



Aviation Investigation Final Report

Location:	State College, Pennsylvania	Accident Number:	ERA16FA215
Date & Time:	June 16, 2016, 08:30 Local	Registration:	N3591P
Aircraft:	Piper PA31	Aircraft Damage:	Destroyed
Defining Event:	Controlled flight into terr/obj (CFIT)	Injuries:	2 Fatal
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

The commercial pilot was completing an instrument flight rules air taxi flight on a route that he had flown numerous times for the customer on board. Radar and voice communication data revealed that the airplane was vectored to the final approach course for the precision approach and was given a radio frequency change to the destination airport control tower frequency. The tower controller issued a landing clearance, which the pilot acknowledged; there were no further communications with the pilot. Weather conditions at the airport at the time of the accident included an overcast ceiling at 300 ft with 1 mile visibility in mist.

The wreckage was located in densely-wooded terrain. Postaccident examination revealed no evidence of any mechanical malfunctions or anomalies that would have precluded normal operation. The wreckage path and evidence of engine power displayed by numerous cut tree branches was consistent with a controlled, wings-level descent with power.

A radar performance study revealed that, as the airplane crossed the precision final approach fix 6.7 nautical miles (nm) from the runway threshold, the airplane was 800 ft above the glideslope. At the outer marker, 5.5 nm from the runway threshold, the airplane was 500 ft above the glideslope. When radar contact was lost 3.2 nm from the threshold, the airplane was about 250 ft above the glideslope. Although the airplane remained within the lateral limits of the approach localizer, its last two recorded radar returns would have correlated with a full-downward deflection of the glideslope indicator in the cockpit, and therefore, an unstabilized approach.

Further interpolation of radar data revealed that, during the last 2 minutes of the accident flight, the airplane's rate of descent increased from 400 ft per minute (fpm) to greater than 1,700 fpm, likely as a result of pilot inputs. During the final minute of the flight, the rate decreased briefly to 1,000 fpm before radar contact was lost. The company's standard operating procedures stated that, if a rate of descent greater than 1,000 fpm was encountered during an instrument approach, a missed approach should be performed.

The airplane's relative position to the glideslope and its rapid changes in descent rate after crossing the outer marker suggest that the airplane never met the operator's stabilized approach criteria. Rather than executing a missed approach procedure as outlined in the company's operating procedures, the pilot chose to continue the unstabilized approach, which resulted in a descent into trees and terrain.

It is unlikely that the pilot's well-controlled diabetes and effectively treated sleep apnea contributed to the circumstances of this accident. However, whether or not the pilot's multiple sclerosis contributed to this accident could not be determined.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's decision to continue an unstabilized instrument approach in instrument meteorological conditions, which resulted in controlled flight into terrain.

Findings

Aircraft	Descent/approach/glide path - Not attained/maintained
Personnel issues	Aircraft control - Pilot
Personnel issues	Decision making/judgment - Pilot
Environmental issues	Clouds - Effect on operation
Personnel issues	Predisposing condition - Pilot

Factual Information

History of Flight

Approach-IFR final approach	Controlled flight into terr/obj (CFIT) (Defining event)
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On June 16, 2016, at 0830 eastern daylight time, a Piper PA-31-325, N3591P, was destroyed when it collided with terrain while on approach to University Park Airport (UNV), State College, Pennsylvania. The airline transport pilot and the passenger were fatally injured. The airplane was owned and operated by Aeronational, Inc. Instrument meteorological conditions prevailed, and an instrument flight rules flight plan was filed for the on-demand air taxi flight, which was conducted under the provisions of Title 14 Code of Federal Regulations (CFR) Part 135. The flight departed Washington County Airport (AFJ), Washington, Pennsylvania, about 0800.

According to the operator, the passenger was a regular customer who was routinely flown to UNV. The pilot was familiar with the passenger and the route and had completed the flight numerous times.

Radar and voice communication information from the Federal Aviation Administration (FAA) revealed that, at 0824:35, air traffic control (ATC) provided the pilot with a heading to intercept the final approach course for the instrument landing system RWY 24 approach at UNV and cleared the airplane for the approach. At 0825:30, the pilot was advised that radar services were terminated and was instructed to contact the tower controller at UNV.

At 0825, the pilot contacted the UNV tower controller and announced, "...with you on the approach." The tower controller acknowledged the call and issued a landing clearance, which the pilot acknowledged. There were no further communications with the pilot despite multiple attempts by ATC.

