landed safely.
- On 16 November 2008, Flight 4551, a Dash 8-300 operated by Piedmont Airlines landed at Philadelphia International Airport without its nosegear. There were no reported injuries.
- On 13 February 2009, Austrian Airlines Flight OS780, operated by Tyrolean Airways, a scheduled flight from Skopje to Vienna failed to retract landing gear after take-off and performed an emergency landing on Skopje Airport.
- On 12 May 2009, Colgan Air Flight 3268 reported tyre detachment after landing at Buffalo Niagara International Airport. It was discovered that a wheel bearing Overheated and snapped, leading to the detachment.
- On 30 September 2010, Air New Zealand subsidiary Air Nelson Flight 8841 was flying from Wellington International Airport to Nelson Airport but was diverted to Blenheim due to bad weather in Nelson. On landing, the nosegear on the Dash 8 Series 300 collapsed. No passengers or crew were injured.

## Chapter- 9

# Aviation Accidents and Incidents in 2008

## 2008 Aéreo Ruta Maya crash

2008 Aéreo Ruta Maya crash



### Accident summary

<b>Date</b>	2008-08-24
<b>Type</b>	Engine failure in midair
<b>Site</b>	Near Cabañas, Zacapa, 115 km east of Guatemala City
<b>Passengers</b>	12
<b>Crew</b>	2
<b>Injuries</b>	3
<b>Fatalities</b>	11 (incl. pilot and copilot)
<b>Survivors</b>	3 passengers
<b>Aircraft type</b>	Cessna Caravan 208

<b>Operator</b>	Aéreo Ruta Maya
<b>Tail number</b>	TG-JCS
<b>Flight origin</b>	La Aurora International Airport
<b>Destination</b>	El Estor

On August 24, 2008, an Aéreo Ruta Maya Cessna Caravan 208 carrying 10 American aid workers, two Guatemalan aid agency representatives, pilot and copilot en route from La Aurora International Airport, Guatemala City to El Estor, crashed 45 minutes after take off. The crash killed seven aid workers, two aid agency representatives, the pilot and the copilot and injured three aid workers. The source of the crash was engine failure, as was called in by the pilot, who attempted to make an emergency landing according to the Guatemalan civil aviation director Jose Carlos. The aid workers were members of Choice Humanitarian, a West Jordan, Utah based humanitarian group on their way to the village of Sepamac.

## Crash Casualties and Survivors

### Injured

- April Marie Jensen and daughter Sarah Jensen (19).
- Dan Lilljenquist (president and chief operating officer of Focus Services of Roy, Utah a company that handles customer service calls for other companies).

### Deceased

- Pilot Monica Bonilla and co-pilot Fernando Estrada.
- Guatemalan CHOICE Humanitarian representatives; Javier Rabanales and Walfred de Rabanales.
- Liz Johnson, (wife of CHOICE Humanitarian Chief Executive, Chris Johnson).
- Roger Jensen (48), maintenance manager of Smyth Companies and son, Zachary, (from Amery, Wisconsin).
- Four employees of Focus Services company, two from Utah and two from another call center in Cedar Falls, Iowa.
  - Cody Odekirk.
  - John Carter.
  - Jeff Reppe.
  - Lydia Silvia.

# 2008 Chelyabinsk Antonov An-12 crash

## 2008 Chelyabinsk An-12 crash

### Accident summary

<b>Date</b>	2008-05-26 13:15 GMT
<b>Site</b>	Chelyabinsk Balandino Airport approach  55°24'N 061°30'E / 55.4°N 61.5°E
<b>Passengers</b>	0
<b>Crew</b>	9
<b>Fatalities</b>	9 (all)
<b>Survivors</b>	0
<b>Aircraft type</b>	Antonov An-12
<b>Operator</b>	Moskovia Airlines
<b>Tail number</b>	RA-12957
<b>Flight origin</b>	Chelyabinsk
<b>Destination</b>	Perm

On 26 May 2008, a **Moskovia Airlines An-12 cargo aircraft crashed** near Chelyabinsk, Russia, killing all nine crew members when after departure to Perm it turned back and crashed near the airfield.

The aircraft transported cash money to Chelyabinsk , and was returning back to Perm without any cargo. It took off only after a second attempt at 18:02 (local time). On 18:09, the crew reported smoke in the cabin (probably resulted by short circuit) and decided to return to the airport. The first attempt to approach the runway was unsuccessful and the plane had to go around. Flying too low, it accidentally hit a power transmission line and crashed near the airfield at 18:15. The fire broke out after the crash; there were no survivors.

One of the flight recorders is severely damaged, it could make the investigation of disaster's causes more difficult. The aircraft was built in 1968.

# Iran Aseman Airlines Flight 6895

## Iran Aseman Airlines Flight 6895

### Accident summary

<b>Date</b>	24 August 2008
<b>Type</b>	Controlled flight into terrain
<b>Site</b>	Manas International Airport, Bishkek, Kyrgyzstan  <a href="#">43°3'28"N 74°28'43"E</a> / <a href="#">43.05778°N 74.47861°E</a>
<b>Passengers</b>	83
<b>Crew</b>	7
<b>Injuries</b>	18
<b>Fatalities</b>	65
<b>Survivors</b>	25
<b>Aircraft type</b>	Boeing 737-219 Advanced
<b>Operator</b>	Itek Air
<b>Tail number</b>	EX-009
<b>Flight origin</b>	Manas International Airport, Bishkek, Kyrgyzstan
<b>Destination</b>	Tehran Imam Khomeini International Airport, Tehran, Iran

**Iran Aseman Airlines Flight 6895**, an Itek Air Boeing 737-219 Advanced (registered as EX-009), was a charter flight operated on behalf of Iran Aseman Airlines which crashed on 24 August 2008 (at 20:30 local time) near Manas International Airport in Kyrgyzstan while en route to Imam Khomeini International Airport, Tehran, Iran. It crashed while returning to the airport of origin after experiencing technical difficulties.

