United Airlines Flight 811, a Boeing 747-122 (registration number N4713U), took off from Honolulu International Airport bound for Sydney, Australia, via Auckland, New Zealand with 3 flight crew, 15 flight attendants, and 337 passengers at approximately 01:52 local time. It was under the command of Captain David Cronin.

During the climb, the crew made preparations to detour around thunderstorms along the aircraft's track; anticipating turbulence, the captain kept the seat-belt sign lit. Around this time (02:08) the plane had been flying for approximately 16 minutes and was passing between 22,000 and 23,000 feet. In the business-class section, a grinding noise was heard, followed by a loud thud which rattled the whole aircraft—1½ seconds later the forward cargo-door blew out abruptly. The pressure differential caved in the floor above the door, causing two rows of seats (8G-12G and 8H-12H) and an individual in 9F to be ejected from the cabin, resulting in nine fatalities and leaving a gaping hole in the aircraft. The fatalities were: Anthony and Barbara Fallon, Harry and Susan Craig, Lee Campbell, Dr. John Crawford, John Swan, Rose Harley and Mary Handley-Desso. Mae Sapolu a flight-attendant in the Business-Class cabin was also severely injured when she was almost pulled out of the plane too, but survived when she was seen clinging to a seat leg by passengers and fellow crew who pulled her to safety inside the cabin. The pilots began an emergency descent to get the aircraft rapidly down to breathable air, while performing a 180-degree left turn to take them back to Honolulu. The decompression had damaged components of the on-board emergency oxygen supply system, which is primarily located in the forward cargo sidewall area, just aft of the cargo door.

Illustration showing the location of N1 and N2 in a turbofan engine, and a diagram of EPR, EGT, N1 and N2 indicators.

Aircraft engines, just like car engines, are monitored for their rotational speed using a tachometer. However, unlike a piston engines, many turbine engines have multiple rotating assemblies called spools which can turn at different speeds, requiring multiple tachometers. These tachometers are referred to as N1 and N2.

The debris ejected from the plane during the explosive decompression caused severe damage to the number 3 and 4 engines, causing visible fires in both. The crew did not get fire warnings from either of
them, although engine 3 was experiencing heavy vibration, no N1 reading, and low EGT and EPR, leading the crew to deactivate it. At 02:10, an emergency was declared, and the crew began dumping fuel to get the plane's weight down to an acceptable landing weight. Initially, they pushed the number 4 engine slightly to help force the plane down faster, but once they noticed it was giving almost no N1, high EGT, and was emitting flames, they shut it down also. Some of the explosively ejected debris damaged the right wing's LEDs (Leading Edge Devices), dented the horizontal stabilizer on that side, and even struck the tailfin. NTSB reports found human remains in the fan blades of Number 3 Engine, bringing a cold comfort that some of the victims died almost instantly as they were pulled out of the plane.[2]

During the course of the descent Captain Cronin had ordered Flight Engineer Randal Thomas to tell the flight attendants to prepare for an emergency landing, however Thomas was unable to contact the flight attendants. Thomas asked the captain if he could go down and find out what was happening. Cronin agreed. Thomas saw severe damage immediately upon leaving the cockpit: the aircraft's skin was peeled off in some areas on the upper deck revealing the frames and stringers. As he went down to the lower deck the magnitude of the damage became obvious as he now saw the gigantic hole in the side of the plane. Thomas came back to the cockpit, visibly pale, and reported that large section of fuselage aft of the Number 1 exit door was open. He concluded that it was probably a bomb, and considering the condition of the plane, it would be unwise to exceed 250 knots (460 km/h). The plane's stall speed was around 240 knots (440 km/h), producing a narrow operating envelope.[3]

As the plane neared the airport, the landing gear was extended; the flaps only partially deployed, as a result of damage sustained following the decompression. This resulted in a landing speed between 190 kts and 200 kts. Regardless, Captain Cronin was able to get the plane to a halt without going off the end of the runway. Fourteen minutes had elapsed since the emergency was declared.[3] Evacuation was carried out and all passengers and flight attendants were off in less than 45 seconds, though every flight attendant suffered some injury during the evacuation, ranging from scratches to a dislocated shoulder.[1]

[edit] Cause

The accident was most likely caused by improper wiring and deficiencies in the door's design. Unlike a plug door which opens inwards and essentially jams against its frame as the pressure outside drops, the Boeing 747 was designed with an outward-hinging door which, while increasing capacity, required a locking mechanism to keep the door closed. Deficiencies in the design of wide-body aircraft cargo doors were already known since the early 1970s from flaws in the DC-10 cargo door.[4][5] Despite the warnings and deaths from the 1970s DC-10 incidents, and early Boeing attempts to solve the problems in the 1970s, the problems were not seriously addressed by the aircraft industry until much later.[6]

The 747's cargo door utilized a series of electrically-operated latch cams with which the latch pin locks in, the cam then rotating into the closed position. A series of L-shaped arms called locking sectors, actuated by the moving of a lever to close the door, are designed to reinforce the latch cams and prevent them from rotating into the unlocked position. The locking sectors were made out of aluminum, and of too thin a gauge to actually be able to keep the latch cams from moving into the unlocked position against the power of the door motors. An electrical switch designed to cut electrical power to the cargo door when the outer handle was closed was faulty; the motors could still draw
power. It appeared in this case that a short circuit in the aging plane caused an uncommanded rotation of the latch cams, which forced the weak locking sectors to unlock; the pressure differential and aerodynamic forces then blew the door off the fuselage, causing the massive decompression.[3]

