

= 1999 South Dakota Learjet crash =

On October 25 , 1999 , a chartered Learjet 35 was scheduled to fly from Orlando , Florida , to Dallas , Texas . Early in the flight , the aircraft , which was cruising at altitude on autopilot , quickly lost cabin pressure and all on board were incapacitated due to hypoxia ? a lack of oxygen . The aircraft failed to make the westward turn toward Dallas over north Florida and continued on its northwestern course , flying over the southern and midwestern United States for almost four hours and 1 @, @ 500 miles ( 2 @, @ 400 km ) . The plane ran out of fuel over South Dakota and crashed into a field near Aberdeen after an uncontrolled descent . The four passengers on board were PGA golf star Payne Stewart , his agents , Van Ardan and Robert Fraley , and Bruce Borland , a highly regarded golf architect with the Jack Nicklaus golf course design company .

= = Flight chronology = =

Note : all times are presented in 24 @-@ hour , military format . Because the flight took place in both the Eastern time zone ? Eastern Daylight Time ( EDT ) ? and the Central Time zone ? Central Daylight Time ( CDT ) ? all times are given in this article in Coordinated Universal Time ( which is indicated by the time followed by the letter Z )

= = = Departure = = =

On October 25 , 1999 , Learjet 35 , registration N47BA , operated by Sunjet Aviation of Sanford , Florida , departed Orlando International Airport ( IATA : MCO , ICAO : KMCO ) at 1319Z ( 0919 EDT ) on a two @-@ day , five @-@ flight trip . Before departure , the aircraft had been fueled with 5 @, @ 300 lb ( 2 @, @ 400 kg ) of Jet A , enough for 4 hours and 45 minutes of flight . On board were two pilots and four passengers .

At 1327 : 13Z , the controller from the Jacksonville ARTCC instructed the pilot to climb and maintain flight level ( FL ) 390 ( 39 @, @ 000 feet ( 11 @, @ 900 m ) above sea level ) . At 1327 : 18Z ( 0927 : 18 EDT ) , the pilot acknowledged the clearance by stating , " three nine zero bravo alpha . " This was the last known radio transmission from the airplane , and occurred while the aircraft was passing through 23 @, @ 000 feet ( 7 @, @ 000 m ) . The next attempt to contact the aircraft occurred six minutes , 20 seconds later ( 14 minutes after departure ) , with the aircraft at 36 @, @ 500 feet ( 11 @, @ 100 m ) , and the controller 's message went unacknowledged . The controller attempted to contact N47BA five more times in the next 4 ½ minutes , again with no answer .

= = = First interception = = =

About 1454Z ( now 0954 CDT due to the flight 's crossing into the Central Time zone ) , a U.S. Air Force F @-@ 16 test pilot from the 40th Flight Test Squadron at Eglin AFB in western Florida , who happened to be in the air nearby , was directed by controllers to intercept N47BA . When the fighter was about 2 @, @ 000 feet ( 600 m ) from the Learjet , at an altitude of about 46 @, @ 400 feet ( 14 @, @ 100 m ) , the test pilot made two radio calls to N47BA but did not receive a response . The F @-@ 16 pilot made a visual inspection of the Lear , finding no visible damage to the airplane . Both engines were running , and the plane 's red rotating anti @-@ collision beacon was on ( standard operation for aircraft in flight ) . The fighter pilot could not see inside the passenger section of the airplane because the windows seemed to be dark . Further , he stated that the entire right cockpit windshield was opaque , as if condensation or ice covered the inside . He also indicated that the left cockpit windshield was opaque , although several sections of the center of the windshield seemed to be only thinly covered by condensation or ice ; a small rectangular section of the windshield was clear , with only a small section of the glare shield visible through this area . He did not see any flight control movement . About 1512Z , the F @-@ 16 pilot concluded his inspection of N47BA and broke formation , proceeding to Scott AFB in southwestern Illinois .

== Second interception ==

At 1613Z , almost three hours into the flight of the unresponsive Learjet , two F @-@ 16s from the 138th Fighter Wing of the Oklahoma Air National Guard ( ANG ) , flying under the call @-@ sign " TULSA 13 flight " , were directed by the Minneapolis ARTCC to intercept . The TULSA 13 lead pilot reported that he could not see any movement in the cockpit , that the windshield was dark and that he could not tell if the windshield was iced . A few minutes later , a TULSA 13 pilot reported , " We 're not seeing anything inside , could be just a dark cockpit though ... he is not reacting , moving or anything like that he should be able to have seen us by now . " At 1639Z , TULSA 13 left to rendezvous with a tanker for refueling .