Reports state that members of the crew reported "technical issues" with the plane shortly after take off. Within 10 minutes the crew reported a severe loss of cabin pressure. When they attempted to make an emergency landing, the aircraft crashed approximately 2 kilometres (1.2 mi) from the airport runway and burst into flames. The United States Air Force sent ambulances and fire apparatus with firefighters and medical personnel from its base at the airport in response to a request for assistance. The victims included ten members of a Bishkek high school sports team (AKA Kyrgyzstan National U18 Basketball Team).

## Casualties

There were 90 people on board (83 passengers and 7 crew) of whom 68 died. At least 22 are reported to have survived, including 2 crew members. The victims included ten members of a Bishkek high school sports team (AKA Kyrgyzstan National U18 Basketball Team).

Nationality	Passengers	Crew	Total	Survivors
 Canada	2	0	2	1
 Iran	52	1	53	10
 Kazakhstan	3	0	3	0
 Kyrgyzstan	24	6	30	11
 People's Republic of China	1	0	1	0
 Turkey	1	0	1	0
<b>Total</b>	<b>83</b>	<b>7</b>	<b>90</b>	<b>22</b>

## Investigation

The Interstate Aviation Committee (MAK) attempted to retrieve data from the flight-data and cockpit voice-recorders, which were badly damaged in the fire which destroyed most of the aircraft. While disassembling the casing, both the mechanisms of the tape recorder and the tape media in the voice recorder were found in damaged condition, but the MAK attempted to read the data from the damaged media.

The MAK has drawn final conclusions. The report claims that the forward left cabin door was not closed completely, and that the person who closed it was an engineer who was not listed among those (in the Cabin Attendant Manual) who were supposed to close the door. The report concludes that the aircraft originally lost cabin pressure due to this error, but that it was just a contributing factor to the crash. The plane could have landed with reduced pressure, but the pilot failed to maintain visual contact with the runway, failed to properly monitor altitude and ignored automated warnings about terrain proximity (TAWS).

It has been reported that both the captain and co-pilot have been sentenced to five years and five years and two months respectively in a penal colony for the crash.

## Aircraft

The crashed plane first flew on June 16, 1980 and was delivered on July 1 of the same year to Air New Zealand as ZK-NAS. In 1995, it changed hands to Copa Airlines, and in 2003 again changed hands to Phoenix Aviation. In 2005, Phoenix Aviation was rebranded as AVE.com, and in April 2006, it changed hands to Itek Air.

Itek Air, along with all air carriers certified by the authorities with responsibility for regulatory oversight of Kyrgyzstan, is included in a European Union list of banned airlines for safety concerns and is therefore not permitted to fly over the territory of the EU. In May 2008, EX-009 passed a full technical inspection.

## 2008 Mexico City plane crash

### 2008 Mexico City Interior Ministry plane crash



Cordoned-off crash site with burned buildings in background, with Mexican Police guarding the area

#### Accident summary

<b>Date</b>	November 4, 2008
<b>Site</b>	Las Lomas, Mexico City
<b>Passengers</b>	5
<b>Crew</b>	3
<b>Injuries</b>	40 bystanders seriously injured 1,200 residents evacuated 30 cars destroyed
<b>Fatalities</b>	16 (all 9 on board plus 7 on ground)
<b>Survivors</b>	0

<b>Aircraft type</b>	Learjet 45
<b>Operator</b>	Secretaría de Gobernación
<b>Tail number</b>	XC-VMC
<b>Flight origin</b>	Ponciano Arriaga International Airport, San Luis Potosí, S.L.P.
<b>Destination</b>	Mexico City International Airport

An official Mexican Interior Ministry aircraft **crashed in central Mexico City** at around 18:45 local time on November 4, 2008. Mexican Secretary of the Interior Juan Camilo Mouriño, who was aboard the plane, was killed in the crash, along with the other seven people on board and at least six people on the ground.

The plane crashed in rush-hour traffic close to the intersection of Paseo de la Reforma and the Anillo Periférico, in the upscale Las Lomas residential and business district.

## Details



A picture of Reforma Avenue, the area in which the crash occurred

The Interior Secretariat-owned Learjet 45 (registration XC-VMC) left Ponciano Arriaga International Airport in San Luis Potosí, S.L.P., and was 12 km (7.5 mi) short of landing at Mexico City International Airport when it crashed amidst rush hour traffic into the ground in the heart of the financial district at approximately 18:45 due to currently unknown reasons, causing an explosion that "reached higher than the buildings." According to Secretary of Communications and Transport Luis Téllez, there were no survivors. Téllez also stated that the crash appeared to be an accident.

The crash heavily damaged the surrounding area, setting multiple cars and a newsstand on fire and injuring at least 40 people. Body parts were reported to be scattered around the wreckage.



A Canadian-built LearJet-45

A joint investigation between Mexican and American experts is currently taking place. Audio and video transcripts show that the aircraft was instructed to reduce speed three miles (5 km) before entering the approach, and later show that it complied with instructions a minute and 12 seconds later. The aircraft dove into the ground without having given any sort of distress call. Hence, dialogue with air control was brief, and the pilot's possibilities to react to the emergency are thought to have been quite limited. Mexican air traffic officers have published that wake turbulence, left behind by a Mexicana Boeing 767 ahead of the Learjet, possibly affected the crashed aircraft. At

12 km from touchdown on a common approach slope, the aircraft should have been about 630 meters above the terrain.

