



National Transportation Safety Board Aviation Accident Final Report

Location:	Albany, GA	Accident Number:	ERA16FA097
Date & Time:	01/30/2016, 1445 EST	Registration:	N401PT
Aircraft:	BROOK AARON D LANCAIR IV P	Aircraft Damage:	Destroyed
Defining Event:	Loss of control in flight	Injuries:	3 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The two pilots and a passenger were departing in the turbine engine-equipped, experimental, amateur-built airplane for a local personal flight. The airplane fuel tanks had been topped off before the flight. Video imagery indicated that the airplane rotated for takeoff about 1,200 ft from the start of the runway. After rotation, the airplane banked sharply to the right and climbed to the height of the treetops. The bank angle increased to about 90° where it remained as the airplane descended to ground impact; a postcrash fire ensued. Examination of the wreckage did not reveal evidence of any preimpact mechanical malfunctions.

The commercial pilot seated in the left seat had recently purchased the airplane, and, based on data recovered from a portable GPS unit onboard the airplane, the airplane had been flown at least 36 hours since the purchase. The second pilot, who was seated in the right seat, held airline transport pilot and flight instructor certificates. The second pilot was assisting the owner in becoming more familiar and proficient in the airplane; however, although he had received 9 hours of dual instruction in the airplane, none of it was given with him seated in the right seat. The pilot/owner and the second pilot had estimated flight times in the airplane of 27 and 36 hours, respectively. The investigation could not determine which of the pilots was flying the airplane at the time of the accident.

In addition to the two pilots, the airplane was loaded with full fuel and a passenger in the rear seat, and calculations indicated that the airplane was about 470 pounds over its maximum gross takeoff weight and 0.5 inch beyond its most aft center of gravity limit. This was likely the only flight the pilots had conducted with the airplane loaded in this manner. Following a takeoff about 2 weeks before the accident, during which the airplane had full fuel but no rear seat passenger, the second pilot reported to the flight instructor from whom he received his training in the airplane that they had almost crashed on takeoff. The instructor cautioned the second pilot that, with full fuel, the rotation must be gradual and should not occur at too low an airspeed. Further, the instructor stated that, during the second pilot's training, he had told him that, if the airplane's auxiliary fuel tanks were full, the airplane should have no more than two occupants.

Although the rotation speed during the accident takeoff could not be determined, the video imagery showed that the airplane lifted off after a ground roll similar to that on previous takeoffs from the same airport that were recorded by the portable GPS unit. Therefore, it is likely that the airplane rotated about the same speed on the accident flight as it had during the previous takeoffs conducted by the pilots. However, because the airplane was likely operating at a higher gross weight and aft center of gravity than previous flights, during the accident takeoff, the pilots should have used a higher rotation speed. Because of the lower rotation speed, the airplane was likely more difficult and possibly impossible to control upon liftoff.

Probable Cause and Findings

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

The pilots' failure to maintain control during a takeoff attempt in a high-performance airplane. Contributing to the accident were the pilots' decision to operate the airplane above its maximum gross weight and with an aft center of gravity and their lack of experience in the make and model airplane.

Findings

Aircraft	Lateral/bank control - Not attained/maintained (Cause)
	Maximum weight - Capability exceeded (Factor)
	CG/weight distribution - Capability exceeded (Factor)
Personnel issues	Aircraft control - Pilot (Cause)
	Decision making/judgment - Pilot (Factor)
	Decision making/judgment - Copilot (Factor)
	Total experience w/ equipment - Pilot (Factor)
	Total experience w/ equipment - Copilot (Factor)

Factual Information

HISTORY OF FLIGHT

On January 30, 2016, at 1445 eastern standard time, an experimental amateur-built Lancair IV-P, N401PT, was destroyed when it impacted terrain shortly after takeoff from the Southwest Georgia Regional Airport (ABY), Albany, Georgia. The two pilots, a commercial pilot and an airline transport pilot, and the passenger were fatally injured. The airplane was registered to and operated by the commercial pilot. Visual meteorological conditions prevailed, and no flight plan was filed for the local personal flight, which was conducted under the provisions of Title 14 *Code of Federal Regulations* Part 91.

Video recordings from an airport security system captured a portion of the flight. A review of those recordings revealed that the airplane rotated for takeoff about 1,200 ft from the beginning of runway 22. After rotation, the airplane banked sharply to the right and climbed to the height of the treetops. The bank angle increased to about 90° where it remained as the airplane descended to the ground.