At 0843:50, an airport operations ground vehicle operating at the approach end of runway 24 identified smoke in a wooded area about 1 mile northeast of the airport and notified control tower personnel. The source of the smoke was later identified as the accident airplane.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	Age:	60, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	3-point
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	Toxicology Performed:	Yes
Medical Certification:	Class 1 Waiver time limited special	Last FAA Medical Exam:	March 7, 2016
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 12493 hours (Total, all aircraft), 718 hours (Total, this make and model), 12099 hours (Pilot In Command, all aircraft), 91 hours (Last 90 days, all aircraft), 19 hours (Last 30 days, all aircraft)		

The pilot held an airline transport pilot certificate with ratings for airplane single-engine land, multiengine land, and instrument airplane. His most recent FAA first-class medical certificate was issued March 7, 2016, with the limitation, "Not valid for any class after 3/31/2017." The pilot reported 12,400 total hours of flight experience on the date of the examination, 350 hours of which were during the previous 6 months.

Company training records indicated that the pilot had received the training required by the company's operations and training manuals. The pilot had completed the required annual ground training on January 18, 2016. His last airman competency check was completed satisfactorily on January 18, 2016, in the accident airplane. Pilot duty records indicated compliance with the flight and duty time requirements of Title 14 CFR Part 135. The pilot had just returned from 1 week of vacation, and the accident flight was his first flight since returning to duty.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	Registration:	N3591P
Model/Series:	PA31 325	Aircraft Category:	Airplane
Year of Manufacture:	1980	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	31-8012081
Landing Gear Type:	Tricycle	Seats:	
Date/Type of Last Inspection:	February 19, 2016 Annual	Certified Max Gross Wt.:	6499 lbs
Time Since Last Inspection:	44 Hrs	Engines:	2 Reciprocating
Airframe Total Time:	16040.1 Hrs at time of accident	Engine Manufacturer:	LYCOMING
ELT:	Installed, not activated	Engine Model/Series:	T10-540 SER
Registered Owner:	AERONATIONAL INC	Rated Power:	325 Horsepower
Operator:	AERONATIONAL INC	Operating Certificate(s) Held:	On-demand air taxi (135)

According to FAA records, the airplane was manufactured in 1980. Its most recent annual inspection was completed February 19, 2016, at 15,999.6 total aircraft hours, about 44 hours before the accident.

The airplane was equipped with a King KAP/KFC 200 flight control system (autopilot). According to the operating instructions for the airplane's autopilot system, the system's approach mode captures localizer course and glideslope indications when properly configured by the pilot. The system will capture from either above or below the glideslope. No system limitations were published regarding the altitude above the glideslope from which the system would not capture or the rate of descent above which the system would not capture.

A certification engineer for the autopilot manufacturer stated that a descent rate of 1,000 ft per minute (fpm) was "normal" to capture the glideslope from above. The operator's director of operations said that the autopilot in the accident airplane was unlikely to capture the glideslope from above at descent rates greater than 500 fpm.

It could not be determined if the autopilot was in use during the approach, or which operational modes may have been engaged.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	Condition of Light:	Day
Observation Facility, Elevation:	KUNV,1231 ft msl	Distance from Accident Site:	1 Nautical Miles
Observation Time:	08:53 Local	Direction from Accident Site:	240°
Lowest Cloud Condition:		Visibility	1 miles
Lowest Ceiling:	Overcast / 300 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	/	Turbulence Type Forecast/Actual:	/ None
Wind Direction:		Turbulence Severity Forecast/Actual:	/ N/A
Altimeter Setting:	29.79 inches Hg	Temperature/Dew Point:	17°C / 17°C
Precipitation and Obscuration:	Moderate - None - Mist		
Departure Point:	Washington, PA (AFJ)	Type of Flight Plan Filed:	IFR
Destination:	State College, PA (UNV)	Type of Clearance:	IFR
Departure Time:	07:45 Local	Type of Airspace:	Class D

At 0853, the weather recorded at UNV included an overcast ceiling at 300 ft, calm wind, and visibility 1 statute mile in mist. The temperature was 17°C and the dew point was 17°C; the altimeter setting was 29.80 inches of mercury. AIRMET Sierra for instrument meteorological conditions and mountain obscuration was in effect for the area surrounding the accident site at the time of the accident.

Airport Information

Airport:	UNIVERSITY PARK UNV	Runway Surface Type:	Asphalt
Airport Elevation:	1231 ft msl	Runway Surface Condition:	Dry
Runway Used:	24	IFR Approach:	ILS
Runway Length/Width:	6701 ft / 150 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	1 Fatal	Aircraft Fire:	On-ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Fatal	Latitude, Longitude:	40.842777,-77.842498(est)

The accident site was about 1 nautical mile (nm) from the threshold of runway 24 and about 2 nm beyond the final radar return at an elevation of 1,200 ft mean sea level. The wreckage was examined at the accident site, and all major components were accounted for at the scene.

