



National Transportation Safety Board Aviation Accident Final Report

Location:	Goodland, KS	Accident Number:	DEN08LA013
Date & Time:	10/17/2007, 1010 MDT	Registration:	N31MC
Aircraft:	Learjet 35A	Aircraft Damage:	Substantial
Defining Event:		Injuries:	2 None
Flight Conducted Under:	Part 91: General Aviation - Business		

Analysis

According to the flight crew, they exited the clouds approximately 250 feet above ground level, slightly left of the runway centerline. The pilot not flying took control of the airplane and adjusted the course to the right. The airplane rolled hard to the right and when the pilot corrected to the left, the airplane rolled hard to the left. The airplane impacted the ground in a right wing low attitude, resulting in substantial damage. Further examination and testing revealed anomalies with the yaw damper and spoileron computer. According to the manufacturer, these anomalies would not have prevented control of the airplane. Greater control wheel displacement and force to achieve a desired roll rate when compared with an operative spoileron system would be required. The result would be a slightly higher workload for the pilot, particularly in turbulence or crosswind conditions. An examination of the remaining systems revealed no anomalies.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to maintain aircraft control during the landing.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings

1. FLT CONTROL SYST, WING SPOILER SYSTEM - INOPERATIVE
 2. MISCELLANEOUS, BOLT/NUT/FASTENER/CLAMP/SPRING - MISSING
 3. (C) AIRCRAFT CONTROL - NOT MAINTAINED - PILOT IN COMMAND
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Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings

4. TERRAIN CONDITION - GROUND

Factual Information

On October 17, 2007, approximately 1010 mountain daylight time, a Learjet 35A, N31MC, registered to Jagee Ventures, Inc., and piloted by an airline transport pilot, sustained substantial damage when it impacted terrain during landing at Renner Field (GLD), Goodland, Kansas. Instrument meteorological conditions prevailed at the time of the accident. The flight was being conducted on an instrument flight rules flight plan under the provisions of Title 14 Code of Federal Regulations Part 91. The pilot and co-pilot reported no injuries. The flight originated at Fort Worth Meacham International Airport (FTW), Fort Worth, Texas, at 0950 central daylight time.

According to the telephone conversation with the flight crew immediately following the accident, the airplane exited instrument conditions at 250 feet above ground level on approach to runway 30 (5,499 feet by 100 feet, concrete) slightly left of the runway centerline. The flying pilot aligned the airplane with the runway centerline and experienced an uncontrolled left and right rolling motion. The pilot not flying stated that he noted that the aileron augment annunciator light had illuminated.

According to the written statement provided by the pilot, prior to flying the instrument approach, it was briefed that the co-pilot would fly the approach and he (the pilot) would watch for the runway environment and "take the controls for the landing." He stated that when he had the runway environment in sight, they were "slightly to the left of center line" and he took control of the airplane, announcing the exchange verbally, and he made a "slight correction to the right." At this time the airplane "rolled excessively to the right" and he corrected to the left, at which time the airplane "rolled excessively to the left."

According to the written statement provided by the co-pilot, the flight and instrument approach were without issues or anomalies. He stated that the airplane was fully configured to land and stabilized on the glide slope. As he approached the decision height, he was preparing to go-around when the pilot announced he had the runway environment in sight and took control of the airplane, as previously briefed. The airplane was to the left of the runway centerline and the pilot corrected to the right. At this time, the airplane "rolled much farther than was commanded." Correction was made to the left and back to the right, at which time, the airplane rolled hard again to the right.

According to the Federal Aviation Administration inspectors and Learjet investigators, the runway and aircraft damage indicated that the right tip tank struck the runway at a very high right wing low attitude, crossing the runway at a 45 degree angle. The aircraft traveled off of the right side of the runway leveling out and contacting the ground. The aircraft then banked left with the left wing at a very high angle striking the left tip tank on the runway surface and breaking the left wing extension. The aircraft continued traveling left across the runway again off into the grass left of the runway at an approximate angle of 45 degrees. The airplane came to rest between the runway and the taxiway, adjacent to the airport terminal area.

Examination of the airplane revealed that the left outboard wing section separated approximately three feet from the wing tip tank. The right tip tank fin was torn and the bottom of the tank exhibited forward to aft scratches. The fuel tip tank fuel cell was leaking.

The weather at the time of the accident was reported as winds 330 degrees at nine knots; visibility 1.25 statute miles in mist; sky condition overcast 200 feet; temperature six degrees

Celsius; dewpoint five degrees Celsius; altimeter 29.44 inches.

