



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Groton, CT	<b>Accident Number:</b>	NYC03FA173
<b>Date &amp; Time:</b>	08/04/2003, 0639 EDT	<b>Registration:</b>	N135PT
<b>Aircraft:</b>	Learjet 35A	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>		<b>Injuries:</b>	2 Fatal

**Flight Conducted Under:** Part 91: General Aviation - Positioning

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## Analysis

About 5 miles west of the airport, the flightcrew advised the approach controller that they had visual contact with the airport, canceled their IFR clearance, and proceeded under visual flight rules. A witness heard the airplane approach from the east, and observed the airplane at a height consistent with the approach minimums for the VOR approach. The airplane continued over the runway, and entered a "tight" downwind. The witness lost visual contact with the airplane due to it "skimming" into or behind clouds. The airplane reappeared from the clouds at an altitude of about 200 feet above the ground on a base leg. 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 described the weather to the north and northeast of the airport, as poor visibility with "scuddy" clouds. According to CVR and FDR data, about 1.5 miles from the runway with the first officer at the controls, and south of the extended runway centerline, the airplane turned left, and then back toward the right. During that portion of the flight, the first officer stated, "what happens if we break out, pray tell." The captain replied, "uh, I don't see it on the left side it's gonna be a problem." When the airplane was about 1/8-mile south of the runway threshold, the first officer relinquished the controls to the captain. The captain then made an approximate 60-degree heading change to the right back toward the runway. The airplane crossed over the runway at an altitude of 200 feet, and began a left turn towards the center of the airport. During the turn, the first officer set the flaps to 20 degrees. The airplane reentered a left downwind, about 1,100 feet south of the runway, at an altitude of 400 feet. As the airplane turned onto the base leg, the captain called for "flaps twenty," and the first officer replied, "flaps twenty coming in." The CVR recorded the sound of a click, followed by the sound of a trim-in-motion clicker. The trim-in-motion audio clicker system would not sound if the flaps were positioned beyond 3 degrees. About 31 seconds later, the CVR recorded a sound similar to a stick pusher stall warning tone. The airplane impacted a rooftop of a residential home about 1/4-mile northeast of the approach end of the runway, struck trees, a second residential home, a second line of trees, a third residential home, and came to rest in a river. Examination of the wreckage revealed the captain's airspeed indicator reference bug was set to 144 knots, and the first officer's was set to 124 knots. The flap selector switch was observed in the "UP" position. A review of the Airplane Flight Manual revealed the stall speeds for flap positions of 0 and 8 degrees, and a bank angle of 60 degrees, were 164 and 148 knots

respectfully. There were no charts available to calculate stall speeds for level coordinated turns in excess of 60 degrees. The flightcrew was trained to apply procedures set forth by the airplane's Technical Manual, which stated, "...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."

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: 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. Factors in the accident were the captain's decision to perform a low altitude maneuver using excessive bank angle, the flight crews inadequate coordination, and low clouds surrounding the airport.

### Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT  
Phase of Operation: MANEUVERING

#### Findings

1. (F) WEATHER CONDITION - CLOUDS
2. (C) LOW ALTITUDE FLIGHT/MANEUVER - PERFORMED - PILOT IN COMMAND
3. STALL - INADVERTENT - PILOT IN COMMAND
4. (F) CREW/GROUP COORDINATION - INADEQUATE - FLIGHTCREW
5. (C) RAISING OF FLAPS - INADVERTENT - COPILOT/SECOND PILOT

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Occurrence #2: IN FLIGHT COLLISION WITH OBJECT  
Phase of Operation: DESCENT - UNCONTROLLED

#### Findings

6. OBJECT - RESIDENCE

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Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER  
Phase of Operation: DESCENT - UNCONTROLLED

#### Findings

7. TERRAIN CONDITION - RESIDENTIAL AREA
8. TERRAIN CONDITION - WATER

## Factual Information

### HISTORY OF FLIGHT

On August 4, 2003, at 0639 eastern daylight time, a Learjet 35A, N135PT, operated by Air East Management Ltd., was destroyed when it impacted a residential home and terrain while maneuvering to land at the Groton/New London Airport (GON), Groton, Connecticut. The two certificated airline transport pilots were fatally injured. Visual meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan had been filed for the flight, which originated from Republic Airport (FRG), Farmingdale, New York. The positioning flight was conducted under 14 CFR Part 91.