## **Deaths**

Among the dead was Secretary of the Interior Juan Camilo Mouriño, top aide to President Felipe Calderón. Mouriño was in charge of the fight against the drug trade in Mexico.

Also on the plane were:

- José Luis Santiago Vasconcelos, former assistant attorney general and current head of the federal technical secretariat for implementing the recent constitutional reforms on criminal justice and public security.
- Miguel Monterrubio, director general of social communications with the Interior Secretariat.
- Arcadio Echeverría, coordinator of special events, office of the Interior Secretary.
- Norma Díaz, director in the communications department of the Interior Secretariat.
- Julio César Ramírez Dávalos, pilot.
- Álvaro Sánchez, co-pilot.
- Gisel Carrillo, stewardess.

## Government response



Police guard the crash site, with burned cars visible behind them.

President Felipe Calderón addressed the nation live on national television. He spoke of Mouriño as "one of his closest friends and collaborators" and conveyed his condolences to the family. He stated that Mouriño was a man "who always fought to make Mexico a better country" and he guaranteed the nation that there would be an investigation on the causes behind the plane crash. Calderón encouraged Mexican men and women to continue fighting for a better country, "no matter how difficult or painful any rising event may be".

Marcelo Ebrard, Head of Government of the Federal District, also conveyed his condolences to the family of the Secretary of Interior and assured that Mexico City's government would issue a statement to the nation regarding the issue. Ebrard later said that the Mexico City government would give financial aid to all of the injured receiving medical care, irrespective of whether they had been admitted to private or public hospitals, and he stated that the local authorities had handed over all recordings taken by surveillance video cameras to the federal attorney general (PGR), along with all witness accounts that local police were able to gather.

Several other political figures have made statements regarding the crash, including various senators from the Institutional Revolutionary Party (PRI) and Germán Martínez, leader of the ruling National Action Party (PAN).

A group of senators – from different political parties – have asked the Procuraduría General de la República (PGR) to investigate the accident so that all doubts and inquiries on the event may be cleared.



Building under repair, two weeks after the crash

## **Results of investigation**

The black boxes were sent to the United States for analysis. Information gathered from 38 minutes of cabin conversations, along with video footage from a security camera on top of the Omega Office Building, provided evidence for an official statement by the Mexican Government that the crash was the result of pilot error. The Learjet was ruled to have been following too close to a Boeing 767-300 jet operated by Mexicana Airlines, and therefore suffered violent wake turbulence caused by the larger jet. The minimum

allowable distance for a lighter plane to follow behind a heavier plane is 5 nautical miles (9.3 km); the Learjet 45 was only 4.1 nautical miles (7.6 km) behind the Mexicana Airplane.

Investigations into the accident have discovered several issues with the Mexican Government's use of private contractors as pilots of government aircraft, especially important in cases such as this, when the passengers are high level officials. Aviación Ejecutiva SA de CV is a company out of Toluca Mexico, which currently holds the contract with the Mexican Federal government to provide services of maintenance and pilots for the Federal airline fleet.

Benito Juarez Airport restricts light general aviation, which typically flies from Toluca International Airport. Only some government areas handle small and medium planes from facilities in Mexico City's Benito Juarez International Airport.

Several key elements of the accident have emerged during the investigation:

- The flight crew appears to have had little experience in operation of the LearJet 45, and an investigation concerning how they received their certification is currently underway.
- Conversation among the flight crew indicates they had little familiarity with the operation of the plane, failing on several occasions to enter the proper information into the cockpit instruments; they did not follow a proper flight plan, and had navigational difficulties, missing their original arrival to San Luis Potosi by over 250 nautical miles (460 km). Further it was stated that their in flight conversations were more of the nature of 2 people driving a car, not of trained pilots following a proper flight plan.
- The flight crew waited over 1.3 minutes to follow the order from air traffic control to reduce their velocity. The Learjet 45 had been traveling at 262 knots (485 km/h), while the Mexicana 767-300 was flying at 185 knots (343 km/h), which caused the Learjet 45 to get too close to the 767-300. The accident happened during peak hour at the airport with heavy air traffic; this has brought criticism from top government officials as to their handling and scheduling of risky flight plans for top government officials.
- The accident happened just at the point where aircraft entering Mexico City traveling on a 160° course (south-southeast) make a sharp left turn to align with the runways of Benito Juarez International Airport, at 52° (northeast). When the Learjet 45 reached the turning point, too close behind the Mexicana 767-300, it encountered violent wake turbulence, causing the plane to invert into a nose down attitude. At this point, the plane would have been flying at 9,000 feet (2,700 m) MSL, which is about 1700 ft (500 m) over the ground.
- The flight crew was unable regain control due to airspeed, inverted nose-down position, and insufficient altitude. The flight crew did manage to reduce the angle of descent from 45 to 40 degrees before hitting the ground at over 300 miles per hour (480 km/h).

## Chapter- 10

# Aviation Accidents and Incidents in 2009

## 2009 Andhra Pradesh Chief Minister helicopter crash

### 2009 Andhra Pradesh helicopter crash



A Bell 430 similar to the helicopter involved in the accident

#### Occurrence summary

<b>Date</b>	September 2, 2009
<b>Type</b>	Spatial disorientation resulting from a mechanical failure, pilot error
<b>Site</b>	Kurnool, Andhra Pradesh, India
<b>Fatalities</b>	5
<b>Survivors</b>	0
<b>Aircraft type</b>	Bell 430
<b>Operator</b>	Andhra Pradesh Government
<b>Tail number</b>	VT-APG

The **2009 Andhra Pradesh helicopter crash** occurred on September 2, 2009 near Rudrakonda Hill, 40 nautical miles (74 km) from Kurnool, Andhra Pradesh, India. The helicopter was a Bell 430 helicopter owned by the Andhra Pradesh Government, and registered VT-APG. Fatalities included Y. S. Rajasekhara Reddy, the Chief Minister of the Indian state of Andhra Pradesh.