A witness located about 1/4 mile north of the accident site reported that the airplane sounded "normal" until shortly before impact, when the engine noise became louder.

PERSONNEL INFORMATION

A witness reported that as the occupants embarked, the commercial pilot (owner/pilot) was seated in the left front seat, and the airline transport pilot (second pilot) was seated in the right front seat. The investigation could not determine which pilot was at the controls at the time of the accident or which pilot served as pilot in command. Neither of the pilots' logbooks was available for examination during the investigation.

According to Federal Aviation Administration (FAA) records, the owner/pilot held a commercial pilot certificate with ratings for airplane single-engine land and instrument airplane. He reported 1,000 hours of flight experience at the time of his most recent FAA third-class medical examination, which was performed on January 20, 2015.

The second pilot held an airline transport pilot certificate with ratings for airplane multiengine land and rotorcraft helicopter. He held a commercial pilot certificate with a rating for airplane single-engine land. He also held a flight instructor certificate with ratings for airplane single- and multiengine, rotorcraft helicopter, instrument airplane, and instrument helicopter. He reported 6,750 hours of flight experience at the time of his most recent FAA second-class medical examination, which was performed on July 8, 2015.

Interviews with several of the owner's acquaintances revealed that his flight experience in the Lancair IV-P make and model was exclusively in the accident airplane, which he had purchased about 2 months before the accident. According to one acquaintance, the owner/pilot arranged for the second pilot to receive Lancair specific training at Deland Municipal Airport (DED), Deland, Florida, where the airplane was stored temporarily after its purchase. The plan was for

the second pilot to subsequently provide training to the owner/pilot. The acquaintance did not know how many flight hours the owner had accrued in the airplane; however, he said that, as of January 12, 2016, the owner had not met the insurance policy requirements for solo flight.

According to a representative of the owner/pilot's insurance company, the policy did not require a specific number of flight hours, but it required that the owner complete ground and flight training in the Lancair IV-P make and model and have that training endorsed in his logbook before solo flight.

According to the flight instructor at DED who provided flight training to the second pilot, on December 21, 2015, both pilots attended a one-day ground school training session on engine and propeller operations. During the week of January 6, 2016, the second pilot received 9 hours of flight training at DED from the instructor, who was endorsed by the Lancair Owners and Builders Organization (LOBO). The training was conducted in the accident airplane, and the second pilot flew all 9 hours from the left seat. He had not flown the Lancair IV-P before that training. The instructor stated that one flight was conducted "at max rear [center of gravity] CG" with full main fuel tanks and the pilot/owner in the rear seat. He also stated that he discussed with the second pilot that, if the airplane's belly and rear tanks were full, the airplane should be treated "as a two seater aircraft and no weight in the luggage compartment."

An employee from the Eagles of America fixed base operator at ABY observed several previous flights of the accident airplane. On two occasions, he observed the owner fly the airplane alone, and on one occasion he observed the owner flying with the second pilot in the right seat and the passenger in the rear seat.

AIRCRAFT INFORMATION

The turbo-propeller-powered airplane was built in 2002. It was powered by a 724-horsepower Walter M601-D engine driving a 3-blade propeller. It was equipped with retractable tricycle-style landing gear. It was not equipped with a gust lock feature. A review of maintenance logbooks revealed that the most recent condition inspections of the airframe and engine occurred on October 29, 2015, and both were found to be in satisfactory condition. The pilot purchased the airplane on December 10, 2015.

According to a mechanic, maintenance was performed on the airplane during the week of January 25, 2016. The starter generator was replaced, and a nose gear door was repaired. These tasks were not documented in the airplane logbooks.

A review of fuel records indicated that the airplane had been fueled nine times at the ABY airport between January 10 and January 30, 2016. The airplane was fueled with 64 gallons of fuel just before the accident flight, with an order to top off all tanks. The fuel capacity was 60 gallons in each wing tank and a combined total of 38 gallons in the two auxiliary tanks, one located in the baggage area and one in the belly of the airplane.

