



Aviation Investigation Final Report

Location:	Fort Lauderdale, Florida	Accident Number:	ERA19FA112
Date & Time:	March 1, 2019, 11:41 Local	Registration:	N145AB
Aircraft:	Piper PA25	Aircraft Damage:	Destroyed
Defining Event:	Collision with terr/obj (non-CFIT)	Injuries:	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Banner tow		

Analysis

The newly-hired banner tow pilot departed on his first banner-tow flight away from the training airport. After completing several circuits the pilot was flying on a southerly heading with an 8 knot easterly wind about 1/4 mile offshore, which was about half the distance he was trained to be offshore. The pilot initiated a right turn descended to 250 ft mean sea level and flew over a heavily congested area with tall buildings nearby. The airplane was seen flying about 250 ft above ground level over a heavily-congested area before it impacted the 16th and 17th floors of a 19-story building while in a right turn.

Although witnesses provided varying accounts of how the engine was operating near the end of the flight, a sound spectrum study conducted with video taken of the airplane just before the impact indicated that the engine was operating near its maximum available power at the time of impact. Postaccident examination of the airplane and engine revealed no evidence of preimpact failure or malfunction. The abnormal engine sounds reported by several witnesses were likely attributed to be from the lack of a muffler of the exhaust system. Given the lack of any mechanical malfunctions with the airplane, it was likely that the pilot did not adequately compensate for the wind conditions, which would have pushed the airplane inland during a right turn to reverse course.

The operator reported that banner-tow flights were performed between 500 and 700 ft above mean sea level while offshore. At no time, except during takeoff or landing or unless authorized by air traffic control, were pilots expected to fly at altitudes less than 500 ft.

According to training records, the pilot had received 17 hours of banner tow flight training. He completed a .6-hour solo banner tow training flight in the airport vicinity 3 days before the accident.

Probable Cause and Findings

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

The pilot's failure to maintain proper altitude and clearance while maneuvering during a banner tow flight, which resulted in an in-flight collision with a 19-story building in a heavily congested area. Contributing to the accident were the easterly wind conditions, the pilot's total lack of experience in banner tow operations, and his inadvertent flight over a densely populated area with numerous tall buildings nearby.

Findings

Aircraft	Altitude - Not attained/maintained
Environmental issues	(general) - Contributed to outcome
Personnel issues	Aircraft control - Pilot
Personnel issues	Total experience in position - Pilot

Factual Information

History of Flight

Maneuvering-low-alt flying	Other weather encounter
Maneuvering-low-alt flying	Collision with terr/obj (non-CFIT) (Defining event)

On March 1, 2019, about 1141 eastern standard time, a Piper PA-25-235, N145AB, was destroyed when it was involved in an accident near Fort Lauderdale, Florida. The pilot was fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 banner tow flight.

The pilot was scheduled to complete a 2-hour flight towing a "medium size" company banner, which was 30 feet high by 90 feet long, near Hollywood Beach, Fort Lauderdale Beach, and north to the Commercial Boulevard Pier, which was the northernmost point of the route.

The operator reported that, after taking off, the pilot conducted 5 or 6 practice banner pick-ups, then picked up the accident banner about 1059. Company tracking data and Federal Aviation Administration (FAA) radar data indicated that the flight proceeded due east to the beach, where the pilot performed several circuits near Hollywood Beach. Review of the track data revealed that, at the southern end of the second circuit, the pilot began a right turn to return to a northerly direction but changed to a left turn and then proceeded in a northerly direction. He made several more circuits, then at 1125:00, the pilot initiated a right turn and proceeded north toward Commercial Boulevard Pier. At 1137:23, while over water south of the Commercial Boulevard Pier, the pilot initiated a right turn and flew in a south-southwesterly direction less than 1/2 nautical mile from the beach. At 1140:02, when the flight was south of Oakland Park Boulevard, about 0.4 nautical mile east-southeast from the accident site, flying about 1/4 mile offshore, he initiated a right turn. (The pilot had been taught to fly 1/2 miles from the shore during his training flights.) The airplane proceeded over land while towing the banner and FAA radar data indicated it descended to 250 ft mean sea level. The company tracking data indicated that while flying over land the airplane proceeded in a northwesterly direction until about 1140:32. At that time, just north of NE 30th Street, about 380 ft east-southeast of the accident site, the airplane turned left and proceeded in a west-northwesterly direction about 54 miles per hour (mph) groundspeed.

A witness who was on a boat about 0.6 nautical mile northeast of the accident site noted that the airplane was flying at a much lower altitude and came closer to the shore as it flew south. An individual who was with the witness estimated that the airplane was about 200 ft overhead. At that time, they reported there was no sputtering or backfire from the engine, adding that it was "steady and loud." The airplane flew south, then made a right turn followed by a "sharp" left turn. During the left turn, the banner went upside down and dropped. The airplane disappeared from their view.

