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Learjet Strikes Houses, Terrain After Inadvertent Retraction of Flaps

A witness saw the airplane 'skimming' the clouds in the traffic pattern before entering a low-altitude turn with a bank angle of almost 90 degrees. The airplane then descended to the ground.

FSF Editorial Staff

At 0639 local time Aug. 4, 2003, a Learjet 35A struck three houses, two groups of trees and a river as the crew performed a circling maneuver for a second attempt at landing at the Groton/New London (Connecticut, U.S.) Airport after a positioning flight from Farmingdale, New York. The airplane was destroyed, and the two crewmembers — the only people in the airplane — were killed.[1]

The U.S. National Transportation Safety Board (NTSB) said, in its final report, that the probable cause of the accident was "the first officer's inadvertent retraction of the flaps during the low-altitude maneuvering, which resulted in the inadvertent stall and subsequent in-flight collision with a residential home."

NTSB said that factors in the accident were "the captain's decision to perform a low-altitude maneuver using excessive bank angle, the flight crew's inadequate coordination and low clouds surrounding the airport."

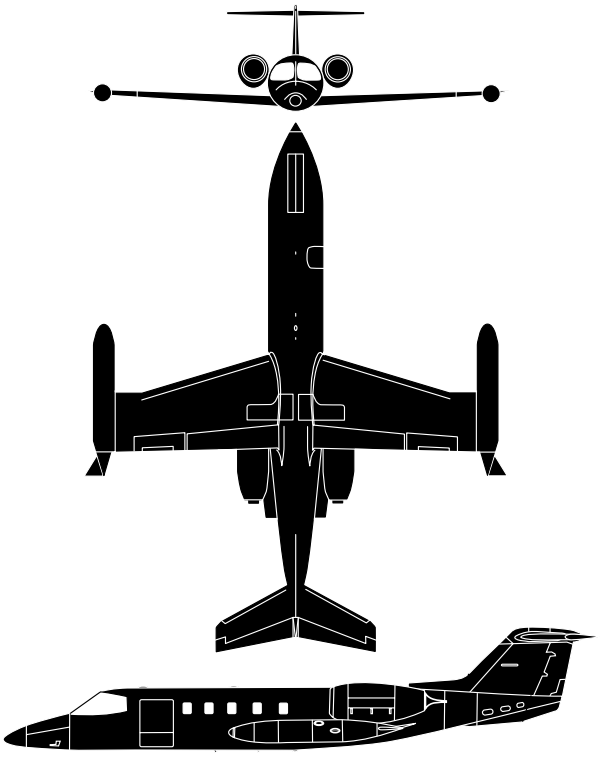
The captain of the accident airplane held an airline transport pilot (ATP) certificate with an airplane multi-engine rating and a type rating in Learjets; he also held a commercial pilot certificate for single-engine airplanes and a flight instructor certificate for single-engine airplanes and instrument instruction. He completed a competency/proficiency check for the Learjet series on May 1, 2003. He reported having 4,300 flight hours when he applied for his most recent first-class medical certificate, which was issued June 24, 2003.

The first officer held an ATP certificate with an airplane multi-engine rating, an airplane single-engine rating and a type rating in Learjets; he also held a commercial pilot certificate for single-engine seaplanes and a flight instructor certificate for single-engine airplanes, multi-engine airplanes and instrument instruction. He completed his competency/proficiency check for the Learjet series on Jan. 20, 2003. His most recent first-class medical certificate was issued June 4, 2003; at the time, he reported having 9,000 flight hours.

The airplane was operated by Air East Management, based at Republic Airport in Farmingdale, and was maintained on an approved aircraft inspection program. The airframe had 9,287 flight hours. The most recent airframe maintenance was performed July 21, 2003; at the same time, a 300-hour thrust-reverser inspection was performed on each engine.

The left engine had 7,104 flight hours, and the right engine had 6,727 flight hours. The most recent maintenance on both engines was completed Aug. 1, 2003. A 300-hour inspection was conducted on each engine, including an oil and filter sample analysis; results of both analyses were normal.

The airplane had a hydraulically actuated, electrically controlled flap system with flap settings of zero degrees, eight degrees, 20 degrees and 40 degrees. The system was designed to synchronize movement of the left flap and the right flap to remain within two degrees of each other. There was no



Learjet 35A

The Learjet 35 made its first flight in 1973; deliveries began in 1974. The airplane is similar to the Learjet 25 but has turbofan engines rather than turbojet engines, a longer fuselage and longer wings. The Learjet 35A was introduced in 1976 with "Century III" modifications designed to improve low-speed handling and performance; the modifications included increased wing-leading-edge camber and an improved stall-warning system. "Softflite" wing modifications designed to improve the airplane's stall characteristics were introduced in 1979; the modifications included full-chord stall fences and boundary-layer energizers.

The Learjet 35A has two Honeywell (formerly Garrett and AlliedSignal) TFE731-2-2B engines, each rated at 3,500 pounds thrust (15.6 kilonewtons). Usable fuel capacity is 931 gallons (3,524 liters).

