



National Transportation Safety Board Aviation Accident Final Report

Location:	Lexington, KY	Accident Number:	NYC02FA177
Date & Time:	08/30/2002, 1307 EDT	Registration:	N45CP
Aircraft:	Gates Learjet 25C	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	1 Fatal, 4 Serious, 1 Minor
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled - Air Medical (Unspecified)		

Analysis

Shortly before landing, the crew confirmed that the hydraulic and emergency air pressures were "good", and that the circuit breakers on the "right and left" were in. In addition, the first officer reported "arming one and two." The airplane landed 1,000 - 1,500 feet from the landing threshold of runway 04, which was 7,003 feet in length. The captain utilized aerodynamic braking during part of the landing roll. About 3 seconds after touchdown, the first officer stated, "they're not deployed, they're armed only." About 6 seconds after touchdown, there was an increase in engine rpm. Shortly after that, there was an expletive from the captain. One and a half seconds later, there was another expletive. Slightly less than 2 seconds later, the captain told the first officer to "brake me," and 2.7 seconds after that, stated "emergency brake." About 4 seconds later, there was a "clunk", followed by a decrease in engine rpm 1 second later. Immediately after that, the captain stated, "we're going off the end." The airplane subsequently dropped off an embankment at the end of the runway, impacted and descended through a localizer tower, then impacted the ground and slid across a highway. The airplane had been fitted with a conversion that included thrust reversers. An examination of the wreckage revealed that the thrust reversers were out of the stowed position, but not deployed. The drag chute was also not deployed. Brake calipers were tested with compressed air, and operated normally. Brake disc pads were measured, and found to be within limits. According to an excerpt from the conversion maintenance manual, reverser deployment was hydraulically actuated and electrically controlled. There was also an accumulator which allowed deploy/stow cycling in the event of hydraulic system failure. Interlocks were provided so that the reverser doors could not be deployed until the control panel ARM switch was on, the main throttle levers were in idle position, and the airplane was on the ground with the squat switches engaged. The previous crew reported no mechanical anomalies. Runway elevation rose by approximately 35 feet during the first 2/3 of its length, then decreased until it was 8 feet lower at its departure end. Winds were reported as being from 050 degrees true at 7 knots. At the airplane's projected landing weight, without the use of thrust reversers, the estimated landing distance was about 2,850 feet with the anti-skid operative, and 3,400 feet with the anti-skid inoperative.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The captain's addition of forward thrust during the landing rollout, which resulted in a lack of braking effectiveness and a subsequent runway overrun. A factor was the captain's inability to deploy the thrust reversers for undetermined reasons.

Findings

Occurrence #1: OVERRUN

Phase of Operation: LANDING - ROLL

Findings

1. (F) THRUST REVERSER - NOT DEPLOYED
2. DISTANCE - EXCEEDED - PILOT IN COMMAND
3. (C) IMPROPER USE OF EQUIPMENT/AIRCRAFT - PILOT IN COMMAND
4. BRAKES(NORMAL) - DIMINISHED
5. TERRAIN CONDITION - DROP-OFF/DESCENDING EMBANKMENT

Occurrence #2: ON GROUND/WATER COLLISION WITH OBJECT

Phase of Operation: LANDING

Findings

6. OBJECT - TOWER

Factual Information

HISTORY OF FLIGHT

On August 30, 2002, at 1307 eastern daylight time, a Gates Learjet 25C, N45CP, operated by American Air Network, Incorporated, doing business as (dba) Care Flight International, was destroyed when it overran a runway at Blue Grass Airport (LEX), Lexington, Kentucky. One passenger was fatally injured. The captain, first officer, flight nurse and another passenger were seriously injured, and a truck driver received minor injuries. An instrument flight rules flight plan had been filed for the flight, between Marco Island Airport (MKY), Marco Island, Florida, and Lexington. The air ambulance flight was conducted under 14 CFR Part 135.

According to the flight nurse, the deceased passenger was en route Lexington to receive medical treatment. The passenger was belted into the seat on the left side of the cabin, just aft the cabin door. The other passenger was seated directly behind her. The flight nurse was seated on the right side of the cabin, immediately forward of the medical stretcher, which was not occupied.

In a written statement, the captain reported that the touchdown was "smooth, idle power, and 1,000 - 1,500 feet from the landing threshold." The main wheels touched down, and the spoiler switch and thrust reverser levers were activated. No immediate loss of thrust was felt, and it was confirmed by no "thrust reverser deployed" lights. The captain "immediately lowered the nose wheel to the runway, and simultaneously stowed the thrust reverse levers." Speed was still greater than 100 knots at the time.

The captain again activated the thrust reversers, "and no cockpit lights or feel indicated TR deployment." Toe brakes were "lightly" applied, but "gave no indication of slowing the aircraft." The captain then released and reapplied the brakes with no effect. He then called for the first officer to apply his brakes, but felt no deceleration.