## **Accident**

The Bell 430 helicopter took off from Begumpet Airport, Hyderabad, and soon encountered bad weather. The official accident report states that the aircraft's weather radar was red, meaning that the weather was extreme. The flight crew decided to fly slightly left of their planned route. The pilots soon noticed that the weather was getting worse, and agreed that they would turn left after crossing Krishna River. Begumpet and Shamshabad Air Traffic controllers lost contact with the aircraft at 9:02 am while it was passing through the dense Nallamala forest area.

However, shortly after 09:20 IST, the flight crew encountered a problem with the transmission oil pressure. The pilots became engaged in finding out emergency checklist procedures for the transmission oil pressure, but they were unable to locate them.

Soon after, the co-pilot continually called out "go around", likely indicating that he thought the aircraft would soon crash into something. During the last 14 seconds the rate of descent was extremely high. Thereafter helicopter crashed due to loss of control resulting in high rate of descent in down draught. The helicopter impacted the ground in a steep left bank and all occupants on board died due to crash injuries.

## **Aftermath**

The state government of Andhra Pradesh and the Government of India launched one of the largest search and rescue operations in the history of the country. The state's security officials mentioned that bad weather was hindering the search and rescue efforts. The Home Ministry of India dispatched 5000 CRPF soldiers for the operation while the Defence Ministry of India ordered the Indian Air Force to comb the area using low altitude planes and the Sukhoi-30MKI equipped with thermal imaging systems. In addition, police personnel from six districts were involved in the ground search. Andhra Pradesh's anti-Naxal forces were also deployed in the area, owing to their familiarity with the jungle terrain there. Local tribal residents from this part of the state assisted with the search mission. Patrol parties also combed the Krishna river for the remains of the helicopter. ISRO's RISAT-2 satellite was also deployed to search the area, but the 41 high-resolution images of the area were unable to trace the helicopter. The wreckage of the helicopter was finally spotted by an IAF Mi-8 helicopter at 0820h within less than 24 hours after contact was lost with the aircraft.

## **Death of Y. S. Rajasekhara Reddy**

The Indian Prime Minister's Office confirmed the helicopter's crash on the morning of 3 September and the death of all aboard, including that of Y. S. Rajasekhara Reddy. The Director General of Police said that the bodies of Reddy and others were charred beyond recognition and had to be identified on the basis of clothing. The autopsy of all the bodies was carried out at Kurnool Medical College.

Reddy was the Chief Minister of the Indian state of Andhra Pradesh. He represented the Indian National Congress party. He was elected to the 9th, 10th, 11th and 12th Lok Sabha from the Kadapa constituency for four terms and to the Andhra Pradesh Assembly for five terms from the Pulivendula constituency. He also holds the record of not losing any election throughout his political career. In 2003 he undertook a three-month-long paadayaatra, or walking tour, across several districts in Andhra Pradesh. He led his party to victory in the next general and assembly elections held in 2004 and also the next election in 2009. He is the only chief minister of AP to have come back to power after being in office for a full term.

## **Investigation**

Although the sparsely populated forest area is considered to be stronghold of the outlawed Naxal communist insurgents, the National Security Advisor of India ruled out the possibility of the Naxals bringing down the helicopter.

The investigation eventually concluded that the factors that caused that crash included the fact that the crew became fixated for more than six minutes in trying to find out what was behind the problem with their transmission oil pressure system, and they became distracted from the worsening weather. They also noted that the flight crew was flying in Instrument Meteorological Conditions whereas the flight plan was cleared for VFR flying, and the flight crew never discussed the bad weather, diverting, or returning to base.

# 2009 Aéro-Frêt Antonov An-12 crash

## 2009 Aéro-Frêt Antonov An-12 crash



An Antonov AN-12, similar to the accident aircraft

### Accident summary

<b>Date</b>	26 August 2009
<b>Type</b>	In-flight fire and mid-air break up
<b>Passengers</b>	1
<b>Crew</b>	5
<b>Fatalities</b>	6
<b>Aircraft type</b>	Antonov An-12BK
<b>Tail number</b>	TN-AIA
<b>Flight origin</b>	Pointe Noire Airport
<b>Destination</b>	Maya-Maya Airport, Brazzaville

The **2009 Aéro-Frêt Antonov An-12 crash** was the crash of an Antonov An-12 into a cemetery at Brazzaville, Congo on 26 August 2009.

## Aircraft

The aircraft involved was an Antonov An-12BK of Aéro-Frêt, registration TN-AIA. The aircraft was manufactured in 1966, msn 6344607.

## Accident

The aircraft crashed into a cemetery at Nganga Lingolo on the outskirts of Brazzaville while on a flight from Pointe Noir Airport. The accident happened at 06:00 local time. The five Ukrainian crew and the Congolese passenger died in the accident. The accident site is 11 kilometres (6.8 mi) south east of Maya-Maya airport. The aircraft was due to

land on runway 05, it was carrying a cargo of food, a minibus and three other vehicles. The METAR in force at the time of the accident was METAR FCBB 260600Z 27006KT 7000 SCT016 OVC130 21/20 Q1015 NOSIG (translation: Metar for Maya-Maya airport, issued at 06:00 UTC on the 26th of the month. Wind direction 270° at 6 knots (11 km/h), visibility 7 kilometres (4.3 mi), scattered clouds at 1,600 feet (490 m), overcast at 13,000 feet (4,000 m), temperature 21°C, dewpoint 20°C, QNH 1013 millibars, no significant change expected in next few hours). At the time of the accident it was drizzling and visibility was 3.5 kilometres (2.2 mi). Eyewitnesses reported that one of the wings was on fire before the crash, and that the aircraft broke up in mid-air. The carriage of the passenger was in contravention of the law in the Congo which bans AN-24s from use as passenger aircraft.

