



National Transportation Safety Board Aviation Accident Final Report

Location:	Somerset, KY	Accident Number:	ERA10LA103
Date & Time:	01/02/2010, 1521 EST	Registration:	N227ML
Aircraft:	FAIRCHILD SA227	Aircraft Damage:	Substantial
Defining Event:	Loss of control on ground	Injuries:	3 None
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled		

Analysis

According to witness statements and tire marks on the runway, the airplane touched down more than halfway down the runway while landing with a slight quartering tailwind. As the nosewheel contacted the runway, the airplane veered to the right. The pilot applied full left rudder and full reverse on the left power lever, but was unsuccessful in correcting the alignment of the airplane. He then engaged the nosewheel steering button on the left power lever, and the airplane began a more aggressive turn to the right. It departed the runway, traveled down an embankment, and came to rest against the airport boundary fence.

Postaccident examination of the airplane, engines, brakes, and nose landing gear steering actuator revealed no obvious mechanical anomalies. After the airplane was repaired and returned to service it again experienced an intermittent loss of steering. As a result, a series of troubleshooting taxi tests were performed. The airplane veered off the runway as it reached an airspeed of 50 knots and the brakes were applied. Further examination of the airplane revealed damaged wires in the nosewheel steering harness, which would have caused an intermittent loss of steering. Although an electrical anomaly contributed to the loss of control, the fact that the pilots landed long, and potentially with excess speed, resulted in less runway and time available to recover from the anomaly.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Damaged wiring in the nosewheel steering harness, which resulted in a loss of control during landing. Contributing to the accident was the pilots' improper touchdown point.

Findings

Aircraft	Land gear sys wiring - Damaged/degraded (Cause) Directional control - Attain/maintain not possible (Cause) Descent/approach/glide path - Not attained/maintained (Cause)
Personnel issues	Incorrect action performance - Flight crew (Factor)

Factual Information

HISTORY OF FLIGHT

On January 2, 2010, about 1521 eastern standard time, a Fairchild SA227 Metro III, N227ML, registered to 472 LLC, ran off the side of runway 23 during landing roll at the Lake Cumberland Regional Airport (SME), Somerset, Kentucky. The pilot, co-pilot and passenger were not injured, and the airplane sustained substantial damage. The flight was operated by Locair, Inc., as flight 151, an on-demand air taxi flight, conducted under the provisions of Title 14 Code of Federal Regulations (CFR) Part 135, with an instrument flight rules (IFR) flight plan filed. Visual meteorological conditions (VMC) prevailed at the time of the accident. The flight originated from Baltimore/Washington International Thurgood Marshall Airport (BWI), Baltimore, Maryland, at 1320 the same day.

According to the pilot-in-command (pilot flying), the airplane was on a stabilized approach to runway 23. It touched down normally with the main landing gear contacting first, and then the nose landing gear. As the nose wheel contacted the runway, the airplane veered to the right. The pilot applied full left rudder and full reverse on the left power lever; but was unsuccessful in correcting the alignment of the airplane. He then engaged the nose wheel steering button on the left power lever, and the airplane began a more aggressive turn to the right. It departed the runway, traveled down an embankment and came to rest against the airport boundary fence.

The co-pilot (non-flying pilot) stated that after the airplane touched down, the pilot-in-command brought the power levers to reverse. At that time, the airplane suddenly turned to the right and exited the runway. Despite the pilot-in-commands' constant efforts to correct the airplane's path, including full reverse on the left engine, the airplane continued to veer to the right. It came to a rest after sliding down the embankment and impacting the airport fence.

A Locair customer service representative observed the airplane's approach, as she was outside on the tarmac waiting for it to land. She stated that the airplane touched down normally on the runway and began to taxi. At the point where it needed to make a turn toward the terminal, it began to "fishtail." It continued this movement for "a little bit," then straightened out and went off the runway.

Another witness observed the airplane touchdown beyond the 3,000 feet distance remaining marker for runway 23. He also noted that the winds were reported on the AWOS from 330 degrees.

PILOT INFORMATION

The pilot flying, age 41, held an airline transport pilot certificate with a rating for airplane multiengine land. He also held a flight instructor certificate with ratings for airplane single and multiengine land, and instrument airplane. His most recent first-class medical certificate was issued on December 6, 2009. At that time, he reported 5,350 hours of total flight experience.

The pilot monitoring, age 33, held a commercial pilot certificate with ratings for airplane single and multiengine land, and instrument airplane. His most recent first-class medical certificate was issued on August 8, 2008. At that time, he reported 350 hours of total flight experience.