An individual walking on the beach near the accident site took video footage of the airplane flying low south of her position. The airplane performed a shallow right turn and flew over land. The engine sounded normal during the turn, but she reported that it "quit" about 10 seconds before she perceived the

impact. She did not see any smoke trailing the airplane while she observed it in flight.

Witnesses near the accident site provided differing accounts of engine operation. The accounts varied from hearing the engine with no sputtering or other sounds of distress, a sputtering sound, an engine that was operating at a low power setting, or an engine which sounded "very strange" and "not smooth."

The airplane impacted the east face of a 19-story building at the 16th and 17th floors and came to rest on the second floor level.

There was no in-flight contact between the pilot and any company personnel around the accident time.

Pilot Information

Certificate:	Commercial	Age:	28, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Center
Other Aircraft Rating(s):	None	Restraint Used:	3-point
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 1 Without waivers/limitations	Last FAA Medical Exam:	June 20, 2018
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	August 15, 2018
Flight Time:	312.7 hours (Total, all aircraft)		

The pilot's first evaluation flight with the operator occurred on November 18, 2018. The flight duration was 1.1 hours and covered full stalls, flight at critically low airspeeds, and maximum performance maneuvers. The flight was conducted in a Cessna 305A. He was hired and began his ground training on January 23, 2019. According to the "Banner Tow Pilot Training" form dated February 22, 2019, he received 20 hours of ground training and about 17 hours flight training, which included a 1.5-hour dual/solo banner tow flight. A "Verification Of Training And FAA Observation" form dated February 22, 2019, indicated that he had 1.5 hours banner tow time. He was trained to fly the operator's Cessna 305A and Piper PA-25 airplanes in banner tow operations and was put on the company's FAA Certificate of Waiver on February 28, 2019. The pilot's logbook showed that he had completed a .6-hour practice solo banner tow flight in the vicinity of the airport on February 26, 2019. The accident flight was the pilot's first solo banner tow flight away from the banner tow box at North Perry Airport (HWO), Hollywood, Florida, where he conducted his training.

Coworkers who interacted with the pilot before the flight reported he was excited and enthusiastic about it; one employee described that the pilot displayed an "appropriate level of nervousness."

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	Registration:	N145AB
Model/Series:	PA25 235	Aircraft Category:	Airplane
Year of Manufacture:	1965	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	25-3137
Landing Gear Type:	Tailwheel	Seats:	1
Date/Type of Last Inspection:	February 25, 2019 Annual	Certified Max Gross Wt.:	2900 lbs
Time Since Last Inspection:	3 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	9711.6 Hrs as of last inspection	Engine Manufacturer:	Lycoming
ELT:	Not installed	Engine Model/Series:	O-540-B2B5
Registered Owner:		Rated Power:	235 Horsepower
Operator:		Operating Certificate(s) Held:	None

The airplane was equipped with a "Live View GPS Tracker" system. The exhaust system consisted of pipes with no muffler on either side.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	FLL, 65 ft msl	Distance from Accident Site:	6 Nautical Miles
Observation Time:	11:53 Local	Direction from Accident Site:	203°
Lowest Cloud Condition:		Visibility	10 miles
Lowest Ceiling:	Broken / 3100 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	8 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	110°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.13 inches Hg	Temperature/Dew Point:	27°C / 19°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Hollywood, FL (HWO)	Type of Flight Plan Filed:	Company VFR
Destination:	Hollywood, FL (HWO)	Type of Clearance:	None
Departure Time:	10:43 Local	Type of Airspace:	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:		Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	26.16611,-80.101112

The airplane came to rest on the 2nd floor of an outside pool area that was under construction. The banner was found on the ground about 400 ft east-southeast of the building.

The wreckage came to rest on its left side on a magnetic heading of 050°. The left wing exhibited extensive impact damage and was resting beneath the fuselage, while the right wing was elevated and sustained minimal impact damage. A slight amount of oil was noted on the upper surface of the right wing outboard of the lift strut. Both cockpit doors were found near the main wreckage. The fuel cap was separated from the fuel tank but remained attached by its chain. The oil filler cap and rod were separated from the engine but found in the immediate vicinity of the engine. The rod portion of the oil filler cap and rod was bent near the cap. Both wing lift struts, the aileron flight control cables, and the left flap bellcrank were cut to facilitate recovery. There was no evidence of bird remains on either wing, horizontal stabilizer, vertical stabilizer, or in the cockpit area.

The engine remained partially attached to the airframe. The engine mount was impact damaged and the engine was displaced about 25° to 30° in a clockwise direction. The propeller was separated from the engine and a piece about 15 inches in length was fractured off. The separated propeller and fractured propeller piece were found in close proximity to the main wreckage. The position of the engine precluded visual examination of the mixture control cable.