The aircraft reached a maximum altitude of 48 @, @ 900 feet ( 9 @. @ 3 mi ; 14 @. @ 9 km ) .

== Third interception and escort ==

About 1650Z , two F @-@ 16s from the 119th Wing of the North Dakota ANG with the identification " NODAK 32 flight " were directed to intercept N47BA . TULSA 13 flight also returned from refueling , and all four fighters maneuvered close to the Lear . The TULSA 13 lead pilot reported , " We 've got two visuals on it . It 's looking like the cockpit window is iced over and there 's no displacement in any of the control surfaces as far as the ailerons or trims . " About 1701Z , TULSA 13 flight returned to the tanker again , while NODAK 32 remained with N47BA .

There was some speculation in the media that military jets were prepared to shoot down the Lear if it threatened to crash in a heavily populated area . Officials at the Pentagon strongly denied that possibility . Shooting down the plane " was never an option , " Air Force spokesman Captain Joe Della Vedova said , " I don 't know where that came from . "

== Crash ==

The Learjet 's cockpit voice recorder ( CVR ) , which was recovered from the wreckage , contained an audio recording of the last 30 minutes of the flight ( it was an older model which only recorded 30 minutes of data ; the aircraft was not equipped with a flight data recorder ) . At 1710 : 41Z , the Learjet 's engines can be heard winding down , indicating that the plane 's fuel had been exhausted . In addition , sounds of the stick shaker and autopilot disconnect can be heard ( with the engines powered down , the autopilot would have attempted to maintain altitude , causing the plane 's airspeed to bleed off until it approached stall speed , at which point the stick shaker would have automatically engaged to warn the pilot and the autopilot would have switched itself off ) .

At 1711 : 01Z , the Lear began a right turn and descent . One NODAK 32 airplane remained to the west , while one TULSA 13 airplane broke away from the tanker and followed N47BA down . At 1211 : 26 CDT , the NODAK 32 lead pilot reported , " The target is descending and he is doing multiple aileron rolls , looks like he 's out of control ... in a severe descent , request an emergency descent to follow target . " The TULSA 13 pilot reported , " It 's soon to impact the ground ; he is in a descending spiral . " The fighter planes were at this point forced to break off their pursuit and had to land at local airports , having reached the limit of their endurance .

Impact occurred approximately 1713Z , or 1213 local , after a total flight time of 3 hours , 54 minutes , with the aircraft hitting the ground at a nearly supersonic speed and an extreme angle . The Learjet crashed in South Dakota , just outside Mina in Edmunds County , on relatively flat ground and left a crater 42 feet ( 13 m ) long , 21 feet ( 6 @. @ 4 m ) wide , and 8 feet ( 2 @. @ 4 m ) deep . None of its components remained intact .

== Passenger and Crew ==

In addition to Payne Stewart and 3 others , there were two pilots onboard :

The 42 @-@ year @-@ old captain , Michael Kling , held an airline transport pilot certificate and type ratings for the Boeing 707 , Boeing 737 , and Learjet 35 . He also had Air Force experience

flying the KC @-@ 135 and Boeing E @-@ 3 Sentry . Kling was also an instructor pilot on the KC @-@ 135E in the Maine Air National Guard . According to Sunjet Aviation records , the captain had accumulated a total of 4 @,@ 280 hours of flight time ( military and commercial ) and had flown a total of 60 hours with Sunjet , 38 as a Learjet pilot @-@ in @-@ command and 22 as a Learjet second @-@ in @-@ command .

The first officer , 27 @-@ year @-@ old Stephanie Bellegarrigue , held a commercial pilot certificate and type ratings for Learjet and Cessna Citation 500 . She was also a certified flight instructor . She had accumulated a total of 1 @,@ 751 hours of flight time , of which 251 hours were with Sunjet Aviation as a second @-@ in @-@ command and 99 as a Learjet second @-@ in @-@ command .

= = Investigation = =

The National Transportation Safety Board ( NTSB ) has several levels of investigation , of which the highest is a " major " investigation . Because of the extraordinary circumstances in this crash , a major investigation was performed .

The NTSB determined that :

The probable cause of this accident was incapacitation of the flight crew members as a result of their failure to receive supplemental oxygen following a loss of cabin pressurization , for undetermined reasons .