## Investigation

The accident is being investigated by the Congolese National Agency for Civil Aviation.

## 2009 Iranian Air Force mid-air collision

### 2009 Iranian Air Force mid-air collision

#### Mid-air collision summary

<b>Date</b>	22 September 2009
<b>Total fatalities</b>	7

#### First aircraft

<b>Type</b>	Ilyushin IL-76MD
<b>Name</b>	<i>Simorgh</i>
<b>Operator</b>	Iranian Air Force
<b>Tail number</b>	5-8208
<b>Crew</b>	7
<b>Fatalities</b>	7
<b>Survivors</b>	0

#### Second aircraft

<b>Type</b>	Northrop F-5E Tiger II
<b>Operator</b>	Iranian Air Force

<b>Crew</b>	2
<b>Injuries</b>	2
<b>Survivors</b>	2

The **2009 Iranian Air Force mid-air collision** on September 22, 2009 involved an Ilyushin IL-76MD and a Northrop F-5E Tiger II aircraft. The accident resulted in the destruction of Iran's only functional aircraft equipped with an Airborne Warning and Control System (AWACS).

## **Accident**

A military parade was held in Tehran on September 22, 2009 to mark the anniversary of the start of the 1980–1988 Iran–Iraq War, and was a send-off for President Mahmoud Ahmadinejad who was to give a speech at the United Nations General Assembly in New York on September 23. A fly-past by the Iranian Air Force was part of the parade. An AWACS-equipped Ilyushin-76MD was to be escorted by several Northrop F-5E Tiger II aircraft. The Il-76MD and one of the escorts collided in mid-air, with the Ilyushin subsequently crashing in flames at Varamin—on the site of the tomb of former Iranian leader Ayatollah Khomeini—killing all seven crew members on board. According to Western observers, no mayday call was made by either aircraft indicating a sudden event. The accident was initially reported on the Islamic Republic News Agency website, but was withdrawn 5 hours later. A video of burning wreckage from the military aircraft surrounded by fire trucks was also shown on state TV. However, president Ahmadinejad made no mention of it during his speech at the parade.

## **Aircraft involved**

The escort aircraft was a US-made Northrop F-5E Tiger II. The other aircraft involved was an Ilyushin Il-76MD, a Soviet-built transport aircraft, fitted with AWACS system for the Iraqi Air Force. It was evacuated to Iran in 1991 during the First Gulf War, given serial number 5-8209 and renamed from "Baghdad" to "Simorgh" (a flying creature of Iranian fable which performs wonders in mid-flight). Russian technicians reportedly upgraded the aircraft and installed a newer Iranian-made radar, which could trace flying objects within 1,000 km from Iranian borders. The aircraft came into service in April 2008 and was the only AWACS-equipped Iranian aircraft.

# Bangkok Airways Flight 266

## Bangkok Airways Plane Crash - Flight 266



An ATR 72 of Bangkok Airways

### Runway Overrun summary

<b>Type</b>	Runway overrun
<b>Passengers</b>	68
<b>Crew</b>	4
<b>Injuries</b>	41
<b>Fatalities</b>	1 (pilot)
<b>Survivors</b>	71
<b>Aircraft type</b>	ATR 72-212A
<b>Aircraft name</b>	<i>Pha Ngan</i>
<b>Operator</b>	Bangkok Airways
<b>Tail number</b>	HS-PGL
<b>Flight origin</b>	Krabi Airport, Thailand
<b>Destination</b>	Samui Airport, Thailand

**Bangkok Airways Flight 266** was a scheduled domestic service to Samui Airport, Thailand, which overran the runway on landing and crashed into an old and unmanned control tower on 4 August 2009.

## **Aircraft**

The aircraft involved was an ATR 72-212A, registration HS-PGL, msn 670. The aircraft made its first flight on 6 June 2001 with French registration F-WWER. It entered service with Bangkok Airways on 16 July 2001 re-registered HS-PGL. On 29 May 2006 it entered service with Siem Reap Airways International, returning to Bangkok Airways on 7 January 2009 after Siem Reap Airways International ceased trading. The aircraft was named *Pha Ngan*, and has been in service for approx. 20,000 hrs.

## **Accident**

The aircraft is reported to have skidded off the runway and hit an old and unmanned control tower which was used as part of a fire-fighting stations. The accident happened at around 14:15 local time (07:15 UTC). One pilot was reported to have been killed. The co-pilot, who was stuck in the aircraft for more than two hours, was among the last evacuated from the stricken plane. Serious injuries included four passengers — two Britons, one Italian and one Swiss suffered broken legs, while two other Britons suffered less severe injuries. The co-pilot also had leg injuries. A total of 41 people were injured. The METAR in force at the time of the accident was METAR VTSM 040700Z 29015KT 9000 FEW020TCU SCT120 BKN300 31/25 Q1007 A2974 TCU-NW. This translates as METAR for Samui Airport, issued on the 4th of the month at 07:00 UTC, wind at 15 knots, direction 290° visibility 9 km, few clouds at 2,000 ft, scattered clouds at 12,000 ft, broken clouds at 30,000 ft, temperature 31°C, dewpoint 25°C, altimeter 1007 millibars or 29.74 inches, towering cumulonimbus to north west.