Review of Federal Aviation Administration (FAA) air traffic control (ATC) communication and recorded radar data, revealed that the flight departed Republic Airport about 0610. About 5 miles west of Groton, the flightcrew advised the Providence Approach controller that they had visual contact with the airport, and requested to cancel their IFR clearance. The controller acknowledged the request and terminated the clearance. No further communications were received from the flightcrew.

According to the recorded radar data, a target was observed entering the left downwind for runway 23 at Groton, at an altitude of 1,800 feet, and continued to descend. About 2.7 miles northeast of the runway, the target made a left turn onto base leg. About 1.3 miles 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 1/8-mile 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 reentered 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 1/4-mile northeast of the runway.

Excerpts of the cockpit voice recorder (CVR) transcript revealed the following:

At 0634:09, the captain stated, "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 radioed the approach controller that "five Papa Tango had the field in sight," and requested to cancel the IFR clearance. The controller acknowledged the request and terminated the clearance.

At 0635:22, the first officer stated, "flaps eight."

At 0635:25, the CVR recorded a sound similar to a trim-in-motion audio clicker, followed by the first officer stating, "hold on a second, flaps eight."

At 0635:28, the CVR recorded a sound of a click.

At 0635:29, the flightcrew announced on the radio, "Groton traffic, Lear one three five Papa Tango, left downwind for two three Groton."

At 0636:19, the first officer stated, "let me know when to turn?" The captain replied, "forty degrees of bank. Watch your speed."

At 0636:43, the first officer stated, "hold this altitude. We're near the ground." About 17

seconds later the first officer asked for "flaps full."

At 0637:28, the first officer stated, "what happens if we break out, pray tell." The captain replied, "uh, I don't see it on the left side it's gonna be a problem."

At 0637:45, the first officer stated, "damn it. you got the airplane." About 4 seconds later he stated, "can't do it right?"

At 0637:52, the CVR recorded a sound of a click. About 3 seconds later, the first officer stated, "okay, we have flaps twenty...do you want the gear up?" The captain replied, "leave 'em down."

At 0638:09, the CVR recorded a sound similar to increase in engine RPM.

At 0638:10, the captain stated, "yee haw." About 6 seconds later, the CVR recorded an unidentified voice state, "whoo."

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

At 0638:28, the captain called for "flaps twenty." The first officer replied, "flaps twenty coming in," followed by the CVR recording the sound of a click.

At 0638:34, the CVR recorded a sound similar to an autopilot/yaw damper disengage tone, and 4 seconds later, a sound similar to a trim-in-motion audio clicker.

At 0638:43, the first officer stated, "airspeed's ten above," followed one second later with, "airspeed's right on."

At 0638:45, the CVR recorded a sound of a click.

At 0638:48, the CVR recorded a sound similar to a trim-in-motion audio clicker.

At 0638:49, the first officer stated, "watch your speed. it's gonna stall."

At 0638:50, the CVR recorded a sound similar to a stick pusher stall warning tone.

At 0638:55, the CVR recorded an unidentified voice state, "taking over," followed by the captain stating, "okay. I'm with you."

At 0639:01, the CVR recorded a sound of impact.

The recording ended at 0639:02.

A witness, who was conducting a pre-flight inspection on an airplane at the Groton airport, heard the accident airplane as it approached from the east. The witness observed the airplane at a height consistent with the approach minimums for the VOR approach, and turn left for the runway 23 downwind leg. The witness lost visual contact with the airplane as it continued on the downwind leg, due to it "skimming" into or behind clouds. 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 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.

A second witness observed the airplane proceed over the airport and initiate a steep left turn to join the downwind leg for runway 23. The airplane continued the left turn, increasing the bank angle to almost 90-degrees to the horizon. As the airplane was turning for it's final approach, it

began to wobble from left to right, before disappearing behind a tree line.

The airplane's initial impact point was the rooftop of a single-story residential home, about 1/4-mile northeast of the approach end of runway 23. The wreckage path, which was orientated on a 280-degree heading, continued for about 800 feet through a small line of hardwood and evergreen trees, a second residential home, a second line of trees, a third residential home, down an embankment, and through a boardwalk, before coming to rest in the Pequannock River.