On October 18, 2007, the Federal Aviation Administration (FAA) inspectors and investigators from Bombardier Learjet examined the airplane and its systems. A spoiler test box was installed and the spoilers were tested per the airplane maintenance manual. The aileron augmentation light illuminated with certain movement of the flight controls. The spoileron computer was removed from the airplane for further examination.

On December 4, 2007, the spoileron computer was taken to Bombardier Learjet in Wichita, Kansas, and tested with the spoileron computer test panel. During initial examination, it was noted that the command limit was set clockwise to its farthest setting. It was also noted that the lock nuts on both potentiometers were loose. The left and right balance potentiometers were reset using the spoileron test panel. The unit was tested according to the vendor manual, with all results within test parameters. The left and right balance potentiometers were returned to their initial settings and the unit was retested. The spoilerons tracked consistently when tested in the air mode. The unit passed the remaining tests conducted.

On December 17, 2007, National Transportation Safety Board, Bombardier Learjet, and FAA investigators examined the airplane and its systems. Aileron augmentation and yaw damper tests were conducted in various airplane configurations.

During the aileron augmentation test, with the flaps set at 40 degrees, the spoilerons deployed to an unknown angle (motion was too rapid to measure) after five degrees of left aileron and immediately stowed. This was accompanied by an aug/ail light illumination in the cockpit. The spoilerons deployed and tracked normally with right aileron activation up to 14 degrees. The spoilerons stowed at 15 degrees of right aileron; this was accompanied by an aug/ail light illumination in the cockpit.

The spoilerons were inoperative during airmode testing (with flaps at 20 degrees) and during computer power testing (with the spoileron computer circuit breaker pulled), as expected.

Both yaw damper self-tests failed. The other yaw damper tests were within parameters. The yaw damper computer, two rate gyros, and two lateral accelerometers were removed for further testing. During the removal of the rate gyro, it was noted that the 7.5 degree wedge was not installed.

On April 1, 2008, the yaw damper controller was tested in Wichita, Kansas, by Bombardier Learjet and L-3 Avionics Systems, under the auspices of the Federal Aviation Administration. The first functional test of the unit, as removed from the airplane, revealed the following:

The primary and secondary centering voltages were high

The primary rate gyro circuit did not function

The primary cross feed did not function

The secondary cross feed reacted slow

The unit centering voltage potentiometers were centered and the unit was retested, revealing the following:

The secondary centering voltage did not function

The primary and secondary rate gyro circuits functioned properly

The primary cross feed was functioned properly

The secondary cross feed did not function properly

Finally, the test set voltage was adjusted and the unit was retested, revealing the following:

The primary and secondary centering voltages were high

The primary rate gyro circuit did not function

The primary cross feed did not function

The secondary cross feed reacted slow

Following the bench test, the settings were returned to their original configuration.

Disassembly revealed that the J-6 pin 2 was pushed back and contacting the cover. No other anomalies or defects were noted.

A review of the maintenance records, provided by Turbine Engine Specialists Inc, revealed that the "spoileron system" was not "working properly" and maintenance was initiated on October 2, 2007, addressing this issue in conjunction with other inspections and issues. The customer recalled the airplane while the spoileron system was being trouble shot and Turbine Engine Specialists reported that they "deactivated" the spoileron system in accordance with the Learjet minimum equipment list procedure. The circuit breaker was pulled and secured with a tie wrap and a decal was installed on the instrument panel indicating the system was deactivated. Neither the tie wrap nor decal were noted during the examination of the cabin of the airplane and both the spoiler and spoileron circuit breakers were in the closed position.

According to the pilot, the "aug/ail" circuit breaker was pulled during the entire flight except for a short time in cruise flight when he attempted to reset the system. He stated that the system would not reset so he pulled the circuit breaker and it remained in that position for the remainder of the flight. He confirmed that the fuel load was balanced, the yaw damper was engaged, the flaps were "full", and the autopilot was not used during the approach. It was also stated that all cabin circuit breakers were reset following the accident.

According to the Master Minimum Equipment List (MEL) for Learjet (including a Lear 35A) Revision 6, which was located in the accident airplane, the spoileron system may be inoperative provided the ground spoilers are operative, the airplane is operated at or below flight level 250, and the airplane is operated with a maximum crosswind limitation of 20 knots. There was no letter of authorization from the FAA for this MEL. According to Learjet, an inoperative spoileron system would not exaggerate control inputs or create control problems during landing. Learjet added that temporary flight manual change issued in July of 2007 states that "landing on a wide runway of sufficient length with minimum turbulence and crosswind is recommended" while operating with this system inoperative.

