



Aviation Investigation Final Report

Location:	Batesville, Arkansas	Accident Number:	CEN23LA056
Date & Time:	November 29, 2022, 19:10 Local	Registration:	N988MC
Aircraft:	LEARJET INC 45	Aircraft Damage:	Substantial
Defining Event:	Runway excursion	Injuries:	2 Minor, 6 None
Flight Conducted Under:	Part 91: General aviation - Business		

Analysis

The two pilots were conducting a business flight with six passengers when the accident occurred. During the night arrival the captain flew a visual approach with excessive airspeed and the airplane crossed the runway threshold more than 50 knots above approach speed (V_{ref}). The before-landing checklist was not completed, and the flaps were at an incorrect 20° position instead of 40°. The airplane touched down near the midfield point of the 6,022 ft non-grooved runway, which was wet due to earlier precipitation. The captain initially applied intermittent braking, then applied continuous braking starting about 2,069 ft from the end of the runway. The captain did not deploy the thrust reversers. The airplane exited the runway above 100 knots groundspeed, then continued into a ditch and airport perimeter fence, which resulted in substantial damage to the forward fuselage.

Examination of the airplane revealed no mechanical anomalies that would have precluded normal operation.

The operator's flight manual directed that all approaches were to be flown using the stabilized approach concept. For a visual approach, this included establishing and maintaining the proper approach speed and correct landing configuration at least 500 ft above the airport elevation. Neither pilot recognized the requirement to execute a go-around due to the excessive approach speed or the long landing on a wet runway, which resulted in the runway excursion.

Probable Cause and Findings

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

The crew's failure to execute a go-around during the unstable approach and long landing, which resulted in a runway excursion.

Findings

Personnel issues	Decision making/judgment - Pilot
Personnel issues	Decision making/judgment - Copilot
Aircraft	Surface speed/braking - Capability exceeded
Personnel issues	Flight planning/navigation - Flight crew

Factual Information

History of Flight

Landing-landing roll	Runway excursion (Defining event)
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On November 29, 2022, about 1910 central standard time, a Learjet 45 airplane, N988MC, was substantially damaged when it was involved in an accident at Batesville Regional Airport (BVX), Batesville, Arkansas. The two pilots sustained minor injuries and the six passengers were not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 business flight.

A review of automatic dependent surveillance-broadcast (ADS-B) data revealed that the airplane departed Waterloo Regional Airport (ACO), Waterloo, Iowa, about 1757 on an instrument flight rules (IFR) flight plan and climbed to cruise at flight level (FL) 410 en route to BVX.

During the arrival to BVX, which was flown by the captain, air traffic control (ATC) cleared the flight for the RNAV (GPS) Rwy 8 approach.

According to the cockpit voice recorder, at 19:08:28, after the crew visually acquired the runway environment, the copilot cancelled the IFR flight plan with ATC.

At 19:08:54, the captain disconnected the autopilot as the airplane crossed the final approach fix (FAF) at 265 knots groundspeed.

At 19:09:12, the captain said, "my goodness, slow down", then several seconds later called for flaps 20 and extension of the landing gear.

At 19:10:08, the captain said, "disregard this". Soon after, a sound similar to spoiler handle movement occurred, as well as a single chime consistent with a master caution aural alert, which is triggered when a caution message posts on the engine indicating and crew alerting system (EICAS).

When the airplane is in flight and spoilers are extended with flaps extended more than 3°, a SPOILERS EXT caution message will post on the EICAS, accompanied by a master caution aural alert (single chime). The flight manual prohibits extending the spoilers with flaps extended while airborne, except as specified in emergency and/or abnormal procedures.

At 19:10:23, the copilot said, "still really fast", and the captain responded, "yeah".

At 19:10:24, the automated MINIMUMS callout was annunciated.

The airplane crossed the runway threshold at 185 knots groundspeed/180 knots airspeed, according to onboard flight data. The calculated Vref was 123 knots based on an airplane weight of 19,200 lbs.

The crew did not complete the before-landing checklist before landing, and the flaps remained at 20° extended instead of 40°. Landing distance information was not discussed by the crew during the flight.