Two weight and balance specification sheets were found in a binder recovered from the airplane's baggage compartment. One sheet, dated May 2005, indicated that the maximum allowable gross weight was 3,800 pounds and that the allowable center of gravity (CG) moment range was between 108.37 and 116.3 inches. The sheet did not contain any reference to the two

auxiliary fuel tanks, which, according to the airplane maintenance records, were installed in October 2011. In addition, it indicated an empty weight and moment arm of 2,566 pounds and 111.6 inches, respectively. The second weight and balance sheet was undated and included a reference to an auxiliary tank in the baggage area, using 20 gallons of fuel in that tank as an example calculation. The second sheet did not reference the belly fuel tank, and it did not indicate any values for maximum gross weight or CG limits. It indicated a "new" empty weight and moment arm of 2,576 pounds and 111.97 inches, respectively.

Using occupant weights obtained from medical and/or motor vehicle records, and full main and auxiliary fuel tanks, the weight and balance at the time of the accident was estimated to be 4,270 pounds at a CG moment arm of 116.8 inches. According to the limits shown on the May 2005 sheet, the airplane was about 470 pounds above its maximum gross takeoff weight and 0.5 inch beyond its most aft CG limit.

METEOROLOGICAL INFORMATION

The 1451 recorded weather observation at ABY included wind from 210° at 9 knots, skies clear, visibility 10 statute miles, temperature 21°C, dew point 3°C, and an altimeter setting of 30.13 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The airplane impacted a grass field about 1,900 ft from the beginning of the runway and 280 ft to the right of the runway centerline. The wreckage path extended from the initial impact ground scar along a heading of 270° and was 170 ft long. A position light with green lens fragments and the right winglet were among the debris found closest to the initial impact scar. Both wings were separated from the fuselage at their roots and fragmented with pieces distributed along the wreckage path. The left-wing tip and winglet were found about 130 ft along the wreckage path. The main wreckage area included the empennage, which was largely intact and displayed severe fire and impact damage forward of the rear seats. The right horizontal stabilizer and elevator were fractured about mid-span with the outboard portion displaced forward. The trailing edge of the elevator trim tab was found deflected about 1/2 inch downward. The trailing edge of the rudder trim tab was found deflected about 1/4 inch to the right. The engine mounting structural tubes were fractured, and the engine was found inverted. The propeller hub separated from the engine flange, and one of the three blades separated from the hub. All three blades exhibited some bending in the aft direction from about mid-span outward, and each showed some amount of twisting deformation.

The engine power turbine blades were intact and exhibited slight bending at their tips and rub marks at their roots. The engine casing was displaced and twisted, and the engine could not be turned by hand at the starter or the propeller shafts. After removal of the planetary gear system, the propeller shaft turned easily and did not exhibit any evidence of twisting.

Examination of the airframe revealed that the main landing gear were retracted. The position of the nose landing gear could not be determined. The position of the flaps could not be determined. The elevator moved freely, and pitch control continuity was confirmed from the elevator through the push-pull tubes to the aft cabin area. Rudder control continuity was confirmed from the rudder through a push-pull tube to the cable and bell crank assembly in the

empennage. The rudder was free to move, and both cables exhibited binding as a result of fire damage. Both ailerons had separated from their respective wings and were found fractured and fire damaged. Both cockpit control sticks remained connected to their control tubes. Continuity from those tubes to the remainder of the control components could not be confirmed due to impact and fire damage.

MEDICAL AND PATHOLOGICAL INFORMATION

The Division of Forensic Sciences, Georgia Bureau of Investigation, State of Georgia, conducted autopsies on both pilots. The cause of death was determined to be "multiple blunt force trauma" in both cases.

The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, conducted toxicological testing of specimens from both pilots. The results for the pilot/owner were negative for carbon monoxide, ethanol, and drugs of abuse. Acetaminophen, a common over the counter analgesic/antipyretic (Tylenol), was detected in the urine. This medication does not pose a hazard to flight safety. The results for the second pilot were negative for carbon monoxide, ethanol, drugs of abuse and medications.

TEST AND RESEARCH

A portable GPS receiver was recovered from the accident site and forwarded to the NTSB Vehicle Recorder Laboratory for examination. The unit captured about 36 hours of flight data from January 6 through January 30, 2017, including the taxi portion of the accident flight. A review of the recorded GPS data from previous takeoffs during January 2016 revealed that when departing ABY, the airplane typically lifted off the runway about 1,000 to 1,500 ft from the start of the runway. During the week of January 6, when the second pilot was receiving instruction at DED, the airplane typically lifted off about 1,500 to 1,900 ft from the start of the runway.