The Board added a commentary regarding the possible reasons why the crew did not obtain supplemental oxygen :

Following the depressurization , the pilots did not receive supplemental oxygen in sufficient time and / or adequate concentration to avoid hypoxia and incapacitation . The wreckage indicated that the oxygen bottle pressure regulator / shutoff valve was open on the accident flight . Further , although one flight crew mask hose connector was found in the wreckage disconnected from its valve receptacle ( the other connector was not recovered ) , damage to the recovered connector and both receptacles was consistent with both flight crew masks having been connected to the airplane 's oxygen supply lines at the time of impact . In addition , both flight crew mask microphones were found plugged into their respective crew microphone jacks . Therefore , assuming the oxygen bottle contained an adequate supply of oxygen , supplemental oxygen should have been available to both pilots ' oxygen masks .

[ A ] possible explanation for the failure of the pilots to receive emergency oxygen is that their ability to think and act decisively was impaired because of hypoxia before they could don their oxygen masks . No definitive evidence exists that indicates the rate at which the accident flight lost its cabin pressure ; therefore , the Safety Board evaluated conditions of both rapid and gradual depressurization .

If there had been a breach in the fuselage ( even a small one that could not be visually detected by the in @-@ flight observers ) or a seal failure , the cabin could have depressurized gradually , rapidly , or even explosively . Research has shown that a period of as little as 8 seconds without supplemental oxygen following rapid depressurization to about 30 @,@ 000 feet ( 9 @,@ 100 m ) may cause a drop in oxygen saturation that can significantly impair cognitive functioning and increase the amount of time required to complete complex tasks .

A more gradual decompression could have resulted from other possible causes , such as a smaller leak in the pressure vessel or a closed flow control valve . Safety Board testing determined that a closed flow control valve would cause complete depressurization to the airplane 's flight altitude over a period of several minutes . However , without supplemental oxygen , substantial adverse effects on cognitive and motor skills would have been expected soon after the first clear indication of decompression ( the cabin altitude warning ) , when the cabin altitude reached 10 @,@ 000 feet ( 3 @,@ 000 m ) ( which could have occurred in about 30 seconds ) .

Investigations of other accidents in which flight crews attempted to diagnose a pressurization problem or initiate emergency pressurization instead of immediately donning oxygen masks following a cabin altitude alert have revealed that , even with a relatively gradual rate of

depressurization , pilots have rapidly lost cognitive or motor abilities to effectively troubleshoot the problem or don their masks shortly thereafter . In this accident , the flight crew 's failure to obtain supplemental oxygen in time to avoid incapacitation could be explained by a delay in donning oxygen masks of only a few seconds in the case of an explosive or rapid decompression or a slightly longer delay in the case of a gradual decompression .

In summary , the Safety Board was unable to determine why the flight crew could not , or did not , receive supplemental oxygen in sufficient time and / or adequate concentration to avoid hypoxia and incapacitation .

The NTSB report showed that the plane had several instances of maintenance work related to cabin pressure in the months leading up to the accident . The NTSB was unable to determine whether they stemmed from a common problem ? replacements and repairs were documented , but not the pilot discrepancy reports that prompted them or the frequency of such reports . The report gently chides Sunjet Aviation for the possibility that this would have made the problem harder to identify , track , and resolve ; as well as the fact that in at least one instance the plane was flown with an unauthorized maintenance deferral for cabin pressure problems .

= = Aftermath = =

Stewart was ultimately headed to Houston for the 1999 Tour Championship , but planned a stop in Dallas for discussions with the athletic department of his alma mater , Southern Methodist University , about building a new home course for the school 's golf program . Stewart was memorialized at the Tour Championship with a lone bagpipe player playing at the first hole at Champions Golf Club prior to the beginning of the first day of play . The owner of the crash site , after consulting the wives of Stewart and several other victims , created a memorial on about 1 acre ( 4 @ , @ 000 m<sup>2</sup> ) of the site . At its center is a rock pulled from the site inscribed with the names of the victims and a Bible passage .

The 2000 U.S. Open , held at Pebble Beach Golf Links , began with a golf version of a 21 @ - @ gun salute when 21 of Stewart 's fellow players simultaneously hit balls into the Pacific Ocean .

In 2001 , Stewart was posthumously inducted into the World Golf Hall of Fame .

On June 8 , 2005 , a Florida state court jury in Orlando found that Learjet was not liable for the deaths of Stewart and his agents Robert Fraley and Van Ardan , who had also been aboard the plane .

= = Similar incidents = =

While this type of crew incapacitation is extremely rare , it is not unknown . Several similar accidents have occurred and recent incidents are detailed below ( those prior to 1980 are not listed here ) .