The airplane then departed the runway straight ahead, about 70-80 knots. The captain felt a "short freefall," then saw and felt the right wing strike the wooden structure that held the opposite-direction ILS antennas and lighting.

In his statement, the first officer reported that upon landing, "the brakes and thrust reversers failed. I applied the emergency brake. Despite this, we went off the [end] of the runway."

The airplane had a cockpit voice recorder onboard, and a successful download was accomplished at the Safety Board Recorders Laboratory. According to the group chairman's factual report, the crew commenced the approach checklist at 1253. During the checklist, the crew confirmed that the circuit breakers were "in" on the "right and left," and that "hydraulic and emergency air pressure are good."

Prior to landing, a voice, identified as that of the first officer stated, "anti-skid," and a voice identified as that of the captain stated, "kay." The first officer subsequently stated, "hydraulic pressure is good."

At 1304, the first officer stated, "autopilot's off, yaw dampener and full flaps complete the list. you want the thrust reversers?" Five seconds later, he reported "arming one and two."

About 45 seconds later, the captain requested full flaps, and 20 seconds after that, the first officer reported "short final. three green no red, flaps set."

At 1306:39, there was a sound of a "chirp."

At 1306:39.7, there was a sound of a "clunk."

At 1306:42.0, the first officer stated, "they're not deployed they're armed only."

At 1306:45.0, there was a sound similar to increased rpm.

At 1306:45.3 and 1306:46.8, there were expletives from the captain.

At 1306:48.6, the captain stated, "brake me," and two seconds later, the first officer stated, "we're not going to brake." The captain then stated, at 1306:51.3, "brake. emergency brake."

At 1306:55.5 there was a sound of a "clunk," followed, at 1306:56.5, by a sound similar to decreased engine rpm.

At 1306:56.8, the captain stated, "we're going off the end."

According to a Lexington Tower controller, the airplane "seemed to touch down in the normal touchdown zone," but the nose wheel appeared to be off the ground between taxiways A-3 and C. He briefly thought that the airplane was attempting to abort the landing, "thinking that the airplane appeared a little fast." As the airplane crossed the intersection of runway 08/26 [on the airport diagram, located about 1,200 feet from the departure end of runway 04], it was apparent to the controller that the airplane wasn't going to stop, so he rang the crash phone.

Another controller stated that he saw the airplane cross runway 08/26, "about 80 knots, lift up the nose and set it back down" as the first controller picked up the crash phone.

The accident occurred during the hours of daylight, when the airplane departed the end of runway 04 at 38 degrees, 02.56 minutes north latitude, 84 minutes, 35.9 minutes west longitude.

PILOT INFORMATION

The captain held an airline transport pilot certificate with multi-engine and Learjet ratings. According to company records, his latest FAR Part 135 proficiency check was on July 19, 2002. The captain's latest Federal Aviation Administration (FAA) first class medical certificate was dated July 16, 2002. The captain reported 2,681 hours of flight time, with 436 hours in make and model.

The first officer held a commercial pilot certificate with multiengine and instrument ratings. According to company records, his latest FAR Part 135 proficiency check was on June 22, 2002. The first officer's latest second class FAA medical certificate was dated February 12, 2002. The first officer reported 1,326 hours of flight time, with 60 hours in make and model.

OPERATOR INFORMATION

According to the director of operations, the operator managed 17 contracts, in which, "dba's" obtained their own customers, charged and collected fees for services under their own Department of Transportation-registered dba name, and incurred all expenses. The operator received signing and monthly flat fees, and provided FAR Part 135 operational control, including pilot training/records oversight, scheduled and unscheduled maintenance, crew scheduling, and dispatch flight following.

The operator managed 47 aircraft and 85 pilots.

AIRCRAFT INFORMATION

According to Federal Aviation Administration (FAA) records, the airplane was owned by Henry Air, Limited.

The airplane had a Dee Howard XR conversion, which included thrust reversers. According to the XR maintenance manual, the thrust reversers consisted of upper and lower "clam shell" doors that pivoted near the engines' horizontal centerlines. Reverser deployment was hydraulically actuated and electrically controlled. There was also an accumulator, which allowed deploy/stow cycling in the event of hydraulic system failure.

"With the aircraft firmly on the ground, the arming switches are actuated. When the power levers are retarded to idle stop, the auxiliary mechanical locks are released, and this action is indicated by illumination of the left and right ARM lights.

The piggy-back sub-throttles are raised to the idle detents to deploy the systems. Deployment is indicated by the UNSAFE lights on while the systems are in transit, and UNSAFE lights out and DEPLOY lights on when the buckets are deployed. At the time the DEPLOY light comes on, the piggy-back sub-throttle safety solenoids actuate, allowing further movement of the sub-throttle."