The wreckage path was located in densely wooded terrain and extended about 450 ft on a magnetic heading of 223°. The initial impact points were in treetops about 70 ft above the ground, and tree trunks and branches displayed impact fractures and sharp, angular cuts along the length of the wreckage path. Both wings were fragmented along the path. Both engines and each main landing gear were separated and scattered along the wreckage path.

The fuselage and empennage came to rest upright facing the direction of travel. The instrument panel, cockpit, and cabin area were destroyed by postcrash fire.

Control continuity could not be established due to extensive impact damage; however, parts associated with the wings, flaps, and ailerons were identified. Sheet metal and cabling associated with the empennage, horizontal and vertical stabilizers, and the elevators were identified, and the cable attach points at all primary flight controls were secure.

Examination of the landing gear and components associated with the flap system were consistent with a 15° flap extension and the landing gear in the down and locked position at the time of impact.

The propeller systems were attached to their respective engines, and all propeller blades exhibited similar twisting, bending, leading edge gouging, and chordwise scratching. Several tree branches and trunks displayed deep, angular cuts and paint transfers consistent with propeller blade contact.

The engines were each damaged by impact and postcrash fire. The left engine displayed extensive thermal damage. The magnesium oil sump and the accessories mounted to the accessory section were consumed by fire, and the damage and contamination produced by the fire precluded rotation of the engine. The single-drive, dual magneto was consumed by fire and could not be tested. Borescope examination of the cylinders revealed normal operational deposits and wear and no preimpact anomalies.

The right engine displayed extensive thermal damage. Impact damage to the No. 2 cylinder precluded rotation of the engine. The single-drive, dual magneto was damaged by fire and would not produce spark when rotated. Borescope examination of the cylinders revealed normal operational deposits and wear and no evidence of preimpact anomalies. The No. 2 cylinder was removed, and the engine was rotated by hand at the propeller. Continuity was confirmed from the powertrain through the valvetrain to the accessory section. Compression was confirmed on all cylinders using the thumb method, with the exception of the No. 2 cylinder.

Medical and Pathological Information

Forensic DX, Windber, Pennsylvania, performed an autopsy on the pilot. The reported stated the cause of death was thermal injuries.

The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing on specimens from the pilot, with negative results for ethanol, carbon monoxide, and all tested-for drugs.

According to FAA records, in 2001 the pilot reported a diagnosis of multiple sclerosis (MS) with persistent weakness in his left leg. He received his first special-issuance medical certificate in 2002. A report from the pilot's neurologist dated February 2016 indicated that his neurologic status was unchanged through that date. At his most recent examination for an FAA medical certificate, the pilot reported new diagnoses of diabetes and obstructive sleep apnea, which were managed with diet and the use of bilevel positive airway pressure (BiPAP) treatment, respectively.

Additional Information

Performance Study

An airplane performance study was conducted based on radar data. As the airplane crossed the precision final approach fix (PFAF), 6.7 nm from the runway threshold, the airplane was 800 ft above the glideslope. As the airplane crossed the PENUE locator outer marker (LOM), 5.5 nm from the runway threshold, the airplane was 500 ft above the glideslope. When radar contact was lost 3.2 nm from the threshold, the airplane was about 250 ft above the glideslope.

At PENUE LOM and at the last radar return, the airplane's position and altitude would have correlated to a full-downward deflection of the glideslope indication in the cockpit.

Interpolation of radar data revealed that, during the last 2 minutes of the accident flight, the airplane's rate of descent increased from 400 fpm to greater than 1,700 fpm. During the final minute of the flight, the rate decreased briefly to 1,000 fpm before radar contact was lost.

Company Standard Operating Procedures (SOP)

According to the operator's SOP, Stabilized Approach, "Flight should be stabilized by 1000 feet HAT [Height Above Touchdown] in IMC [instrument meteorological conditions]..." and further stipulated, "If an unexpected, sustained rate of descent greater than 1000 feet per minute (fpm) is encountered during the approach, a missed approach should be performed."

FAA Information

According to an FAA Safety Team pamphlet, "Stabilized Approach," a stabilized approach is one in which the pilot establishes and maintains a constant angle glidepath towards a predetermined point on the landing runway.

Administrative Information

Investigator In Charge (IIC):	Rayner, Brian
Additional Participating Persons:	Harold W Haase; FAA/FSDO; Harrisburg, PA Mike McClure; Piper Aircraft Inc; Vero Beach, FL Judson Rupert; Lycoming Engines; Williamsport, PA
Original Publish Date:	February 22, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=93394

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