



National Transportation Safety Board Aviation Accident Final Report

Location:	Aspen, Colorado	Accident Number:	CEN12LA345
Date & Time:	June 7, 2012, 12:24 Local	Registration:	N500SW
Aircraft:	LEARJET INC 60	Aircraft Damage:	Substantial
Defining Event:	Aerodynamic stall/spin	Injuries:	8 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

While the first officer was flying the airplane on a visual approach to the airport located in a steep mountain valley, the tower controller informed him that the pilot of a Citation that had landed about 10 minutes earlier had reported low-level windshear with a 15-knot loss of airspeed on short final. The first officer used the spoilers while on the left base leg and then maneuvered the airplane in an "S-turn" on the final leg to correct for a too-steep approach. Just as the airplane was about to touch down with the airspeed decreasing, the captain made several calls for "power" and then called for a "go around." However, the first officer did not add power for a go-around, and the captain did not take control of the airplane. Both pilots reported that, when the airplane was about 30 ft above ground level (agl), they felt a sensation that the airplane had "stopped flying" with a simultaneous left roll, which is indicative of an aerodynamic stall, followed by an immediate impact with terrain. After striking obstructions that completely separated the right main landing gear and the right flap, the airplane came to rest upright in the dirt on the side of the runway about 4,000 ft from the initial impact point. The airplane sustained substantial damage to the fuselage and both wings. All eight occupants evacuated through the main cabin door. There was a substantial fuel spill but no postimpact fire. Both pilots reported no mechanical malfunctions or failures of the airplane, and neither pilot reported an uncommanded loss of engine power.

Data from the enhanced ground proximity warning system showed that seven warning events occurred in the last 3 minutes before the accident. The first warning was for "sink rate," and it occurred when the airplane was about 1,317 ft agl and in a 3,400-ft-per-minute descent. The last warning was for "bank angle," and it occurred about 10 seconds before touchdown as the airplane exceeded 42 degrees of bank when it was about 200 ft agl. The wind recorded at the airport at the time of the accident would have resulted in a 12-knot variable tailwind with gusts to 18 knots.

The evidence is consistent with the first officer flying a nonstabilized approach with a decreasing airspeed during low-level windshear conditions. The first officer did not properly compensate for the known low-level windshear conditions and allowed the airspeed to continue to decrease and the bank angle to increase until the airplane experienced an aerodynamic stall.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The first officer's failure to maintain adequate airspeed and his exceedance of the airplane's critical angle-of-attack during the final approach in known low-level windshear conditions, which resulted in an aerodynamic stall. Contributing to the accident were the first officer's failure to initiate a go-around when commanded and the captain's lack of remedial action when he recognized that the approach was unstabilized.

Findings

Aircraft	Airspeed - Not attained/maintained
Personnel issues	Lack of action - Copilot
Personnel issues	Incorrect action selection - Copilot
Personnel issues	Incorrect action selection - Pilot
Aircraft	Angle of attack - Not attained/maintained
Personnel issues	Aircraft control - Pilot
Environmental issues	Windshear - Effect on operation
Personnel issues	Lack of action - Pilot

Factual Information

On June 7, 2012, about 1224 mountain daylight time, a Learjet 60, N500SW, was substantially damaged when it impacted terrain and obstructions during landing at Aspen-Pitkin County Airport (ASE), Aspen, Colorado. The two airline transport pilots and the six passengers were not injured. The airplane was registered to and operated by Performance Aircraft Leasing, Inc. under the provisions of 14 Code of Federal Regulations Part 91, as personal flight. Day visual meteorological conditions prevailed and an instrument flight rules flight plan was filed. The airplane departed Opa-Locka Executive Airport (OPF), Miami, Florida, about 1020 eastern daylight time and was destined for ASE.

While on a left downwind for a visual approach to runway 15 the tower controller informed N500SW about a Citation that landed about 10 minutes prior and reported low-level wind shear with a 15-knot speed loss on short final, and N500SW acknowledged. During the arrival to ASE the first officer was manipulating the controls and was seated in the left cockpit seat. The captain was seated in the right seat.

