



Aviation Investigation Final Report

Location:	Morristown, New Jersey	Accident Number:	ERA22LA175
Date & Time:	April 2, 2022, 11:19 Local	Registration:	N877W
Aircraft:	LEARJET INC 45	Aircraft Damage:	Substantial
Defining Event:	Loss of control on ground	Injuries:	4 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The flight crew of the jet obtained weather information for the destination airport, which indicated quartering tailwind conditions for the runway in use at the time, with wind at 3 knots gusting to 16 knots. The crew determined the wind to be within limitations. The cockpit voice recorder transcript and airport surveillance video indicated that the landing approach was normal. The captain, who was the pilot flying, stated that, after touchdown, the thrust reversers were deployed and the airplane turned “sharply to the right.” He reported that remedial control inputs were ineffective in maintaining directional control.

Airport surveillance video footage of the landing roll and accident sequence showed that, about 9 seconds into the landing roll, the airplane turned sharply to its right. The airplane departed the runway, its left wingtip struck the ground, the entire wing structure (left wing/right wing/wingbox) separated from the airplane as one assembly, and the fuselage continued a short distance before it came to rest upright.

The thrust reversers on each engine were deployed and their extended positions were about equal. A windsock could be seen in the surveillance video footage nearly parallel to the ground, indicating nearly a direct crosswind to the landing runway that would have been towards the airplane’s right side. Recorded wind shortly after the accident was consistent with a 90° right crosswind for the landing runway at 6 knots with gusts to 14 knots.

A detailed examination of the airplane and system components revealed that all flight control, steering, and braking systems and their actuator components operated as designed. Although the copilot's yaw force sensor did not meet manufacturer acceptance testing during postaccident examination, this would not have affected the directional controllability of the airplane. Based on the available information, it is likely that the pilot’s compensation for the

crosswind conditions was inadequate, which resulted in a loss of directional control and runway excursion.

Probable Cause and Findings

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

The captain's inadequate compensation for crosswind conditions, which resulted in a loss of directional control.

Findings

Aircraft	Directional control - Not attained/maintained
Personnel issues	Aircraft control - Pilot
Environmental issues	Crosswind - Ability to respond/compensate

Factual Information

History of Flight

Landing-landing roll	Loss of control on ground (Defining event)
Landing-landing roll	Runway excursion

On April 2, 2022, at 1119 eastern daylight time, a Learjet Inc 45, N877W, was substantially damaged when it was involved in an accident at Morristown Municipal Airport (MMU), Morristown, New Jersey. The two airline transport pilots and two passengers sustained minor injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

Each crewmember provided written statements and their statements were consistent throughout.

According to the captain, who was the pilot flying, the airplane was established on a visual approach for landing on runway 23. The reported wind was from 340° at 3 knots gusting to 16 knots. The quartering tailwind was computed “within limits,” the thrust reversers were deployed at touchdown, and the airplane turned “sharply to the right.” He reported that, “It felt unusual. Normal crosswind correction inputs made no difference, extreme inputs were made, and still no control was possible.” The airplane departed the right side of the runway and the entire wing structure separated from the main fuselage, which continued for about 100 ft before coming to rest upright. The crew shut down the airplane and exited the main cabin door along with one passenger, while the second passenger egressed the airplane by the emergency exit.

Examination of flight track data and airport surveillance video revealed a normal approach profile and that the airplane crossed the runway threshold about 120 knots groundspeed. About 9 seconds into the landing roll, the airplane turned sharply to the right and departed the runway. The thrust reversers on each engine were deployed and their positions were approximately matched.

The windsock in the foreground of the video was nearly parallel to the ground, indicating nearly a direct crosswind to the landing runway that would have been towards the airplane’s right side.

The accident site was photographed and a cursory examination of the airplane was completed by a Federal Aviation Administration (FAA) aviation safety inspector. Examination of photographs revealed skid marks on the runway surface that led to the ground scars that marked the airplane’s runway excursion. The skid marks began about 1,200 ft beyond the

approach end of runway 23 and arced to the airplane's right about 560 ft before transitioning to tracks in the grass.

The cockpit voice recorder (CVR) was retained and forwarded to the National Transportation Safety Board (NTSB) Recorders Laboratory in Washington, DC. A review of the summary and transcribed portions of the flight prepared by an NTSB Recorder Specialist revealed that the crew listened to the Automated Terminal Information Service (ATIS) at MMU and were aware of the wind speed, direction, and warnings of "low level windshear" and questioned why runway 23 was in use when the winds favored runway 05. The air traffic controller explained that, due to a runway closure at Newark International Airport (EWR), Newark, New Jersey, the use of runway 05 at MMU allowed for improved conflict resolution and traffic flow at EWR.

The wreckage was recovered and examined at a recovery facility in Clayton, Delaware, by a team of airframe and powerplant specialists supervised by two NTSB aerospace engineers. Detailed descriptions of the examination, component removal, and component download are contained in the public docket.