The airplane touched down near the midfield point of the 6,022 ft non-grooved, asphalt runway, which was wet due to earlier precipitation. Near the midfield point, ground-based ADS-B receiver data indicated the airplane's groundspeed was about 160 knots, and onboard data indicated about 155 knots.

Shortly after touchdown, the copilot said "you're gonna need to...that's the end of the runway". About 2 seconds later, the captain responded "that is right there?"

About 3,021 ft from the end of the runway, tire marks consistent with intermittent braking application started. About 2,069 ft from the end of the runway, tire marks consistent with continuous anti-skid braking application began and continued until the end of the runway.

The airplane exited the end of the runway above 100 knots groundspeed, then continued into a ditch and the airport perimeter fence, which resulted in substantial damage to the forward fuselage.

Following the accident, the captain reported that the airplane touched down fast on the runway and hydroplaned after touchdown. During the landing roll, he initially applied intermittent braking and subsequently applied constant, heavy braking. He did not recall the flap position during the landing or whether the before-landing checklist was completed. He reported he did not deploy or consider deploying the thrust reversers during the landing and recalled the landing weight was about 19,000 lbs. Onboard engine data indicated the thrust reversers were not deployed during the landing rollout.

Following the accident, the copilot reported that he had informed the captain that the approach was high and fast. During a portion of the visual approach, he lost sight of the departure end of the runway due to the overcast clouds at 1,000 ft above ground level. He recalled the airplane touched down near midfield and thought the airplane could still be stopped on the runway, but that the brakes didn't appear to work very well. He did not recall the flap position during the landing or if thrust reversers were used during the landing roll. He reported the landing weight was between 19,000 and 19,500 lbs.

Examination of the airplane revealed no mechanical anomalies that would have precluded normal operation. The spoilers were found in the deployed position, which matched the cockpit spoiler handle position (extend). The cockpit flap handle was at the 20° position, which matched the position of the left and right flap surfaces. The normal flaps position for landing is 40° extended.

The investigation calculated actual landing distance as 4,845 ft for a landing approach speed at V_{ref} with a landing weight of 19,200 lbs, field elevation 463 ft above mean sea level, temperature 18° C, flaps at 40°, 3 knot tailwind, thrust reversers stowed, and a wet runway.

Stabilized Approach Information

The accident airplane crossed the runway threshold more than 50 knots above V_{ref} with the flaps positioned at 20° instead of 40°.

The operator's flight operations manual included the following guidance concerning a stabilized approach:

All approaches, whether IFR or VFR, will be conducted using the stabilized approach concept. A stabilized approach for turbojet aircraft means that the aircraft must be in an approved landing configuration (including a circling configuration, if appropriate), must maintain the proper approach speed with the engines spooled up, and must be established on the proper flight path before descending below the minimum stabilized approach height specified for the type of operation being conducted. These conditions must be maintained throughout the rest of the approach for it to be considered a stabilized approach. A stabilized approach must be established before descending below the following minimum stabilized approach heights:

- *500 ft height above airport (HAA) during VFR or visual approaches and during straight-in instrument approaches in VFR weather conditions.*
- *Circling minimum descent altitude (MDA), not lower than 500 ft HAA, if a circling maneuver is to be conducted after completing an instrument approach.*
- *1000 ft HAA or height above touchdown (HAT) during any straight-in instrument approach in instrument flight conditions.*

The Flight Safety Foundation (FSF) and Air Charter Safety Foundation (ACSF) recommend a maximum airspeed of $V_{ref} + 20$ knots at the minimum stabilized approach heights listed above and recommend that an immediate go-around should occur if $V_{ref} + 20$ is exceeded at or below that height.

In November 2023, the National Business Aviation Association (NBAA) published a guide to reduce runway excursions that encouraged the use of flight data monitoring by operators:

***Work-as-imagined** is often described as the description of how tasks are to be completed in manuals, checklists, policies, and procedures. **Work-as-done** is described as how that same work is actually being performed by frontline employees. Do the two coincide 100%? Well, when it comes to the actual operation of the aircraft, there is a way to gain better insight into this question.*

A functioning flight data monitoring program will maintain anonymity of the crews operating each flight and focus more on overall trends in the data, rather than finding

specific faults on any particular flight. By doing so, an operator can gain invaluable knowledge on how well work-as-done coincides with work-as-imagined.