AIRCRAFT INFORMATION

The airplane was manufactured in 1982, and equipped with two Airesearch TPE331-11U

turboprop engines. The airplane was maintained on a continuous airworthiness inspection program, and the most recent inspection was completed on December 3, 2009 at 25,945 total aircraft hours. At the time of the accident, the airplane had accumulated 25,998 hours.

According to the Metro III Landing Distance Chart in the Airplane Flight Manual, an airplane with a landing weight of 11,000 pounds required approximately 2,600 feet of landing distance, with the wind, temperature, and elevation conditions present for the accident airplane.

METEOROLOGICAL INFORMATION

The weather recorded at SME, at 1515, included wind from 310 degrees at 5 knots, 10 miles visibility with light snow, overcast clouds at 2,500 feet, temperature -7 degrees C, dew point -11 degrees C, and altimeter setting of 30.34 inches mercury.

AIRPORT INFORMATION

Lake Cumberland Regional Airport was comprised of a single runway, oriented in a 5/23 configuration.

Runway 5/23 was 5,800 feet long and 100 feet wide, made of asphalt.

After the accident, a visual inspection of the runway by the airport manager revealed no water, ice or snow. A friction test was also performed by airport personnel, which yielded the following results:

First 1/3 of the runway:	71% friction
Second 1/3 of the runway:	64 % friction
Third 1/3 of the runway:	51% friction
Overall average:	62% friction

FLIGHT RECORDERS

The airplane was equipped with a Fairchild model A-100A cockpit voice recorder (CVR). The CVR was retained and forwarded to the NTSB Vehicle Recorders Laboratory, Washington, D.C., for data download. According to the Specialist's Factual Report, none of the audio was pertinent to the accident investigation. The audio was consistent with a CVR which had malfunctioned and stopped recording some time prior to the accident. There are also indications that an attempt had been made to erase the tape while still installed in the CVR unit, but after the tape mechanism had stopped running. [Additional information regarding the CVR content can be found in the Vehicle Recorder Specialist's Report located in the public docket.]

WRECKAGE INFORMATION

Examination of the runway by a Federal Aviation Administration (FAA) inspector, revealed tire marks from all three landing gear, in the center of runway 23, beginning just past the 2,000 feet remaining sign. The markings appeared to track straight, without skidding, for 120 feet, before beginning a slow curve to the right. They continued to travel in a curve an additional 285 feet before exiting the runway onto the grass parallel to the runway. The markings continued through the grass, until the left propeller struck the Taxiway D intersection sign. The tire marks continued across Taxiway D, into the grass again, and across Taxiway A. After crossing Taxiway A, the markings continued down the embankment, terminating where the

airplane struck the fence (1,131 feet from the initial observed transfer markings).

All runway markings appeared to be "friction" transfer and not skid marks. The markings were indicative to rolling tires only, and there was no indication of locking of the brake assemblies.

Examination of the airplane by a Federal Aviation Administration (FAA) inspector revealed the right wing was substantially damaged, outboard of the landing light assembly. The wing section displayed impact and accordion crushing damage. Additionally, the left propeller displayed damage to 2 of the 4 blades, indicative of contact with the airport taxiway sign. All four blades were curled at their tips, indicative of striking rocks at the base of the embankment. The two damaged blades were locked in the low pitch setting and the other two were free moving in the propeller hub. The right engine propeller was observed to be in the feathered position with damage to all four blades.

The nose section of the airplane sustained scratching from contact with the fence, but was not compromised. The flaps were observed to be partially extended.

The cockpit examination revealed the nose wheel steering switch was in the "ARMED" position, and the engine power levers were between the ground idle and reverse positions. The right power lever was more difficult to move than the left lever. The flap control was between the 1/4 and 1/2 positions.

The airplane was subsequently recovered for further examination.

Visual examination of the landing gear assemblies appeared undamaged, and the tire assemblies did not indicate any damage and/or scuffing. All tires were inflated and wheel assemblies appeared undamaged.

TESTS AND RESEARCH

Engine Examination

Examination of the engine revealed the right power lever was stiff and difficult to operate, even with the friction locks at a minimum. The left power lever operated smoothly and unrestricted. A check of the engine rigging parameters revealed the right engine led the left engine by 8-10 degrees. One possibility for this discrepancy was that the right engine entered into reverse before the left engine.

Brake Examination

The left landing gear brake was submitted for an operational bench test and teardown examination. No defects or discrepancies were noted during the testing or examination.

Nose Landing Gear (NLG) Steering Actuator Examination

The NLG actuator was also submitted for an operational bench test and visual inspection. The results of the testing revealed the reported failure could not be duplicated. Examination of the hydraulic fluid retrieved from inside the unit revealed the fluid was in "like new" condition and contained no contamination.