Post impact fires destroyed two of the residential homes, two automobiles, and five vessels moored on the river. There were no ground injuries reported.

The accident occurred during the hours of daylight, at 41 degrees, 20.59 minutes north longitude, 72 degrees, 2.11 minutes west latitude, at an elevation of 11 feet msl.

#### FLIGHTCREW INFORMATION

##### Captain

The captain held an airline transport pilot certificate with a rating for airplane multi-engine land, and a commercial pilot certificate for airplane single-engine land. He also held a flight instructor certificate for airplane single-engine land, and instrument airplane. In addition, the captain was type rated in the Learjet.

The captain's most recent FAA Airman Competency/Proficiency Check for the Learjet series was completed on May 1, 2003.

The captain's most recent FAA first class medical certificate was issued on June 24, 2003. On the application for the medical certificate, the captain reported 4,300 hours of total flight experience.

##### First Officer

The first officer held an airline transport pilot certificate with ratings for airplane single-engine and multi-engine land, and a commercial pilot certificate for airplane single-engine sea. He also held a flight instructor certificate for airplane single and multi-engine land, and instrument airplane. In addition, the first officer was type rated in the Learjet.

The first officer's most recent FAA Airman Competency/Proficiency Check for the Learjet series was completed on January 20, 2003.

The first officer's most recent FAA first class medical certificate was issued on June 4, 2003. On the application for the medical certificate, the first officer reported 9,000 hours of total flight experience.

#### AIRCRAFT INFORMATION

According to the operator's records, the airplane was maintained on an approved aircraft inspection program (AAIP), and had accumulated about 9,287 total airframe hours. The most recent maintenance performed on the airframe was completed on July 21, 2003, and included a 300-hour thrust reverser inspection to each engine.

The left engine had accumulated about 7,103.7 hours of total time. The most recent maintenance performed on the left engine was completed on August 1, 2003. It included a 300-hour inspection of the engine, and an oil and filter sample analysis. The oil and filter

analysis results were "normal."

The right engine had accumulated about 6,726.8 hours of total time. The most recent maintenance performed on the right engine was completed on August 1, 2003. It included a 300-hour inspection of the engine, and an oil and filter sample analysis. The oil and filter analysis results were "normal."

#### METEOROLOGICAL INFORMATION

An automated weather observation taken at the Groton airport, at 0656 included; 9 miles of visibility, a scattered cloud layer at 4,100 feet, winds from 150 degrees at 10 knots, temperature 73 degrees F, dew point 71 degrees F, and an altimeter setting of 30.05 inches Hg. At 0725, the reported weather included; 6 miles of visibility, few clouds at 600 feet, a broken cloud layer at 3,800 feet, and an overcast cloud layer at 6,000 feet. The winds were from 140 degrees at 8 knots, temperature 73 degrees F, dew point 71 degrees F, and an altimeter setting of 30.05 inches Hg.

A witness, who had worked at the Groton airport in excess of 30 years, described the weather just after the accident as "a typical morning, with the winds from the south packing in the clouds over the hills to the north." The witness added that there were no clouds or fog over the airport or to the south. The witness estimated the cloud heights to the north and northeast were about 500-600 feet above the ground.

#### AIDS TO NAVIGATION

The Groton airport was equipped with 4 instrument approach procedures, an ILS and VOR/GPS approach to runway 5, a GPS approach to runway 33, and a VOR/GPS approach to runway 23.

#### FLIGHT RECORDERS

##### Cockpit Voice Recorder

The airplane was equipped with a Fairchild A100A, cockpit voice recorder (CVR). The CVR was transported to the Safety Board, Office of Research and Engineering, on August 5, 2003.

The CVR recording consisted of four channels of audio information. One CVR channel contained audio information from the cockpit area microphone (CAM) that was mounted in the forward instrument panel of the airplane. The second and third CVR channels contained audio information obtained from the Captain's and the First Officer's audio selector panels in the cockpit. The fourth CVR channel, which was normally associated with the third crewmember on a 3-crew aircraft, was blank.

The CVR group convened on August 19, 2003. A transcript was prepared for the last 8 minutes of the 30-minute 10-second recording.

The audio from the CVR was further examined to see if sound signatures could be found that could be associated with either of the aircraft's two engines.