Compliance with all manner of runway performance-related activities (stabilized approach and go-around policies, touchdown points, flare distances, rates of rotation, etc.) can easily be gleaned from this dataset. Additionally, it can be compared to other participating operators flying similar aircraft, thus benchmarking your operation against the broader fleet. If, upon further analysis, it appears that compliance is not as consistent as imagined, this can be addressed with flight crews through sharing of the data, conversations about expectations and training, as needed.

Flight data monitoring and analysis is yet another tool, one that is rapidly improving and seeing vastly wider adoption, that enables a business aviation operator to have true insight into how its aircraft are being operated, allowing negative trends to be mitigated before they become a runway excursion or other accident.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	Age:	40, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	5-point
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	Toxicology Performed:	
Medical Certification:	Class 1 With waivers/limitations	Last FAA Medical Exam:	October 3, 2022
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	September 27, 2022
Flight Time:	3910 hours (Total, all aircraft), 1560 hours (Total, this make and model), 285 hours (Last 90 days, all aircraft), 103 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Commercial	Age:	23, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	5-point
Instrument Rating(s):	None	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	
Medical Certification:	Class 1 Without waivers/limitations	Last FAA Medical Exam:	June 27, 2022
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	October 25, 2022
Flight Time:	505 hours (Total, all aircraft), 263 hours (Total, this make and model), 166 hours (Pilot In Command, all aircraft), 175 hours (Last 90 days, all aircraft), 48 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	LEARJET INC	Registration:	N988MC
Model/Series:	45	Aircraft Category:	Airplane
Year of Manufacture:	2007	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	352
Landing Gear Type:	Retractable - Tricycle	Seats:	12
Date/Type of Last Inspection:	October 28, 2022 AAIP	Certified Max Gross Wt.:	19200 lbs
Time Since Last Inspection:	50 Hrs	Engines:	2 Turbo fan
Airframe Total Time:	2490 Hrs as of last inspection	Engine Manufacturer:	Honeywell
ELT:	C126 installed, activated, did not aid in locating accident	Engine Model/Series:	TFE731-20BR-1B
Registered Owner:	Creamer Pilot Services LLC	Rated Power:	3650 Lbs thrust
Operator:	Creamer Pilot Services LLC	Operating Certificate(s) Held:	On-demand air taxi (135)
Operator Does Business As:	Jett Aircraft	Operator Designator Code:	8P1A

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	Condition of Light:	Night
Observation Facility, Elevation:	KBVX,463 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	19:10 Local	Direction from Accident Site:	122°
Lowest Cloud Condition:		Visibility	10 miles
Lowest Ceiling:	Overcast / 1000 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	5 knots / None	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	240°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	29.68 inches Hg	Temperature/Dew Point:	17°C / 16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Waterloo, IA (ALO)	Type of Flight Plan Filed:	IFR
Destination:	Batesville, AR (BVX)	Type of Clearance:	IFR
Departure Time:	17:57 Local	Type of Airspace:	Class E

Airport Information

Airport:	Batesville Regional Airport BVX	Runway Surface Type:	Asphalt
Airport Elevation:	465 ft msl	Runway Surface Condition:	Wet
Runway Used:	8	IFR Approach:	Global positioning system;RNAV
Runway Length/Width:	6002 ft / 150 ft	VFR Approach/Landing:	Full stop;Straight-in;None

Wreckage and Impact Information

Crew Injuries:	2 Minor	Aircraft Damage:	Substantial
Passenger Injuries:	6 None	Aircraft Fire:	None
Ground Injuries:		Aircraft Explosion:	None
Total Injuries:	2 Minor, 6 None	Latitude, Longitude:	35.726222,-91.647444(est)

Administrative Information

Investigator In Charge (IIC):	Folkerts, Michael
Additional Participating Persons:	Nathan Bradshaw; FAA, Flight Standards District Office; Little Rock, AR Michael LeMay; Bombardier Aviation; Wichita, KS Dana Metz; Honeywell Aerospace; Phoenix, AZ Todd Gentry; FAA, Accident Investigation and Prevention; Washington, DC
Original Publish Date:	April 10, 2024
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=106387

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