The engines were examined, and the digital electronic engine controls (DEECs) were downloaded. The data indicated that both engines were operating normally and responding to power lever inputs throughout the approach and landing.

Electrical power was applied to the airplane and the primary flight and multi-function displays were downloaded.

The yaw force sensors were tested at the manufacturer's facility using their Acceptance Test Procedure (ATP). Both sensors functioned as designed; however, the copilot's sensor "failed the Output Balance Error element (i.e., zero load), as the measured value was -0.2256% FSO out of specification" in tension and compression.

The nosewheel steering rudder pedal systems and components were tested at the manufacturer's facility and functioned as designed and no significant faults were found to be present in any of the components.

The brake control unit (BCU) and four-wheel speed transducers were tested at the manufacturer's facility. The BCU was tested to the manufacturer's ATP with no faults noted. The data downloaded from the BCU did not include date/time stamps and could not be positively correlated with the accident landing.

Each of the four wheel speed transducers were tested through two different protocols. Each transducer passed both tests with no faults found.

The nose wheel steering electronic control unit and the spoiler control electronics unit were tested at the manufacturer's facility. During the examinations, no faults were found present in either unit. According to the FAA Airplane Flying Handbook, page 9-9:

The landing process should never be considered complete until the airplane decelerates to the normal taxi speed during the landing roll or has been brought to a complete stop when clear of the landing area. Accidents may occur as a result of pilots abandoning their vigilance and failing to maintain positive control after getting the airplane on the ground. A pilot should be alert for directional control difficulties immediately upon and after touchdown due to the ground friction on the wheels. Loss of directional control may lead to an aggravated, uncontrolled, tight turn on the ground, or a ground loop. The combination of centrifugal force acting on the center of gravity (CG) and ground friction of the main wheels resisting it during the ground loop may cause the airplane to tip or lean enough for the outside wingtip to contact the ground. This imposes a sideward force that could collapse the landing gear. The rudder serves the same purpose on the ground as it does in the air—it controls the yawing of the airplane. The effectiveness of the rudder is dependent on the airflow, which depends on the speed of the airplane. As the speed decreases and the nose-wheel has been lowered to the ground, the steerable nose provides more positive directional control.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	Age:	59, 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 2 With waivers/limitations	Last FAA Medical Exam:	March 30, 2022
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	June 6, 2021
Flight Time:	8834 hours (Total, all aircraft), 1599 hours (Total, this make and model), 8131 hours (Pilot In Command, all aircraft), 51 hours (Last 90 days, all aircraft), 22 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Airline transport	Age:	49, 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):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	
Medical Certification:	Class 2 Without waivers/limitations	Last FAA Medical Exam:	April 5, 2021
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 9582 hours (Total, all aircraft), 5146 hours (Total, this make and model), 6868 hours (Pilot In Command, all aircraft), 145 hours (Last 90 days, all aircraft), 49 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	LEARJET INC	Registration:	N877W
Model/Series:	45	Aircraft Category:	Airplane
Year of Manufacture:	2014	Amateur Built:	
Airworthiness Certificate:	Transport	Serial Number:	496
Landing Gear Type:	Retractable - Tricycle	Seats:	12
Date/Type of Last Inspection:	November 15, 2021 Continuous airworthiness	Certified Max Gross Wt.:	21500 lbs
Time Since Last Inspection:	114 Hrs	Engines:	2 Turbo jet
Airframe Total Time:	3290.8 Hrs at time of accident	Engine Manufacturer:	Honeywell
ELT:	C126 installed, not activated	Engine Model/Series:	TFE731-40BR-1B
Registered Owner:	On file	Rated Power:	3850 Lbs thrust
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	MMU,187 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	11:25 Local	Direction from Accident Site:	293°
Lowest Cloud Condition:	Few / 25000 ft AGL	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	6 knots / 14 knots	Turbulence Type Forecast/Actual:	/
Wind Direction:	320°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.11 inches Hg	Temperature/Dew Point:	7°C / -5°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Atlanta, GA (FTY)	Type of Flight Plan Filed:	IFR
Destination:	Morristown, NJ	Type of Clearance:	IFR
Departure Time:	09:21 Local	Type of Airspace:	Class D

Airport Information

Airport:	Morristown Municipal MMU	Runway Surface Type:	Asphalt
Airport Elevation:	186 ft msl	Runway Surface Condition:	Dry
Runway Used:	23	IFR Approach:	None
Runway Length/Width:	5998 ft / 150 ft	VFR Approach/Landing:	Straight-in

Wreckage and Impact Information

Crew Injuries:	2 Minor	Aircraft Damage:	Substantial
Passenger Injuries:	2 Minor	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	4 Minor	Latitude, Longitude:	40.799338,-74.414889

Administrative Information

Investigator In Charge (IIC):	Rayner, Brian
Additional Participating Persons:	Wayne VanSteenburg; FAA/Teterboro; Teterboro, NJ Michael LeMay; Bombardier; Dorval Quebec Jennifer McDuffie; Honeywell; Phoenix, AZ
Original Publish Date:	May 2, 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=104874

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).