While on a left base the first officer used spoilers and maneuvered the airplane in an "S-turn" on final to correct for a too steep approach. Close to touchdown, with airspeed decreasing, and responding to the calls from the captain for "power", the first officer advanced power slightly. Airspeed continued to decrease and the captain called for a "go-around", but the first officer did not add power for a "go-around", and the captain did not take control of the airplane. When the airplane was about 30 feet above ground level (agl) both pilots reported the airplane suddenly "stopped flying" with a simultaneous slight left roll and an immediate impact with terrain.

The airplane impacted to the right of and short of the runway threshold, damaged runway threshold lights, traveled diagonally across the runway, and exited the left side of the runway. It continued moving in the dirt on the left side of the runway and struck obstructions which completely separated the right main landing gear and the right flap and resulted in substantial damage to the fuselage and both wings. The airplane came to rest upright in the dirt on the right side of the runway about 4,000 feet from the initial impact point and about 400 feet east from the airport fire station. All eight occupants evacuated through the main cabin door. There was a substantial fuel spill but no postimpact fire. Aircraft rescue and firefighting (ARFF) crews responded immediately and laid down a protective blanket of foam on the fuel spill.

A postaccident download of data from the Enhanced Ground Proximity Warning System (EGPWS) showed seven warning events had been recorded in the last three minutes before the accident. The first EGPWS warning was for "sink rate" and showed the airplane was in a 3,400 feet per minute descent when at an altitude of about 1,317 feet agl. About 10 seconds before touchdown another EGPWS warning for "bank angle" showed the airplane exceeded 42 degrees of bank when at an altitude of about 200 feet agl and at a calibrated airspeed (CAS) of about 135 knots. The CAS continued to decrease and was about 127 knots just before touchdown.

Both pilots reported there were no preaccident mechanical malfunctions or failures with the airplane that would have precluded normal operation, and neither pilot had any doubt of the engines producing desired power.

At 1153 MDT, ASE reported wind from 020 degrees at 7 knots with gusts to 16 knots, wind direction variable between 350 degrees and 060 degrees, visibility of 10 miles or greater, sky clear, temperature 23 degrees Celsius (C), dew point temperature -6 degrees C, and altimeter setting 30.13 inches of Mercury.

At 1225 MDT, ASE reported wind from 270 degrees at 12 knots with gusts to 18 knots, wind direction variable between 240 degrees and 300 degrees, visibility of 10 miles or greater, sky clear, temperature 24 degrees C, dew point temperature -10 degrees C, and altimeter setting 30.13 inches of Mercury.

ADDITIONAL INFORMATION:

The ASE airport website recommends the following about approach procedures: "Establish the inbound flight path to require no more than a 20-degree bank angle to follow the noise abatement track".

Federal Aviation Administration (FAA) Pilot's Handbook of Aeronautical Knowledge states in Chapter 11: "Ground topography (such as mountains, valleys and canyons) ... can break up the flow of the wind and create wind gusts that change rapidly in direction and speed (which) can affect the takeoff and landing performance of any aircraft and can present a very serious hazard ... Due to the effect terrain has on the wind in valleys or canyons, downdrafts can be severe".

"Low-level wind shear is a sudden, drastic change in wind speed and/or direction over a very small area. Wind shear can subject an aircraft to violent updrafts and downdrafts, as well as abrupt changes to the horizontal movement of the aircraft. While wind shear can occur at any altitude, low-level wind shear is especially hazardous due to the proximity of an aircraft to the ground. Directional wind changes of 180 degrees and speed changes of 50 knots or more are associated with low-level wind shear. The rapid changes in wind direction and velocity change the wind's relation to the aircraft disrupting the normal flight attitude and performance of the aircraft. During a wind shear situation, the effects can be subtle or very dramatic depending on wind speed and direction of change. For example, a tailwind that quickly changes to a headwind causes an increase in airspeed and performance. Conversely, when a headwind changes to a tailwind, the airspeed rapidly decreases and there is a corresponding decrease in performance. In either case, a pilot must be prepared to react immediately to the changes to maintain control of the aircraft".