## Chapter- 11

# Aviation Accidents and Incidents in 2010

## 2010 Air Service Berlin Douglas C-47 crash

### 2010 Air Service Berlin C-47 crash



D-CXXX, the aircraft involved

#### Accident summary

<b>Date</b>	19 June 2010
<b>Type</b>	Under investigation by BFU
<b>Site</b>	Near Berlin Schönefeld Airport
<b>Passengers</b>	25
<b>Crew</b>	3
<b>Injuries</b>	7
<b>Fatalities</b>	0
<b>Survivors</b>	28
<b>Aircraft type</b>	Douglas C-47 Skytrain
<b>Aircraft name</b>	<i>Rosinenbomber</i>
<b>Operator</b>	Air Service Berlin
<b>Tail number</b>	D-CXXX

<b>Flight origin</b>	Berlin Schönefeld Airport
<b>Destination</b>	Berlin Schönefeld Airport

On 19 June 2010, a vintage Douglas C-47 Skytrain aircraft crashed shortly after take-off from Berlin Schönefeld Airport to a sightseeing flight over Berlin, which was operated by **Air Service Berlin**, a provider of event flights. There were no fatalities, but seven out of the 28 passengers and crew were injured.

## Aircraft

The aircraft involved was a Douglas C-47 Skytrain (registered D-CXXX, serial number 16124/32872), a preserved *Rosinenbomber* (English: *Raisin bomber*). It had been built in 1944 and was powered by two Pratt & Whitney R-1830-92 engines. It had participated in the 1947–49 Berlin Airlift, and because of the importance of this event for the city of Berlin it was acquired for sightseeing flights in 2000, as the last surviving aircraft of its type in Europe. Also, the airframe was used as one of the last two aircraft to take off from Berlin Tempelhof Airport (one of the Airlift airports) when it was closed on 30 October 2008.

## Accident

Shortly after take-off at around 15:00 local time from Berlin Schönefeld Airport for a sightseeing flight over the city centre of Berlin, the left engine failed and the aircraft was unable to gain height. The pilots went into a left turn and set down the aircraft into a field near the construction site for the new Berlin-Brandenburg International Airport. There were three crew members and 25 passengers onboard (among them Stefan Kaufmann, a member of Bundestag), all of which were able to leave the aircraft unassisted. Reports claimed that there had been seven injured people, four of which were taken to hospital. A smaller fire that arose from spilled fuel was put out by firefighters who had rushed to the accident scene from the nearby airport. Due to the subsequent lack of emergency services, Schönefeld Airport had to be closed for 15 minutes.

## Aftermath

The C-47 aircraft suffered substantial damage to its tail and left wing. Nevertheless, due to its historic significance (and because it was the signature airframe of the company), Air Service Berlin stated that it intended a complete repair and restoration. Donations towards the cost of the restoration had been received from across the world, including a symbolic 100 USD from Gail Halvorsen, the pilot who is attributed to having started the dropping of sweets for children from aircraft participating in the Berlin Airlift.

# 2010 Okhaldhunga aircraft crash

## 2010 Okhaldhunga aircraft crash



A Tara Air de Havilland Canada DHC-6 Twin Otter, similar to the aircraft involved in the accident

### Accident summary

<b>Date</b>	December 15, 2010
<b>Type</b>	Under investigation
<b>Site</b>	Bilandu Forest, Shreechaur, Okhaldhunga District, Nepal
<b>Passengers</b>	19
<b>Crew</b>	3
<b>Fatalities</b>	22 (all)
<b>Survivors</b>	0
<b>Aircraft type</b>	de Havilland Canada DHC-6 Twin Otter
<b>Operator</b>	Tara Air
<b>Tail number</b>	9N-AFX
<b>Flight origin</b>	Lamidanda Airport, Lamidanda, Nepal
<b>Destination</b>	Tribhuvan International Airport, Kathmandu, Nepal

On December 15, 2010, a Tara Air de Havilland Canada DHC-6 Twin Otter crashed in Nepal shortly after take-off on a domestic passenger flight between Lamidanda Airport, Lamidanda, and Tribhuvan International Airport, Kathmandu. The wreckage of the aircraft, registration *9N-AFX*, was found in Biland forest near the village of Shreechaur, Okhaldhunga District, Nepal, the morning after the crash. All 19 passengers and three

crew aboard were killed in the crash. There was initial speculation that bad weather or the overloading of the aircraft might have caused the crash. An investigation into the crash was launched by Nepalese authorities after the accident site was located.

## **Flight**

Five minutes after taking off from Lamidanda Airport, Lamidanda, at 15:08 local time, the left wing of the aircraft impacted land and the DHC-6 crashed. The aircraft was reportedly scheduled to land in Kathmandu at around 15:35, 35 minutes after departing Lamidanda, but it did not. All 19 passengers and three crew members aboard were killed in the crash.