The airplane has accommodations for two pilots and up to eight passengers. (A longer-range version, the Learjet 36A, accommodates up to six passengers and has a usable fuel capacity of 1,110 gallons [4,201 liters]). The pressurization system can maintain a cabin altitude of 6,500 feet at the airplane's maximum operating altitude, 45,000 feet.

Maximum standard takeoff weight is 17,000 pounds (7,711 kilograms); maximum optional takeoff weight is 18,300 pounds (8,301 kilograms). Maximum landing weight is 15,300 pounds (6,940 kilograms). Maximum rate of climb at sea level is 4,760 feet per minute (fpm). Maximum single-engine rate of climb at sea level is 1,470 fpm. Maximum operating Mach number is 0.83. Maximum cruising speed at 41,000 feet and mid-cruise weight is 460 knots. Economy cruise speed at 45,000 feet and mid-cruise weight is 418 knots. Maximum range with four passengers and a 45-minute fuel reserve is 2,289 nautical miles (4,239 kilometers). Stall speed with landing gear and flaps extended is 96 knots.♦

Source: *Jane's All the World's Aircraft*

mechanical locking mechanism to retain flap-position settings in the event of hydraulic-pressure loss.

An automated weather observation at the airport at 0656 included visibility of nine statute miles (14 kilometers), scattered clouds at 4,100 feet and winds from 150 degrees at 10 knots. At 0725, the reported weather at the airport included visibility of six statute miles (10 kilometers); few clouds at 600 feet, a broken layer of clouds at 3,800 feet, and an overcast at 6,000 feet; and winds from 140 degrees at eight knots.

A witness, who had worked at the airport for more than 30 years, said that the weather after the accident was "a typical morning, with the winds from the south packing in the clouds over the hills to the north." The witness estimated that the clouds were 500 feet above ground level (AGL) to 600 feet AGL. There were no clouds or fog over the airport or south of the airport, the witness said.

At the time of the accident, the airport had four instrument approach procedures: an instrument landing system (ILS) approach to Runway 5, a very-high-frequency-omnidirectional radio (VOR)/global positioning system (GPS) approach to Runway 5, a GPS approach to Runway 33, and a VOR/GPS approach to Runway 23.

The morning of the accident, the airplane departed on an instrument flight rules (IFR) flight plan in daytime visual meteorological conditions from Republic Airport about 0610. About five nautical miles (nine kilometers) west of Groton, the flight crew told air traffic control (ATC) that they had visual contact with the airport and canceled their IFR flight plan. ATC received no further communication from the crew.

Recorded ATC radar data showed that "a target [entered] the left downwind for Runway 23 at Groton at an altitude of 1,800 feet and continued to descend," the report said. "About 2.7 [nautical] miles [5.0 kilometers] northeast of the runway, the target made a left turn onto base leg. About 1.3 [nautical] miles [2.4 kilometers] from the runway, and south of the extended runway centerline, the target turned left, and then back toward the right. When the target was about [0.13 nautical mile; 0.24 kilometer] south of the runway threshold, at an altitude of approximately 300 feet, an approximate 60-degree heading change to the right was made back toward the runway. The target crossed the runway at an altitude of approximately 200 feet and began a left turn towards the center of the airport. The turn continued, and the target re-entered a left downwind for runway 23 again, about 1,100 feet south of the runway, at an altitude of approximately 400 feet. The last target was observed at 0638:25, about [0.25 nautical mile; 0.46 kilometer] northeast of the runway."

A witness, who was conducting a preflight inspection of an airplane at the airport, said that he heard the accident airplane arriving from the east and observed the airplane turning left to enter the downwind leg in the airport traffic pattern for Runway 23 at an altitude "consistent with the approach minimums for the VOR approach," the report said.

"The witness lost visual contact with the airplane as it continued on the downwind leg, due to it 'skimming' into or behind clouds," the report said. "The airplane reappeared from the clouds at an altitude of about 200 feet above the ground, and as it overshot the extended centerline for the runway, the bank angle increased to about 90 degrees. The airplane then descended out of view. The witness recalled hearing the [noise of the] airplane's engines increase just before the crash, 'like it was a last-chance effort.' The witness described the weather to the north and northeast of Groton as poor visibility with 'scuddy' clouds."

Another witness observed the airplane entering a steep left turn to enter the downwind leg and continuing the turn as the bank angle increased to almost 90 degrees to the horizon. The witness said that as the airplane was turning onto the final approach, "it began to wobble from left to right," and then disappeared behind trees.

The cockpit voice recorder (CVR) indicated that at 0634:09, immediately before the crew canceled the IFR clearance, the captain said, "See it down there."

The first officer replied, "Should be, yeah … not yet. Under the cloud thing?"

The captain replied, "No, right there."

At 0634:17, the captain told the approach controller that the crew "had the field in sight" and asked to cancel the IFR clearance. The controller terminated the clearance.

At 0635:22, the first officer said, "Flaps eight."