FAA AC 120-108 states "A stabilized approach is a key feature to a safe approach and landing (and is) characterized by maintaining a stable approach speed, descent rate, vertical flight path, and configuration to the landing touchdown point ... at a rate of descent no greater than 1,000 feet per minute (fpm)"

FAA Publication FAA-P-8740-60 "Tips on Mountain Flying" states the following about approaches and landings at mountain airports: "Plan to fly a stabilized approach to the desired touchdown spot. Since mountain winds are sometimes tricky, be aware of wind shear and go around if necessary".

FAA Approved Airplane Flight Manual (AFM) Learjet 60 Limitations in section I states: maximum landing tailwind component is 10 knots; Normal Procedures in section II states: "It is recommended that if turbulence is anticipated due to gusty winds, wake turbulence, or wind shear, the approach speed be increased. For gusty wind conditions, an increase in approach speed of one half the gust factor is recommended" ... Go Around Procedures in section II states: "Thrust Levers – Select T/O detent ... Climb at approach climb speed ... accelerate to Vref plus 20".

Other data from the AFM states that the Vref speed is 134 knots, and the Vapp speed is 146 knots for operations at a weight of 17,500 pounds to a runway at 7,500 foot elevation with a dry runway, zero wind, and zero runway gradient.

History of Flight

Landing	Aerodynamic stall/spin (Defining event)
Landing	Abnormal runway contact
Landing	Runway excursion
Landing	Collision with terr/obj (non-CFIT)
Post-impact	Part(s) separation from AC
Post-impact	Hazardous material leak/spill
Post-impact	Evacuation

Pilot Information

Certificate:	Airline transport	Age:	54
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	4-point
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 1 With waivers/limitations	Last FAA Medical Exam:	December 8, 2011
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	January 1, 2012
Flight Time:	(Estimated) 18000 hours (Total, all aircraft), 600 hours (Total, this make and model), 16000 hours (Pilot In Command, all aircraft), 50 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft), 8 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Airline transport	Age:	68
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	4-point
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 With waivers/limitations	Last FAA Medical Exam:	March 29, 2012
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	May 27, 2010
Flight Time:	(Estimated) 13500 hours (Total, all aircraft), 25 hours (Last 90 days, all aircraft), 14 hours (Last 30 days, all aircraft), 9 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	LEARJET INC	Registration:	N500SW
Model/Series:	60	Aircraft Category:	Airplane
Year of Manufacture:	1993	Amateur Built:	
Airworthiness Certificate:	Transport	Serial Number:	017
Landing Gear Type:	Retractable - Tricycle	Seats:	10
Date/Type of Last Inspection:	January 30, 2012 Continuous airworthiness	Certified Max Gross Wt.:	23500 lbs
Time Since Last Inspection:	136 Hrs	Engines:	2 Turbo fan
Airframe Total Time:	6456 Hrs at time of accident	Engine Manufacturer:	PWC
ELT:	Installed, not activated	Engine Model/Series:	305
Registered Owner:		Rated Power:	4600 Lbs thrust
Operator:		Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	KASE, 7820 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	11:53 Local	Direction from Accident Site:	360°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	7 knots / 16 knots	Turbulence Type Forecast/Actual:	/
Wind Direction:	20°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.12 inches Hg	Temperature/Dew Point:	23° C / -6° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Miami, FL (OPF)	Type of Flight Plan Filed:	IFR
Destination:	Aspen, CO (ASE)	Type of Clearance:	IFR
Departure Time:	10:20 Local	Type of Airspace:	Class D

Airport Information

Airport:	Aspen-Pitkin County Airport ASE	Runway Surface Type:	Asphalt
Airport Elevation:	7820 ft msl	Runway Surface Condition:	Dry
Runway Used:	15	IFR Approach:	Visual
Runway Length/Width:	7006 ft / 100 ft	VFR Approach/Landing:	Full stop; Traffic pattern

Wreckage and Impact Information

Crew Injuries:	2 None	Aircraft Damage:	Substantial
Passenger Injuries:	6 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	8 None	Latitude, Longitude:	39.220554, -106.867774(est)

Administrative Information

Investigator In Charge (IIC):	Latson, Thomas
Additional Participating Persons:	Richard Hosker; FAA Denver FSDO; Denver, CO Howard Harris; FAA Denver FSDO; Denver, CO
Original Publish Date:	July 13, 2015
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=83888

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.

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