ADDITIONAL INFORMATION

According to the flight instructor who provided the second pilot with his Lancair training at DED, about 2 weeks before the accident, the second pilot contacted him and explained that, during one recent takeoff with the auxiliary fuel tanks full, after rotating for takeoff at 80 knots, he and the pilot/owner lost control and nearly crashed the airplane. The flight instructor advised the second pilot that with the airplane fully fueled, it was important that the rotation technique be "real easy," that rotation should not occur at too low of an airspeed, and that the pilot should be "ready with rudder control." The second pilot also reported that, during the same takeoff, one of the nose gear doors was damaged during the gear retraction. The flight instructor opined that the damage was caused by uncoordinated or side-slipped flight, resulting in the relative wind blowing the gear door to a partially closed position and impinging on the landing gear, as it retracted. (During a conversation with an acquaintance, the owner provided a different explanation for the nose gear damage stating that he believed the damage was because he did not neutralize the rudder before retracting the landing gear.)

The flight instructor, who was a turbo-propeller powered Lancair IV-P owner, offered the following additional information:

For takeoff, he normally would rotate about 85 or 90 knots and then transition promptly to a high pitch attitude to avoid exceeding the landing gear operating speed limitation of 120 knots. He added that, at slower airspeeds or higher density altitudes, care should be taken not to raise the landing gear too soon as the landing gear doors may cause an undesired yawing moment. He said this effect was more pronounced in ground effect.

According to the Pilot's Operating Handbook, the design rotation speed for a 3,900-pound maximum gross weight airplane is 80 knots.

According to the FAA Pilot's Handbook of Aeronautical Knowledge, Chapter 10, Weight and Balance, center of gravity locations aft of the allowable range may cause "extreme control difficulty."

History of Flight

Initial climb	Abrupt maneuver Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Commercial	Age:	40, Male
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Unknown
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 Without Waivers/Limitations	Last FAA Medical Exam:	01/20/2015
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 1000 hours (Total, all aircraft), 27 hours (Total, this make and model)		

Pilot-Rated Passenger Information

Certificate:	Airline Transport; Flight Instructor	Age:	48, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	
Instrument Rating(s):	Airplane; Helicopter	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Helicopter; Instrument Airplane; Instrument Helicopter	Toxicology Performed:	Yes
Medical Certification:	Class 2 With Waivers/Limitations	Last FAA Medical Exam:	07/08/2015
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 6750 hours (Total, all aircraft), 36 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	BROOK AARON D	Registration:	N401PT
Model/Series:	LANCAIR IV P NO SERIES	Aircraft Category:	Airplane
Year of Manufacture:	2002	Amateur Built:	Yes
Airworthiness Certificate:	Experimental	Serial Number:	LIV-408
Landing Gear Type:	Retractable - Tricycle	Seats:	
Date/Type of Last Inspection:	10/29/2015, Condition	Certified Max Gross Wt.:	3800 lbs
Time Since Last Inspection:		Engines:	1 Turbo Prop
Airframe Total Time:	1069 Hours as of last inspection	Engine Manufacturer:	Walter/GE
ELT:	Installed	Engine Model/Series:	M601-D
Registered Owner:	On file	Rated Power:	724 hp
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	KABY, 193 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	1451 EST	Direction from Accident Site:	355°
Lowest Cloud Condition:	Clear	Visibility	10 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	9 knots /	Turbulence Type Forecast/Actual:	/ None
Wind Direction:	210°	Turbulence Severity Forecast/Actual:	/ N/A
Altimeter Setting:	30.13 inches Hg	Temperature/Dew Point:	21° C / 3° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Albany, GA (ABY)	Type of Flight Plan Filed:	None
Destination:	Albany, GA (ABY)	Type of Clearance:	VFR
Departure Time:	1445 EST	Type of Airspace:	Class D

Airport Information

Airport:	SOUTHWEST GEORGIA RGNL (ABY)	Runway Surface Type:	Asphalt
Airport Elevation:	196 ft	Runway Surface Condition:	Dry
Runway Used:	22	IFR Approach:	None
Runway Length/Width:	6601 ft / 148 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	2 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	1 Fatal	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	On-Ground
Total Injuries:	3 Fatal	Latitude, Longitude:	31.539722, -84.190833

Administrative Information

Investigator In Charge (IIC):	Douglass P Brazzy	Report Date:	01/23/2018
Additional Participating Persons:	Michael A Pupek; FAA/FSDO; Atlanta, GA Bob Wolstenholme; Lancair; Redmond, OR John Cook; Turbine Power Technologies; Deland, FL		
Publish Date:	01/23/2018		
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=92657		

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).