Taxi testing

After the accident, Locair maintenance advised a "connection" had been repaired and the nose wheel steering appeared to operate normally. The National Transportation Safety Board (NTSB) Investigator-In-Charge (IIC) was notified and a request was made for the FAA to ride

on board the aircraft for taxi testing to confirm the issue was resolved.

At the initiation of the test, the AMT taxied slowly across the ramp and onto a taxiway. The brakes were applied and the nose wheel steering (NWS) responded appropriately. This test was conducted 5 more times, with no anomalies. The AMT then proceeded to runway 23 for an additional taxi test. He aligned the airplane left of centerline and slowly applied power. As the airspeed reached 20 knots, the AMT applied both brakes, and the airplane gradually veered to the right. The AMT engaged the NWS, which appeared to function normally, and the airplane returned to center. The same test was repeated a second time, and when the airplane reached 35 knots, the AMT engaged the NWS and the airplane returned to center.

A third, and final, test was performed. As the airplane reached 50 knots, the AMT applied both brakes and the airplane veered sharply to the right. The AMT continued to apply left brake and engaged the NWS; however, the airplane continued to the right and exited the runway. The AMT continued to apply "hard left brake" and stated, "It's not responding...it's not turning...I can't steer it!"

The airplane continued to travel down the embankment and came to rest in the grass.

After the second runway excursion, further examination of the nose wheel steering assembly was conducted. The results of the examination revealed damaged wires in the nose wheel steering harness. The harness was rewired, re-installed on the airplane and operationally tested. No further anomalies were experienced with the nose wheel steering.

History of Flight

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

Pilot Information

Certificate:	Airline Transport; Flight Instructor; Commercial	Age:	41, 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 1 Without Waivers/Limitations	Last Medical Exam:	12/16/2009
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	12/31/2009
Flight Time:	(Estimated) 5398 hours (Total, all aircraft), 2000 hours (Total, this make and model), 5220 hours (Pilot In Command, all aircraft), 150 hours (Last 90 days, all aircraft), 49 hours (Last 30 days, all aircraft)		

Co-Pilot Information

Certificate:	Flight Instructor; Commercial	Age:	33, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 1 Without Waivers/Limitations	Last Medical Exam:	08/08/2008
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	09/29/2009
Flight Time:	(Estimated) 625 hours (Total, all aircraft), 277 hours (Total, this make and model), 202 hours (Pilot In Command, all aircraft), 170 hours (Last 90 days, all aircraft), 64 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	FAIRCHILD	Registration:	N227ML
Model/Series:	SA227	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	AC472
Landing Gear Type:	Retractable - Tricycle	Seats:	9
Date/Type of Last Inspection:	12/03/2009, Continuous Airworthiness	Certified Max Gross Wt.:	14500 lbs
Time Since Last Inspection:		Engines:	2 Turbo Prop
Airframe Total Time:	25945 Hours	Engine Manufacturer:	Airesearch
ELT:	Installed, not activated	Engine Model/Series:	TPE331-11U
Registered Owner:	472 LLC	Rated Power:	1000 hp
Operator:	Locair, Inc	Air Carrier Operating Certificate:	On-demand Air Taxi (135)
Operator Does Business As:		Operator Designator Code:	YLXA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	SME, 927 ft msl	Observation Time:	1515 EST
Distance from Accident Site:	0 Nautical Miles	Direction from Accident Site:	0°
Lowest Cloud Condition:	Clear	Temperature/Dew Point:	-7° C / -11° C
Lowest Ceiling:	Overcast / 2500 ft agl	Visibility	10 Miles
Wind Speed/Gusts, Direction:	5 knots, 310°	Visibility (RVR):	
Altimeter Setting:	30.34 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Baltimore/Washi, MD (BWI)	Type of Flight Plan Filed:	IFR
Destination:	Somerset, KY (SME)	Type of Clearance:	IFR
Departure Time:	1320 EST	Type of Airspace:	

Airport Information

Airport:	Lake Cumberland Regional (SME)	Runway Surface Type:	Asphalt
Airport Elevation:	927 ft	Runway Surface Condition:	Dry
Runway Used:	23	IFR Approach:	Visual; VOR
Runway Length/Width:	5800 ft / 100 ft	VFR Approach/Landing:	Straight-in

Wreckage and Impact Information

Crew Injuries:	2 None	Aircraft Damage:	Substantial
Passenger Injuries:	1 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	3 None	Latitude, Longitude:	37.053611, -84.615556

Administrative Information

Investigator In Charge (IIC):	Ralph L Wilson	Adopted Date:	01/15/2013
Additional Participating Persons:	John Heinlein; FAA FSDO; Louisville, KY John W Cox; FAA FSDO; Louisville, KY		
Publish Date:	01/15/2013		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=75216		

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.

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.