The audio information recovered from the individual channels was examined to document any sounds or electrical disturbances recorded on the CVR. The recording was examined on a computer based digital spectrum analyzer, which gave a visual presentation of the frequency content of the signals. The computer program permitted detailed analysis of the analog waveform and presented the specific frequency content of the signals as well as detailed timing

information.

No determination could be made as to which frequency trace was associated with the left or the right engine. Additionally, no definite traces could be identified during the last 5 seconds of the recording. During this time there was an increase in the amount of other sounds recorded on the CAM channel of the CVR. The increased sounds were due to the loud crew comments that could be heard and to the aircraft's aural stall warning that was heard during the last few seconds of the recording.

Review of the data revealed that both engines increased and decreased in frequency uniformly, and no abnormal differences in engine rpm were noted.

#### Flight Data Recorder

The flight data recorder (FDR), a Fairchild model F800 recorder, was forwarded to the Safety Board's flight recorder laboratory on August 5, 2003. Safety Board Vehicle Recorders Division personnel conducted a readout and evaluation of the data retained by the recorder.

The recorder was configured to record six flight parameters: time, pressure altitude, indicated airspeed, magnetic heading, vertical acceleration, and VHF keying. Engine data, as well as control surface and airplane orientation (i.e. pitch and roll), were not recorded.

The FDR recorded the following:

At 0637:45, the g loading was about 1.1667, the pressure altitude was about 500 feet, and the magnetic heading was 227 degrees. About 10 seconds later, the pressure altitude decreased to about 328 feet, and the magnetic heading was about 260 degrees.

At 0638:10, the g loading was about 1.4583, the pressure altitude was about 434 feet, and the magnetic heading was 193 degrees. About 10 seconds later, the g loading increased to about 1.5416, the pressure altitude had increased to about 575 feet, and the magnetic heading was about 110 degrees.

At 0638:30, the g loading decreased to about 1.0833, the pressure altitude decreased to about 550 feet, and the magnetic heading was about 050 degrees. About 15 seconds later, the g loading increased to about 1.5416, the pressure altitude had decreased to about 513 feet, and the magnetic heading was about 007 degrees.

At 0638:50, the g loading increased to about 1.9166, the pressure altitude decreased to about 448 feet, and the magnetic heading was about 320 degrees. During the last 10 seconds of the recording, the g loading increased at varying rates until reaching a maximum loading of 2.7082 g's. The last recorded pressure altitude, at 0638:57, was about 141 feet.

#### WRECKAGE INFORMATION

A portion of the right wing fuel tip tank, which included the tip tank fin, was located in the yard of the third residential home. It displayed several long scratches which were oriented about 45-degrees from a horizontal plane. The scratches on the tip tank portion were matched to roof top flashing used on the first residential home impacted by the airplane.

Also located in the yard of the third residential home, was the right main landing gear assembly, the horizontal stabilizer section of the empennage, a landing light, and additional skin fragments of the right wing and it's tip tank.

A 6-foot section of the right wing, an avionics receiver box, and several airframe skin fragments

were located at the base of the wooden boardwalk.

The remainder of the wreckage was submerged in tidal waters of the river.

On August 5, 2003, the remaining wreckage was recovered and further examined.

The main wreckage was separated into three sections; the forward fuselage, the aft fuselage, with the right engine remaining attached, and the carry-through wing section.

Additional pieces of wreckage that were recovered from the water included the left engine, the left and right flaps, the aft section of the left wing tip tank, the left wing extension, and the left and right thrust reverser assemblies. All flight controls surfaces were accounted for at the accident scene; however, due to impact damage, continuity of the flight controls could not be determined.

The horizontal stabilizer trim actuator nut-screw assembly was measured at 15.25 inches of length, which equated to approximately 5.5 degrees nose down trim. The elevators were separated from their attachments on the horizontal stabilizer.

The aileron trim tab, which was attached to the left wing aileron control surface, was observed in the neutral position, which corresponded to a 0 degree deflection.

The right and left wing spoiler actuators remained attached to their respective wing. The right actuator was measured at .75 inches, which corresponded to 0 degrees of deployment. The left actuator was measured at .81 inches, which also corresponded to 0 degrees of deployment.