Flight control continuity was confirmed from each control surface to each cockpit control, except where cut for recovery. The left flap control cable was connected at the handle and bellcrank near the control surface, while the right flap control cable was connected at the flap control handle and at the bellcrank near the control surface, but exhibited tension overload at the wing root. The stall warning system revealed no evidence of pre-impact failure or malfunction.

The 75-gallon capacity aluminum fuel tank was bulged and ruptured on the forward end consistent with hydraulic deformation. No fuel remained in the tank. Only drops of fuel, a slight amount of water, and some ferrous and non-ferrous slivers were found inside the strainer bowl. The fuel strainer screen was unobstructed. No obstructions were noted from the fuel tank to the fuel strainer and to the carburetor bowl. The auxiliary fuel pump was electrically tested and could be heard operating; it was not functionally tested. About 2 ounces of blue-colored liquid consistent with 100LL aviation fuel were drained from the auxiliary fuel pump.

Examination of the engine following recovery revealed impact damage to the crankshaft flange and to the No. 6 cylinder, which precluded 360° rotation of the crankshaft. Borescope examination of each

cylinder revealed no anomalies. Examination of the lubrication, ignition, valve train, air induction, and exhaust systems revealed no evidence of preimpact failure or malfunction. The carburetor was fractured from engine but was suspended by its attached throttle cable and carburetor heat cable. The mixture cable was detached from its attachment hardware, which was still in place. The mixture control lever was near its midrange position when first viewed. The carburetor inlet screen was impact-damaged and a section could not be removed and remained inside the inlet housing. The section of inlet screen that remained was free of obstructions. The carburetor bowl contained about 2 ounces of fuel which tested negative for the presence of water.

Propeller blade No. 1 (as marked by the manufacturer) was twisted toward low pitch. Heavy coarse chordwise scratches were noted on the cambered side of the blade. It exhibited a slight aft bend near the hub, and a slight forward bend about 2/3 span. Slight chordwise scratches were noted on the aft side of the blade. The No. 2 propeller blade was fractured about 25.5 inches from the center of the propeller hub. Heavy coarse chordwise scratches were noted on the cambered side of the blade. The blade tip was curled about 270°. Coarse chordwise scratches were also noted on the aft side of the blade near the fracture surface. The leading edge exhibited a gouge near the tip, and a section of blade was missing from the trailing edge. The propeller spinner exhibited signs of rotation.

Additional Information

Banner Tow Information/Banner Examination

The operator reported that, when flying north, the typical procedure is to fly at 500 to 700 ft mean sea level (msl) while offshore. The pilot typically performs a climbing right turn to 1,000 ft msl, followed by a descending right turn to a southerly heading flying between 500 and 700 ft msl unless instructed by air traffic control (ATC). At no time during a banner tow flight, except for takeoff or landing or when authorized by ATC, is the airplane expected to be below 500 ft above ground level (agl). The typical power setting when towing a banner the size of the accident banner was to maintain between 2,000 and 2,200 rpm.

Examination of the lead pole of the banner revealed no damage from the rudder or any damage along the length of the pole. The 59.5 ft-long bridle was inspected and only the lower rope was cut. Inspection of the banner revealed normal wear. The No. 1 banner release mechanism operated normally.

NTSB Sound Spectrum Study

A sound spectrum study from the video recording was performed and correlated with company tracking data for time and position information. The sound from the start of the video until the building impact was about 22 seconds, and the airplane was over land for about 19 seconds. The engine rpm initially was about 2,200. During the time the airplane was flying over land, the engine power increased to and remained above 2,300 rpm for about 12 seconds, then increased to about 2,500 rpm, decreased slightly,

then began to increase to about 2,450 rpm at the time of impact. The maximum engine rpm (red line speed) was 2,575.

Medical and Pathological Information

A postmortem examination of the pilot was performed by the Broward County Medical Examiner's Office. The cause of death was reported to be blunt head trauma."

Forensic toxicology was performed on specimens of the pilot by the FAA Forensic Sciences Laboratory. The FAA toxicology report indicated testing for cyanide was not performed and the results were negative for carbon monoxide, volatiles, and tested for drugs.

Administrative Information

Investigator In Charge (IIC):	Monville, Timothy		
Additional Participating Persons:	Derrick D Mayberry; FAA/FSDO; Miramar, FL Christopher A George; FAA/FSDO; Miramar, FL Bob Benyo; Aerial Banners North, Inc.; Pembroke Pines, FL David Harsanyi; Lycoming Engines; Williamsport, PA		
Original Publish Date:	January 28, 2021	Investigation Class:	3
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=99044		

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