The augmented aileron (spoileron) system was incorporated into the airplane design to improve handling qualities (roll axis) at lower airspeeds. When the flaps are retracted above 25 degrees the augmentation system is disabled, and only the speed brake function is operational. When the flaps are extended below the 25 degrees position, the augmentation system is active, and as the airplane is banked, the corresponding spoiler board is lifted to aid the lifted aileron. The automatic function of the system and spoiler deflection ratio is computer controlled, and includes limits of deflection based on aileron travel. The system will shutdown automatically if

an anomaly is detected, leaving the aileron without augmentation, and a reduced roll rate. An enunciator panel warning light visually indicates a system anomaly. According to Learjet "this will result in a noticeable but manageable reduction in roll authority. In other words, it will take greater control wheel displacement and force to achieve a desired roll rate when compared with an operative spoileron system. The result would be a slightly higher workload, particularly in turbulence or crosswind conditions."

According to L-3 Avionics Systems, an inoperative rate gyro circuit could cause the affected yaw damper system to become inoperative. It was noted that the system does not provide an indication of a failed rate gyro circuit. In addition, the absence of the rate gyro wedge would result in the system being less effective at sensing and dampening the roll component of any oscillation.

Co-Pilot Information

Certificate:	Airline Transport; Flight Instructor; Commercial	Age:	67, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land; Single-engine Sea	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	Toxicology Performed:	No
Medical Certification:	Class 2 With Waivers/Limitations	Last FAA Medical Exam:	06/01/2007
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	08/01/2007
Flight Time:	20000 hours (Total, all aircraft), 7000 hours (Total, this make and model), 20000 hours (Pilot In Command, all aircraft), 17 hours (Last 90 days, all aircraft), 8 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Pilot Information

Certificate:	Airline Transport; Flight Instructor; Flight Engineer	Age:	50, 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):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	Toxicology Performed:	No
Medical Certification:	Class 2 With Waivers/Limitations	Last FAA Medical Exam:	11/01/2006
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	10/01/2007
Flight Time:	9500 hours (Total, all aircraft), 700 hours (Total, this make and model), 7500 hours (Pilot In Command, all aircraft), 10 hours (Last 90 days, all aircraft), 2 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Learjet	Registration:	N31MC
Model/Series:	35A	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	270
Landing Gear Type:	Retractable - Tricycle	Seats:	10
Date/Type of Last Inspection:	07/01/2007, AAIP	Certified Max Gross Wt.:	18000 lbs
Time Since Last Inspection:		Engines:	2 Turbo Fan
Airframe Total Time:	5539.8 Hours as of last inspection	Engine Manufacturer:	Honeywell
ELT:	Installed, not activated	Engine Model/Series:	TFE 731-2-2B
Registered Owner:	Jagee Ventures Inc	Rated Power:	3500 lbs
Operator:	Jagee Ventures Inc	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	Condition of Light:	Day
Observation Facility, Elevation:	KGLD, 3656 ft msl	Distance from Accident Site:	1 Nautical Miles
Observation Time:	1008 CST	Direction from Accident Site:	300°
Lowest Cloud Condition:	Thin Overcast / 200 ft agl	Visibility	1.25 Miles
Lowest Ceiling:	Overcast / 200 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	9 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	330°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.44 inches Hg	Temperature/Dew Point:	6°C / 5°C
Precipitation and Obscuration:	Mist		
Departure Point:	Forth Worth, TX (FTW)	Type of Flight Plan Filed:	IFR
Destination:	Goolland, KS (GLD)	Type of Clearance:	IFR
Departure Time:	0950 CDT	Type of Airspace:	

Airport Information

Airport:	Renner Field (GLD)	Runway Surface Type:	Concrete; Snow
Airport Elevation:	3656 ft	Runway Surface Condition:	Dry
Runway Used:	30	IFR Approach:	ILS
Runway Length/Width:	5499 ft / 100 ft	VFR Approach/Landing:	Full Stop

Wreckage and Impact Information

Crew Injuries:	2 None	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 None	Latitude, Longitude:	39.368889, -101.692778

Administrative Information

Investigator In Charge (IIC):	Jennifer Kaiser	Report Date:	12/24/2008
Additional Participating Persons:	Jerry Eichelberger; FAA Flight Standards District Office; Wichita, KS Ralph Witzke; Bombardier Learjet; Wichita, KS William G Ladigo; L-3 Avionics; Wichita, KS		
Publish Date:	12/24/2008		
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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