In addition:

"Interlocks are provided so that the reverser doors cannot be deployed until:

- Control panel ARM switch is on.
- Main throttle levers are in idle position.
- Aircraft is on the ground (squat switches engaged).

At this point, the reverser levers can be raised only to the deploy position with engine power remaining at idle. Only when the reverser doors are fully deployed can the reverser throttle levers be raised further, allowing increase of engine power...."

Maintenance records revealed that the airplane's left main tires were replaced on August 19, 2001, the nose tire was replaced on September 19, 2001, and the right main tires were replaced December 13, 2001. On December 28, 2001, 200/400/600-hour inspections were completed on both thrust reversers. On March 12, 2002, the airplane's hydraulic pumps and brake assemblies were removed and replaced. On June 6, 2002, the nose wheel tire was replaced and the drag chute was inspected.

On June 19, 2002, the airplane was placed on American Air Network's approved airworthiness inspection program (AAIP).

According to the captain and the first officer who had flown the airplane the previous week, there were no maintenance problems at that time. That captain, who had almost 2,000 hours in Lear-20 series airplanes, further stated the accident airplane was "one of the best, if not the best, [Lear 25s]" that he had flown.

METEOROLOGICAL INFORMATION

Weather, recorded at Blue Grass Airport at 1319, included a broken cloud layer at 4,300 feet, visibility 10 statute miles, winds from 050 degrees true, at 7 knots, temperature 81 degrees Fahrenheit, dewpoint 64 degrees Fahrenheit, and a barometric pressure of 30.19 inches HG.

AIRPORT INFORMATION

Runway 04 was 7,003 feet long. Elevation at the approach end was 944 feet above mean sea level (msl), and rose to 979 feet msl about 2/3 along its length. Elevation then decreased, to 972 feet msl at the departure end.

At the departure end of the runway, there was a paved overrun area, about 100 feet in length, followed by a grassy area at the same elevation, about 50 feet in length. The grassy area then dropped off, about 50 feet, at an angle of approximately 60 degrees. About 200 feet from the end of the paved overrun area (about 150 feet from the beginning of the drop-off) there was an instrument landing system (ILS) platform which was constructed of telephone poles and heavy crossbeams, and which rose about 50 feet in height. Beyond the ILS platform, about 60 feet, there was a drainage ditch. The drainage ditch ran along U.S. Route 60, which was, with the median included, about five lanes in width, and bordered on both sides by paved shoulders.

WRECKAGE AND IMPACT INFORMATION

No skid marks were found on the runway; however, light, straight-line skid marks matching the width of the jet's main landing gear, were found on the last part of the paved overrun, for about 40 feet. The skid marks, along with added marks matching the position of the jet's nosewheel, continued through the grass, to the edge of the drop-off. There were no tire tracks beyond the edge of the drop-off.

The northwest (left) half of the ILS platform was cut off horizontally, with the tallest remaining structure rising to almost 1/3 its original height. The majority of the platform top had fallen straight down into the remaining support structure.

A debris and soot trail began at the ILS platform, crossed the drainage ditch, and veered toward the right, across Route 60, to the main wreckage. The airplane came to rest on the opposite shoulder, facing 080 degrees magnetic.

The airplane's right wing was detached from the fuselage, and the empennage was burned from the engines, aft. Both main landing gear were detached from the wings, and the nose landing gear was collapsed. One of the four main landing gear tires exhibited a bald spot which did not penetrate to the cord. The thrust reversers were out of the stowed position, but were not deployed. The drag chute was also not deployed. Flap position could not be determined due to ruptured hydraulic lines.

In the cockpit, the throttles were at idle, and the flap handle was in the down position. The drag chute handle and the emergency brake handle were in the stowed position; however, the "emergency air" gauge indicated zero.

The flap position indicator was up, and landing reference speeds were 123 knots on the captain's side, and 121 knots on the first officer's side.

The brake calipers were tested with compressed air, and operated normally. Brake disc pads were measured, and found to be within limits.

TESTS AND RESEARCH

A security camera, located in a fixed position on top of a parking garage at Lexington Airport, partially recorded the landing and rollout. The recording and a scaled drawing of the airfield were forwarded to the Safety Board Recorders Laboratory for a video study.

According to the video study factual report, the video signal recording was on the order of 1-2 frames per second, but it was not constant, and was significantly slower in some portions of the recording. It was also noted that "many video security systems utilize variable frame rates that can be affected by programming, motion detection within a camera's field of view, the number of cameras in a system, or some combination of these factors."