The right wing flap was found separated from its attachment points on the wing. The right wing flap actuator was measured at 7.06 inches, which corresponded to 35 degrees of deployment. The right flap interconnect cable was separated from the right bell crank, and interconnection cable tension could not be determined. The left wing flap was found separated from its attachment points on the wing. The left wing flap actuator was measured at 2.81 inches, which corresponded to 2 degrees of deployment. No impact or witness marks were observed on the bottom surface or trailing edge of either the left or right flap.

The rudder was destroyed. The rudder trim tab was observed attached to the lower rudder section, which remained attached to the aft fuselage section. The rudder trim tab control rod was bent. The position of the rudder trim actuator was determined to be in the neutral position, which corresponded to a 0 degree deflection of the rudder trim tab.

Examination of the right engine revealed that all fan blades were present. Most of the fan blades exhibited heavy leading edge damage, which was displayed on the outer 1/3 section of the blades. The damage was consistent with foreign object damage, with rotational bending opposite to the direction of normal rotation. There was heavy rotational scoring damage to the fan shroud at the 7 o'clock position, in the area adjacent to the tips of the fan blades. Rotational scoring was observed on the fan spinner. The index pointer for the power lever potentiometer in the fuel control was observed near the 93-degree position. The accessory gearbox remained attached to the engine.

Examination of the left engine revealed that 2 fan blades were missing; and 10 fan blades were broken just outboard of the attachment point. All remaining blades displayed rotational bending opposite to the direction of normal rotation. The fan shroud area was heavily damaged consistent with impact forces, with the fan blade containment shroud separated from its housing. Heavy gouge marks were observed to the fan blade containment ring in the area



adjacent to the tips of the fan blades. The index pointer for the power lever potentiometer in the fuel control was observed near the 120-degree position. The accessory gearbox was separated from the power section; however, it remained attached to the engine assembly by fluid lines.

Examination of the main fuselage revealed that a post crash fire consumed the overhead portion of the cabin.

The cockpit area remained attached to the main fuselage. Due to the extent of impact damage, flight control continuity could not be confirmed.

The captain's airspeed indicator reference bug was set to 144 knots. The first officer's airspeed indicator reference bug was set to 124 knots.

The left throttle lever was found at the idle position, and the right throttle was forward about 1-inch.

The landing gear selector switch was observed in the "DOWN" position.

The flap selector switch was observed in the "UP" position.

The fuel selector was observed in the "L WING" position, and the fuel quantity indicator displayed 1,300 pounds.

The left engine fan speed gauge indicated 97.6 percent, the left engine turbine speed gauge indicated 94.9 percent, and the left engine turbine temperature gauge indicated 821 degrees C. The right engine fan speed gauge indicated 92.2 percent, the right engine turbine speed gauge indicated 85.6 percent, and the right engine turbine temperature gauge indicated 853 degrees C.

#### MEDICAL AND PATHOLOGICAL INFORMATION

The Office of the Chief Medical Examiner, Farmington, Connecticut, performed autopsies on both pilots on August 5, 2003.

The FAA Toxicology and Accident Research Laboratory, Oklahoma City, Oklahoma conducted toxicological testing for both pilots.

#### TEST AND RESEARCH

##### Wing Flap System

The flap system was hydraulically actuated and electrically controlled, providing flap settings of 0, 8, 20, and 40 degrees. The system did not have a mechanical locking mechanism to retain flap position settings, thus allowing the flap to move freely in the event of hydraulic pressure loss. The system also had interconnecting cables and pulleys to synchronize flap movement (within 2 degrees of each other) throughout the range of flap travel.

Learjet production test pilots flew a Learjet 35 to determine the estimated time it took for flap movements. At 135 knots, with a flap setting of 20 degrees, the pilots selected the flaps to 40 degrees. The time of movement was about 3 seconds. At 175 knots, while at flaps 20, they selected 0 degrees. The time of movement was about 5 seconds. The estimated time for the pilots to place their hand on the flap selector switch was about 2 seconds.

##### Trim-In-Motion Audio Clicker System

A trim-in-motion audio clicker system was installed in the airplane to alert the flightcrew of

horizontal stabilizer movement. The system would announce continuous movement of the horizontal stabilizer by producing a series of audible clicks through the headsets and cockpit speakers. The trim-in-motion audio clicker system was wired through the flap position switches and would not sound if the flaps were lowered beyond 3 degrees.