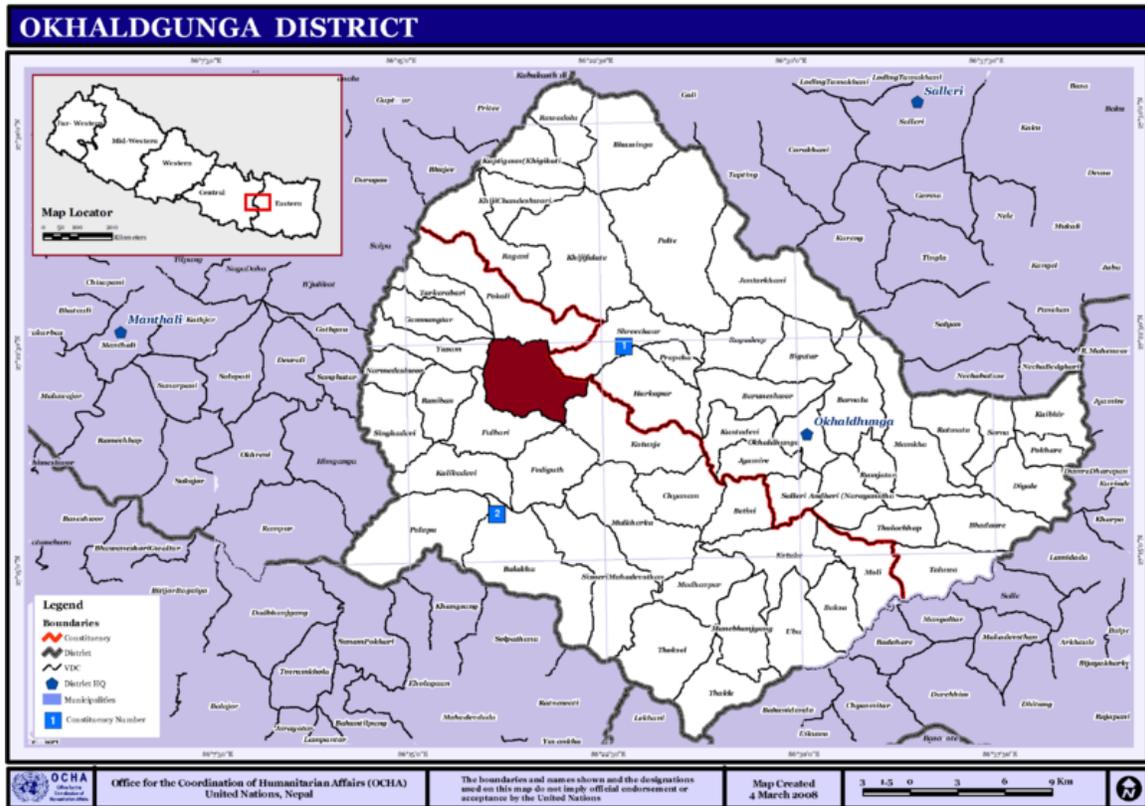
## **Search operation**

Helicopters searched for the wreckage of the aircraft on the day of the crash, but was called off during the night because of poor visibility, even though night vision equipment was installed on the helicopters. The day after the crash, the Nepalese Army located the wreckage in Okhaldhunga, Nepal, at an altitude of approximately 2,700 metres (8,900 ft). All 22 bodies were recovered by rescuers. The wreckage of the aircraft reportedly covered 200 square metres (2,200 sq ft), and, according to a police spokesperson, had "broken up completely".

## **Initial speculation**

There was initial speculation that bad weather caused the crash. The chief executive of Tara Air, Vijay Shrestha, said: "It showed poor visibility at different levels of the atmosphere. Thick haze at lower levels and as thick a cloud higher up could have caused poor visibility." There was also speculation that the aircraft could have been overloaded, but Shrestha refuted these allegations. "The aircraft's maximum take-off weight is 12,500 pounds, while the Twin Otter's take-off weight that crashed killing all 22 on board was 12,280 pounds," he said. "So it was underweight by 220 pounds, the allegation is wrong."

# Investigation



The location of the crash in Shreechaur/Bilandu, Okhaldhunga District, Nepal

An investigation into the crash was launched after the accident site was located. Nepal's Ministry of Tourism and Civil Aviation formed a group of five investigators to find the cause of the crash. The five were ordered to present a report on the accident by 90 days after the crash occurred. The cockpit voice recorder was recovered from the scene of the accident, and, as of December 24, 2010, was to be sent to India or Europe for analysis.

A separate investigation was also started into alleged irregularities, which, according to *The Himalayan Times* included "carrying passengers by issuing tickets in other's name, not verifying identity while checking-in passengers and the process of immigration of the foreign nationals who lost their lives in the crash." Police arrested the general manager of a travel agent based in Kathmandu over suspicions of tax evasion during the sale of tickets for the flight.

## Chapter- 12

# Aviation Accidents and Incidents in 2011

## Iran Air Flight 277

### Iran Air Flight 277



Iran Air Boeing 727 EP-IRR, similar to the aircraft involved  
in the accident

#### Accident summary

<b>Date</b>	January 9, 2011
<b>Type</b>	Under investigation
<b>Site</b>	Iran
<b>Passengers</b>	93
<b>Crew</b>	12
<b>Injuries</b>	26
<b>Fatalities</b>	77
<b>Survivors</b>	28
<b>Aircraft type</b>	Boeing 727-286Adv
<b>Operator</b>	Iran Air
<b>Tail number</b>	EP-IRP
<b>Flight origin</b>	Mehrabad International Airport, Tehran, Iran

**Destination** Urmia Airport, West Azarbaijan province, Iran

**Iran Air Flight 277** was a domestic scheduled passenger flight which, on January 9, 2011, crashed after a go-around was initiated during final approach in poor weather conditions to Urmia Airport, West Azarbaijan province, Iran. The aircraft operating the flight, between Mehrabad International Airport, Tehran, Iran, and Urmia, was an Iran Air Boeing 727-286Adv, registration EP-IRP.

## Aircraft

The aircraft involved in the accident was a Boeing 727-286Adv, registration EP-IRP, built in 1974. The aircraft spent a long time out of service, being impounded at Baghdad, Iraq from 1984-90, and then stored from 1991-2002, following which it was overhauled and returned to service.

## Accident

The flight was travelling between Tehran and Urmia and crashed on its final approach near Urmia Airport near a lake. The accident occurred at around 19:45 local time (16:15 UTC), and was reportedly caused by poor weather. The aircraft had missed its first attempt at landing, it either crashed during a go-around, or while attempting to return to Tehran. The weather conditions at the time of the accident included snow and low visibility.<sup>Note 1</sup> Upon impact, the aircraft broke into multiple pieces, though there was no fire or explosion. There were differing initial reports as to the type of aircraft that crashed, with either a Fokker 100 or a Boeing 727 claimed to have crashed, although the aircraft was later confirmed to be a 727.