The study was limited to an examination of the recorded images between 1312:53 and 1313:26, as indicated by clock times burned into the video frames. The airplane was initially seen as a small white dot as it approached the runway, and at 1313:36, the airplane was moving out of view, with a portion of the tail visible at the very right edge of the image. At times, it was very difficult to isolate the airplane from the background. A comparison of vertical light poles to individual frames also suggested frame distortion, which progressively increased from image centers, outwards. In addition, due to the distances from the airplane to the camera, the low and variable frame rate, and the small number of suitable landmarks, precise groundspeeds could not be calculated, and estimates were calculated with upper and lower bounds.

According to those estimates, during the 5.87 seconds which preceded the airplane's position about 5,345 feet from the runway's departure end, the airplane traveled "less than 1,325 feet," which resulted in an estimated groundspeed of "less than 134 knots." During the next calculated time frame, which lasted 9.37 seconds and ended when the airplane was just to the left of a landmark 2,250 feet from the departure end of the runway, the airplane traveled 1,512 - 1,607 feet, which resulted in an average estimated groundspeed of between 96 and 102 knots.

ADDITIONAL INFORMATION

According to the cockpit voice recorder, the crew planned on a landing speed of 123 knots at a landing weight of 12,500 pounds. Utilizing the Dee Howard Learjet 25 XR landing distance chart, at that landing weight, the estimated landing distance was about 2,850 feet with the anti-skid operative, and 3,400 feet with the anti-skid inoperative. The chart did not include the use of thrust reversers.

On August 31, 2002, the wreckage was released to a representative of the owner's insurance company.

Pilot Information

Certificate:	Airline Transport	Age:	39, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	Last Medical Exam:	07/16/2002
Occupational Pilot:		Last Flight Review or Equivalent:	07/19/2002
Flight Time:	2681 hours (Total, all aircraft), 436 hours (Total, this make and model), 2310 hours (Pilot In Command, all aircraft)		

Co-Pilot Information

Certificate:	Commercial; Flight Engineer	Age:	40, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Rear
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane Single-engine	Toxicology Performed:	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	Last Medical Exam:	06/22/2002
Occupational Pilot:		Last Flight Review or Equivalent:	06/22/2002
Flight Time:	1363 hours (Total, all aircraft), 60 hours (Total, this make and model), 114 hours (Pilot In Command, all aircraft), 60 hours (Last 90 days, all aircraft), 14 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Gates Learjet	Registration:	N45CP
Model/Series:	25C	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	073
Landing Gear Type:	Retractable - Tricycle	Seats:	7
Date/Type of Last Inspection:	12/28/2001, Continuous Airworthiness	Certified Max Gross Wt.:	16000 lbs
Time Since Last Inspection:	81 Hours	Engines:	2 Turbo Fan
Airframe Total Time:	7514 Hours	Engine Manufacturer:	General Electric
ELT:	Installed, not activated	Engine Model/Series:	CJ610
Registered Owner:	Henry Air Ltd	Rated Power:	2950 lbs
Operator:	American Air Network, Inc.	Air Carrier Operating Certificate:	On-demand Air Taxi (135)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	LEX, 980 ft msl	Observation Time:	1319 EDT
Distance from Accident Site:		Direction from Accident Site:	
Lowest Cloud Condition:		Temperature/Dew Point:	27° C / 18° C
Lowest Ceiling:	Broken / 4300 ft agl	Visibility	10 Miles
Wind Speed/Gusts, Direction:	7 knots, 50°	Visibility (RVR):	
Altimeter Setting:	30.19 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:			
Departure Point:	Marco Island, FL (MKY)	Type of Flight Plan Filed:	IFR
Destination:	Lexington, KY (LEX)	Type of Clearance:	IFR
Departure Time:	1110 EDT	Type of Airspace:	Class B

Airport Information

Airport:	Blue Grass Airport (LEX)	Runway Surface Type:	Asphalt
Airport Elevation:	972 ft	Runway Surface Condition:	Dry
Runway Used:	04	IFR Approach:	Visual
Runway Length/Width:	7003 ft / 150 ft	VFR Approach/Landing:	Full Stop; Straight-in

Wreckage and Impact Information

Crew Injuries:	3 Serious	Aircraft Damage:	Destroyed
Passenger Injuries:	1 Fatal, 1 Serious	Aircraft Fire:	On-Ground
Ground Injuries:	1 Minor	Aircraft Explosion:	None
Total Injuries:	1 Fatal, 4 Serious, 1 Minor	Latitude, Longitude:	38.042500, -84.598333

Administrative Information

Investigator In Charge (IIC): Paul R Cox **Adopted Date:** 03/02/2004

Additional Participating Persons: Jeffrey Jennings; FAA/FSDO; Louisville, KY
Douglas Gilliland; American Air Network; Chesterfield, MO
Ralph Witzke; Bombardier Aerospace; Wichita, KS
Ken Wolski; GE Aircraft Engines; Cincinnati, OH

Publish Date:

Investigation Docket: 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 pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at <http://dms.nts.gov/pubdms/>.

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