[edit] Personal investigation

Lee Campbell, a native New Zealander returning home, was one of the casualties on Flight 811. After his death his parents, Kevin and Susan Campbell, investigated the cause of the decompression independently of the National Transportation Safety Board. The Campbell’s investigation led them to conclude that the design of the aircraft's cargo door latching mechanism was flawed.[7]

As early as 1975, Boeing realized the aluminum locking sectors were of too thin a gauge to be effective and recommended the airlines add doublers to the locking sectors. However, most airlines did not actually make the modifications and unfortunately, even with the modifications, the locks were still not secure enough.[citation needed] This was borne out even before the United 811 incident, when in 1987 Pan Am Flight 125 outbound from London Heathrow Airport encountered pressurization problems at 20,000 feet (6,100 m), causing the crew to abort the flight and return to the airport. After the safe landing, the aircraft's cargo door was found to be ajar by about 1.5 inches (3.8 cm) along its ventral edge. When the aircraft was examined in a maintenance hangar, all of the locking arms were found to be either damaged or sheared off entirely. Boeing initially attributed this to mishandling by ground crew, although worries were expressed[who?] about the electrical system. To test this concern, Boeing instructed 747 operators to shut and lock the cargo door with the external handle, and then activate the door-open switch with the handle still in the locked position. Since the S-2 switch was designed to deactivate the door motors if the handle was locked, nothing should have happened. However, some of the airlines reported the door motors did indeed begin running, attempting to force the door open against the locking sectors and causing damage to the mechanism.[3]

Cargo door recovered by US Navy divers

Prior to Flight 811 incident Boeing issued a Service Bulletin notifying operators to replace the aluminum locking sectors with steel locking sectors, and carry out various inspections. In the United States, the FAA mandated this service by means of an Airworthiness Directive (AD) and gave US-flag airlines 18 months to comply with the AD. After the Flight 811 incident, the FAA shortened the time to 30 days.[3]

In 1991, an incident occurred at New York's John F. Kennedy International Airport involving the malfunction of a United Airlines Boeing 747 cargo door.[8] At the time, United Airlines' maintenance staff were investigating the cause of a circuit breaker trip. In the process of diagnosing the cause, an inadvertent operation of the electric door latch mechanism caused the cargo door to open spontaneously. This incident led to latch damage similar to that observed on the cargo door of Flight 811.

Two pieces of the Flight 811 cargo door were recovered from the Pacific Ocean on 26 September 1990 and 1 October 1990.
Outcomes

The damage on United Airlines Flight 811 seen from the cabin

The NTSB issued a recommendation for all 747-100s in service at the time to replace their cargo door latching mechanisms with new, non-faulty locks. A sub-recommendation suggested replacing all outward-opening doors with inward-opening doors, which cannot open in flight due to the pressure differential. No similar fatality-causing accidents have officially occurred on this aircraft type, although other investigations indicate the possibility that other old Boeing 747s were afflicted.

In 1989, the flight crew received the Secretary's Award for Heroism for their actions. United Airlines ran a simulation through a flight simulator and were, despite many attempts and variable tweaks, unable to successfully land a plane after losing the forward cargo door.

The aircraft was successfully repaired, re-registered as N4724U in 1989, and returned to service with United Airlines in 1990. In 1997, the aircraft was registered with Air Dabia as C5-FBS, but abandoned in 2001 during overhaul maintenance at Plattsburgh International Airport. The plane was broken up for spare parts in 2004.

Shari Peterson was raised in a small rural Iowa farm community of fewer than 400 residents. While Shari and her two younger sisters were growing up within a farm community's humble lifestyle, they witnessed their parents demonstrate that "small town, helping others" philosophy. Their family found ways to donate and contribute to their school, church and community.


Following a life-altering event in February, 1989, Shari began a quest for understanding her own life. She began traveling extensively sharing her experiences and teaching personal development. One of her discoveries was her ability to effectively communicate and counsel people empowering them to greater personal growth. She has appeared on Oprah, Turning Point, Hard Copy, Angels II Beyond the Light, Montel Williams, Maury Povich, I Survived a Disaster and It's a Miracle. She has been featured in magazines and appeared on TV and radio in the US, Europe and Australia.

When she retired in 1996, Shari discovered a great financial and emotional need from people in distress who need housing assistance. She was reminded by her father, Phillip Peterson, a WWII Marine and retired railroad engineer, of the sacrifices his generation made for us. He was fond of saying, "You can't walk around with a catcher's mitt on all the time. You have to throw some back."

Shari is now actively involved in philanthropic pursuits. Her goal is to remind people what our senior citizens, military,
children and others have contributed to us. The goal is to return the help, allow people to maintain their dignity and restore the hope to those in need who have none.

Shari is also co-founder and owner of RME Advisors, LLC, a financial education company founded in 2007.


http://www.rmeadvisors.com/

**United Airlines Flight 811**

The result of United Flight 811's cargo door breaking off in mid-air

Taking the cargo door theory one step further, one should examine other cases when such an event has occurred. One key example in recent history was United Airlines Flight 811, which took off from Hawaii bound for New Zealand. During the flight, an apparent fault with the front cargo door led to it unlocking and breaking off from the fuselage. The result was immediate decompression, with five rows of business class seats and nine passengers being pulled through the gap in the vacuum. The pilot managed to descend the plane to breathable air and safely land, despite two faulty engines as a result of the incident.

The case study highlights that a cargo door breaking off from a plane can cause massive damage, but by no way seems to support what happened to Oceanic Flight 815, which completely broke up. However, United Flight 811 was travelling at 23,000 feet at the time of the incident, and Oceanic Flight 815 may have been much higher, causing greater damage during decompression.