The number of people on board was unclear; according to RIA Novosti 95 passengers were on the aircraft, while Reuters reported 156 passengers and the Associated Press claimed 105 passengers. Later reports put the total at either 105 or 106 people on board, with between 10 and 12 crew and either 95 or 94 passengers. The Iran Civil Aviation Organization stated the day after the crash that a total of 93 passengers and 12 crew were on board, according to the manifest of the flight.

## Casualties

At least 77 people were killed and 26 were injured. Rescue efforts were complicated by heavy snow in the area. A local official stated that "[the] problem at the moment for rescue work is the heavy snow," which he said was around 70 cm (28 in) deep at the site of the crash. In the aftermath of the crash, 36 ambulances and 11 hospitals were utilized in the rescue operations.

# Passengers

## Nationalities of passengers

Nationality	Fatalities		Total
	Passengers	Crew	
 Iraq	4	0	4
 Iran	63	10	73
<b>Total Fatalities:</b>			<b>77</b>

## Investigation

Iran ordered an inquiry into the crash. A day after the accident, searchers at the location had obtained both the flight's cockpit voice recorder and the flight data recorder. Iran's Transport Ministry stated that the investigation will comprise several working groups which will include specialists in various areas, including aircraft structure, engine parameter recordings and pilot operations. The investigation will be overseen by the Iran Civil Aviation Organization. The flight data recorder and cockpit voice recorder were recovered from the wreckage and taken to Tehran for analysis.

## Kolavia Flight 348

### Kolavia Flight 348



A Kogalymavia Airlines Tupolev Tu-154M, similar to the aircraft involved in the accident

### Accident summary

<b>Date</b>	1 January 2011
<b>Type</b>	Under investigation
<b>Site</b>	Surgut International Airport, Surgut,

Russia  
 [61°20′30″N 73°24′10″E](#) / [61.34167°N 73.40278°E](#)  
Coordinates:  
 [61°20′30″N 73°24′10″E](#) / [61.34167°N 73.40278°E](#)

<b>Passengers</b>	116
<b>Crew</b>	8 (+10 off-duty crew)
<b>Injuries</b>	43
<b>Fatalities</b>	3
<b>Aircraft type</b>	Tupolev Tu-154B-2
<b>Operator</b>	Kogalymavia
<b>Tail number</b>	RA-85588
<b>Flight origin</b>	Surgut International Airport
<b>Destination</b>	Domodedovo International Airport

**Kolavia Flight** was a domestic scheduled passenger flight from Surgut International Airport, Surgut, Russia, to Domodedovo International Airport, Moscow, Russia. On 1 January 2011, the Kogalymavia Tupolev Tu-154-B2 operating the flight caught fire while taxiing for take-off from Surgut. Three people were killed, and 43 were injured, four seriously. The aircraft was destroyed in the fire.

## Aircraft

The aircraft involved was a Tupolev Tu-154B-2, registration RA-85588, msn 83A/588. The aircraft first flew in 1983. It entered service with Aeroflot as СССР-85588 and was re-registered RA-85588 in June 1993. It then served with Mavial Magadan Airlines between October 1994 and August 1999, when it began service with Vladivostok Air. Kogalymavia acquired the aircraft in April 2007.

## Accident

Flight 348 was carrying eight crew, 116 passengers and 10 off-duty employees of Kogalymavia. As the aircraft was taxiing for take-off from Surgut International Airport, a fire developed in one of the engines and an emergency evacuation was ordered. It was initially reported that the aircraft had made an emergency landing following an engine flame-out on take-off. The accident occurred at 13:12 local time (08:12 UTC). The METAR in force at the time of the accident was METAR USRR 010800Z 16002MPS 5000 BR FEW006 BKN100 M30/M33 Q1052 TEMPO 2000 BR SCT003 RMK QBB200 QFE784 07////45.<sup>Note 3</sup> Four people were killed, and 43 people were injured, from smoke inhalation or burns. The aircraft was operating a domestic scheduled flight from Surgut to

Moscow. The aircraft was burnt out by the fire, which was extinguished by 13:45 local time. Members of the 1990s Russian pop group Na Na were onboard the plane at the time. A statement by the Russia's Ministry of Health and Social Development gave figures of 117 passengers and 18 crew.

## **Aftermath**

Following the accident, Russia's Federal Transport Oversight Agency advised airlines that they should stop using the Tu-154B until the accident had been investigated. This would affect 14 aircraft, all other Tu-154s in service are Tu-154Ms. Kogalymavia pledged to pay compensation of pyб 20,000 to those passengers involved in the accident. The Russian insurance company Sogaz stated that those injured in the accident would receive between pyб 20,000 and pyб 2,000,000 compensation. The families of those killed would receive pyб 2,000,000 compensation. Authorities in the Khanty-Mansi Autonomous Okrug — Yugra had allocated pyб 10,000,000 to assist the families of those injured in the accident. It was reported on 6 January that all three bodies had been recovered from the wreckage.

## **Investigation**

Russia's Interstate Aviation Committee (MAK) opened an investigation into the accident. A separate criminal investigation was opened to investigate allegations of breaching transport and fire safety rules. The Flight Data Recorder and Cockpit Voice Recorder were recovered from the wreckage of the aircraft. Russia's Ministry of Emergency Situations stated that the initial investigations pointed towards an electrical short circuit being the cause of the fire, which started in the central area of the fuselage, ahead of the rear-mounted engines. The fire started between frames 65 and 68. In a statement issued on 4 January, the MAK ruled out the engines or auxiliary power unit as the cause of the fire.