#### ADDITIONAL INFORMATION

The airplane was fueled on August 2, 2003, with 450 gallons of Jet A fuel. A "Prist" additive was mixed with the fuel during the refueling.

#### Airplane Performance

A review of FAA-H-8083-3, Airplane Flying Handbook, revealed:

"...At the same gross weight, airplane configuration, and power setting, a given airplane will consistently stall at the same indicated airspeed if no acceleration is involved. The airplane will, however, stall at a higher indicated airspeed when excessive maneuvering loads are imposed by steep turns, pull-ups, or other abrupt changes in its flightpath. Stalls entered from such flight situations are called 'accelerated maneuver stalls'..."

"...Failure to take immediate steps toward recovery when an accelerated stall occurs may result in a complete loss of flight control..."

"...At any given airspeed, the load factor increases as angle of attack increases, and the wing stalls because the angle of attack has been increased to a certain angle...The speed at which a wing will stall is proportional to the square root of the load factor..."

According to the load factor chart in FAA Advisory Circular 61-23C, Pilot's Handbook of Aeronautical Knowledge, a bank angle of 45 degrees will produce a load factor of 1.4, a bank angle of 60 degrees will produce a load factor of 2, and a bank angle of 80 degrees will produce a load factor of 6 (or 2.4 times the stalling speed).

A review of the Learjet 35/36 FAA approved Airplane Flight Manual (AFM) revealed that the airplane had a flight load factor limit of 3.0 positive g's and -1.0 negative g's with the flaps up, and 2.0 positive g's and 0.0 negative g's with the flaps down. The acceleration values limited the bank angle in a level coordinated turn to 70 degrees (flaps up) and 60 degrees (flaps down)

A review of the "Stall Speeds, Gear - Up or Down, Thrust Idle" chart from the AFM revealed the following stall speeds for selected flap positions:

Flaps 0, 118 knots

Flaps 8, 106 knots

Flaps 20, 101 knots

Flaps 40, 95 knots

A review of the "Stall Speeds, Turning Flight, Gear Up or Down, Thrust Idle, Level Coordinated Turn" chart from the AFM revealed the following stall speeds for selected flap positions, and a bank angle of 60 degrees:

Flaps 0 Gear Up, 164 knots

Flaps 8 Gear Up or Down, 148 knots

Flaps 20 Gear Up or Down, 142 knots

Flaps 40 Gear Down, 134 knots

There were no charts available to calculate stall speeds for level coordinated turns in excess of 60 degrees.

### Standard Operating Procedures

According to the operator, the flightcrew was trained with, and instructed to apply, standard operating procedures set forth by the Learjet 35/36 Technical Manual, and the Gates Learjet Flight Training Manual.

According to the Learjet 35/36 Technical Manual:

"All pilots will follow Standard Operating Procedures during NORMAL operations."

"The PF (Pilot Flying) will call for flap and gear extension and retraction. The PNF 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 (Pilot Not Flying) 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 such as checklist completion, altitude clearances, decision height determination, ect."

### Circling Approaches

After aborting the first attempt to land, under visual flight rules, the flightcrew performed a circling maneuver to attempt a second landing. According to the Gates Learjet Flight Training Manual, Circling Approaches section,

"Nothing has caused more controversy among pilots than the circling approach. Many accidents have occurred while circling. Some airlines and a few corporate flight departments will not accomplish the maneuver at all.... The procedure can become a problem only when (1) the airport disappears, or (2) you can't get the airplane lined up on final approach.... Never, never attempt to land while turning and/or diving steeply.... It is extremely easy to become distracted in the abnormal or unusual traffic pattern situation."

"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. Bring the angle of attack indicator into your crosscheck..."

"Traffic pattern minimum maneuvering speed are based on 1.3 times the aircraft's stall speed with idle thrust in applicable configuration, 30 degree bank attitude. Minimum maneuvering speeds are as follows:

Clean configuration	Vref plus 40 KAIS (approx. 62% N1)
Flaps 8 degrees	Vref plus 30 KAIS (approx. 64% N1)
Flaps 20 degrees	Vref plus 20 KAIS (approx. 66% N1)
Flaps 20 degrees, gear down	Vref plus 20 KAIS (approx. 70% N1)
Flaps, full down, gear down (maintaining altitude)	Vref plus 10 KAIS (approx. 77% N1)

Flaps, full down, gear down

(descending on final)

Vref plus 10 KAIS (approx. 67% N1)

Traffic pattern altitude for jet aircraft is normally 1,500 feet AGL."