A sound similar to a trim-in-motion audio clicker was heard. (The trim-in-motion audio-clicker system is designed to produce a series of audible clicks when the horizontal stabilizer is in motion. The system is "wired through the flap-position switches and would not sound if the flaps were lowered [extended] beyond three degrees," the report said.)

After the series of clicks, the first officer said, "Hold on a second, flaps eight," and there was the sound of a single click.

At 0635:29, the crew announced on the airport's Unicom frequency that the airplane was on a left downwind for Runway 23.

At 0636:19, the first officer said, "Let me know when to turn."

The captain replied, "Forty degrees of bank. Watch your speed."

At 0636:43, the first officer said, "Hold this altitude. We're near the ground." About 17 seconds later, he requested full flaps.

At 0637:28, the first officer said, "What happens if we break out, pray tell?"

In response, the captain said, "Uh, I don't see it on the left side. It's going to be a problem."

At 0637:45, the first officer said, "Damn it. You got the airplane." Four seconds later, he said, "Can't do it right?"

At 0637:52, the CVR recorded a single click, followed by the first officer saying, "OK. We have flaps 20. … Do you want the gear up?"

The captain replied, "Leave them down."

At 0638:09, there was a sound similar to an increase in engine revolutions per minute. One second later, the captain said, "Yee haw."

About six seconds later, an unidentified voice said, "Whoo."

At 0638:20, the first officer said, "I should have put it on the uh, VOR. Been better."

At 0638:28, the captain said, "Flaps 20."

The first officer replied, "Flaps 20 coming in." A single click was heard.

At 0638:34, there was a sound similar to that of an autopilot/yaw damper disengage tone, followed four seconds later by a sound similar to that of a trim-in-motion audio clicker.

At 0638:43, the first officer said, "Airspeed's 10 above," and one second later, "Airspeed's right on."

At 0638:45, there was a single click, followed three seconds later by a sound similar to that of a trim-in-motion audio clicker.

At 0638:49, the first officer said, "Watch your speed. It's going to stall."

At 0638:50, there was a sound similar to that of a stick-pusher stall-warning tone.

At 0638:55, an unidentified voice said, "Taking over," followed by the captain's voice saying, "OK. I'm with you."

At 0639:01, there was the sound of impact.

The recording ended one second later.

The airplane struck a house about 0.25 mile northeast of the approach end of Runway 23, then continued through a line of trees to a second house, another line of trees and a third house, down an embankment and through a boardwalk. The airplane stopped in the Pequannock River.

Post-impact fires destroyed two houses, two automobiles and five vessels that were moored on the river.

Examination of the wreckage showed that the flap-selector switch was in the "UP" position and the landing-gear selector

switch was in the "DOWN" position. The captain's airspeed indicator reference bug was set to 144 knots, and the first officer's airspeed indicator reference bug was set to 124 knots.

The Learjet 35/36 *Airplane Flight Manual* (AFM) included charts for determining the airplane's stall speed in various configurations up to a bank angle of 60 degrees. In a level coordinated turn at 60 degrees of bank and idle thrust, the charts indicated that stall speed would be 164 knots with zero flaps and the landing gear retracted, 148 knots with eight degrees of flaps and the landing gear either retracted or extended, 142 knots with 20 degrees of flaps and the landing gear either retracted or extended, and 134 knots with 40 degrees of flaps and the landing gear extended.

The operator said that the flight crew had been told to comply with standard operating procedures set forth in the Gates Learjet *Flight Training Manual* and the Learjet 35/36 *Technical Manual*, including a provision of the *Technical Manual* that said, "The PF (pilot flying) will call for flap and gear extension and retraction. The PNF [pilot not flying] will normally actuate the landing gear. The PNF will respond by checking appropriate airspeed, repeating the flap or gear setting called for, and placing the lever in the requested position. … The PNF … should always verify that the requested setting is reasonable and appropriate for the phase of flight and speed/weight combination. Both pilots are expected to back one another up during important tasks."

The report said that the flight crew, after rejecting their first attempt to land, then performed a circling maneuver to attempt a second landing.

The *Flight Training Manual* said, "Nothing has caused more controversy among pilots than the circling approach. Many accidents have occurred while circling. … The procedure can become a problem only when … the airport disappears [from the pilots' view] or … you can't get the airplane lined up on final approach. … Never, never attempt to land while turning and/or diving steeply."

The *Flight Training Manual* also said, "Airspeed and bank angle are extremely important. The slower the speed, the closer you will stay to the airport. The steeper the bank angle, the closer you will stay to the airport. There are limitations, of course. Getting too slow and too steep causes snap rolls in any airplane. … Don't fly any slower than the recommended maneuvering speeds. Never exceed 30 degrees of bank."♦

[FSF editorial note: This article, except where specifically noted, is based on U.S. National Transportation Safety Board report NYC03FA173. The 77-page report contains illustrations.]

Note

1. The accident report did not discuss casualties on the ground, but news reports said that no one on the ground was killed and that one person received minor injuries.

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