= = = 1980 Bo Rein crash = = =

Robert Edward " Bo " Rein , a noted football coach for North Carolina State and then Louisiana State University ( LSU ) ( where he had been hired only six weeks before ) was flying with a pilot in Louisiana from Shreveport to Baton Rouge on January 10 , 1980 in a Cessna 441 Conquest twin @ - @ turboprop , registered N441NC . The flight was supposed to last 40 minutes , but after flying east and climbing to avoid a thunderstorm , the plane lost contact with air traffic control and was seen on radar to climb to 40 @ , @ 000 feet ( 12 @ , @ 200 m ) .

The Conquest was eventually intercepted by two Michigan Air National Guard F @ - @ 4C Phantoms from Seymour @ - @ Johnson AFB in North Carolina and a pair of F @ - @ 106 Delta Dart interceptors from the 48th Fighter Interceptor Squadron at Langley AFB in Virginia . When intercepted , the Cessna was over 1 @ , @ 000 miles ( 1 @ , @ 600 km ) off course and flying at an altitude of 41 @ , @ 600 feet ( 12 @ , @ 700 m ) , 5 @ , @ 000 feet ( 1 @ , @ 500 m ) higher than its maximum certified ceiling , and the fighter pilots could not see anyone in the cockpit . The plane

continued out over the Atlantic Ocean where it ran out of fuel , descended to 25 @, @ 000 feet ( 7 @, @ 600 m ) and then entered a spin , crashing into the water . The military pilots spotted some debris , but no wreckage was ever recovered ; the bodies of Rein and pilot Lou Benscotter were never found . The most likely reason given was that the two men apparently lost consciousness due to slow depressurization of the cabin .

= = = 1988 Mexico Learjet 24 crash = = =

A Learjet 24B , N234CM , departed Memphis International Airport on December 16 , 1988 , heading for Addison , Texas with two crew aboard , including NASA astronaut @-@ candidate Susan Reynolds . After it flew past its destination , the aircraft was intercepted by an Air Force T @-@ 38 Talon from the 560th Flying Training Squadron at Randolph AFB , but the pilot was unable to contact the crew . He reported that the cockpit windows appeared to have frost on the inside . The Lear entered Mexican airspace . After exhausting its fuel supply , it entered a spin and crashed near Cuatro Ciénegas in the northern state of Coahuila . The two pilots were killed .

= = = 2000 Australia Beechcraft King Air crash = = =

In western Australia on September 4 , 2000 a Beechcraft 200 Super King Air departed from Perth for Leonora , a mining town 370 miles ( 600 km ) away , carrying seven passengers plus the pilot . After 22 minutes of flight , the aircraft passed its assigned altitude . It was then that Air Traffic Control noticed that the pilot 's speech had become significantly impaired and he was unable to respond to instructions . Communications continued with the pilot for a further eight minutes before he lapsed into unconsciousness and no sounds of life on board could be heard . The plane continued flying on a constant heading for five hours , covering 1 @, @ 760 miles ( 2 @, @ 840 km ) , before crashing in northwest Queensland , at 01 : 10 am AEST . The accident became known in the Australian media as the " Ghost Flight " .

The aircraft was completely destroyed in the impact and the post @-@ crash fire , making the investigation difficult . The Australian Transport Safety Bureau ( ATSB ) and coroner investigating the crash concluded that depressurization was likely the cause of incapacitation , but were unable to conclusively rule out the presence of toxic fumes , possibly from the air conditioning system .

= = = 2005 Helios Airways Flight 522 crash = = =

In Greece on August 14 , 2005 , a Helios Airways Boeing 737 @-@ 300 crashed 40 km ( 25 mi ) from Athens after running out of fuel . An investigation later concluded that an improper pressurization setting in the cockpit had caused the cabin pressure to drop , and resulted in the incapacitation of the passengers and crew . It was later determined that one of the flight attendants had used the bottled oxygen supply and his pilot 's training to attempt to bring the plane down to a lower altitude , but also ultimately perished from a lack of oxygen . All 121 people on board died .

= = = 2014 Daher @-@ Socata TBM @-@ 900 crash = = =

The plane was a Daher @-@ Socata TBM @-@ 900 aircraft built by the French manufacturer Daher @-@ Socata and powered by one Pratt and Whitney engine . The aircraft went down 14 miles northeast of the Jamaican parish of Portland , which is on the Caribbean Sea country 's northeast coast , Jamaica 's National Security Minister Peter Bunning said , citing preliminary reports .

= = Documentaries = =

The documentary Mayday , features this incident in the first episode of its 16th season . The episode is titled ' Deadly Silence.'