### Wreckage Release

The airplane wreckage was released on August 5, 2003, to a representative of the operators insurance company.

### Pilot Information

<b>Certificate:</b>	Airline Transport; Flight Instructor; Commercial	<b>Age:</b>	33, Male
<b>Airplane Rating(s):</b>	Multi-engine Land; Single-engine Land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Seatbelt, Shoulder harness
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Airplane Single-engine; Instrument Airplane	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 1 Valid Medical--no waivers/lim.	<b>Last Medical Exam:</b>	06/24/2003
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	05/01/2003
<b>Flight Time:</b>	4300 hours (Total, all aircraft), 46 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

### Co-Pilot Information

<b>Certificate:</b>	Airline Transport; Flight Instructor; Commercial	<b>Age:</b>	56, Male
<b>Airplane Rating(s):</b>	Multi-engine Land; Single-engine Land; Single-engine Sea	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Seatbelt, Shoulder harness
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 1 Valid Medical--w/ waivers/lim.	<b>Last Medical Exam:</b>	06/04/2003
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	01/20/2003
<b>Flight Time:</b>	9000 hours (Total, all aircraft), 37 hours (Last 30 days, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Manufacturer:</b>	Learjet	<b>Registration:</b>	N135PT
<b>Model/Series:</b>	35A	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Transport	<b>Serial Number:</b>	35A-509
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	8
<b>Date/Type of Last Inspection:</b>	07/21/2003, Continuous Airworthiness	<b>Certified Max Gross Wt.:</b>	18500 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	2 Turbo Fan
<b>Airframe Total Time:</b>	9287 Hours	<b>Engine Manufacturer:</b>	Garrett
<b>ELT:</b>	Not installed	<b>Engine Model/Series:</b>	TFE-731-2-2B
<b>Registered Owner:</b>	Air East Management Ltd.	<b>Rated Power:</b>	3500 lbs
<b>Operator:</b>	Air East Management Ltd.	<b>Air Carrier Operating Certificate:</b>	On-demand Air Taxi (135)
<b>Operator Does Business As:</b>		<b>Operator Designator Code:</b>	RM6A

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual Conditions	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	GON, 11 ft msl	<b>Observation Time:</b>	0656 EDT
<b>Distance from Accident Site:</b>	1 Nautical Miles	<b>Direction from Accident Site:</b>	200°
<b>Lowest Cloud Condition:</b>	Scattered / 4100 ft agl	<b>Temperature/Dew Point:</b>	23° C / 22° C
<b>Lowest Ceiling:</b>	None	<b>Visibility</b>	9 Miles
<b>Wind Speed/Gusts, Direction:</b>	10 knots, 150°	<b>Visibility (RVR):</b>	
<b>Altimeter Setting:</b>	30.05 inches Hg	<b>Visibility (RVV):</b>	
<b>Precipitation and Obscuration:</b>			
<b>Departure Point:</b>	Farmingdale, NY (FRG)	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	Groton, CT (GON)	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	0610	<b>Type of Airspace:</b>	Class G

## Airport Information

<b>Airport:</b>	Groton-New London Airport (GON)	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	10 ft	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>	23	<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	5000 ft / 150 ft	<b>VFR Approach/Landing:</b>	Traffic Pattern

## Wreckage and Impact Information

<b>Crew Injuries:</b>	2 Fatal	<b>Aircraft Damage:</b>	Destroyed
<b>Passenger Injuries:</b>	N/A	<b>Aircraft Fire:</b>	On-Ground
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 Fatal	<b>Latitude, Longitude:</b>	41.337778, -72.053611

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Stephen M Demko	<b>Adopted Date:</b>	07/29/2004
<b>Additional Participating Persons:</b>	T.R. Proven; FAA AAI-100; Washington, DC Jim Allen; Honeywell; Phoenix, AZ Terrance Pearce; Bombardier Learjet; Wichita, KS Michael Terascio; Air East Management Ltd.; Farmingdale, NY		
<b>Publish Date:</b>			
<b>Investigation Docket:</b>	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at <a href="mailto:pubinq@ntsb.gov">pubinq@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report.