Aviation Investigation Final Report

Location:	Atlantic Ocean, Atlantic Ocean	**Accident Number:**	ERA19LA026
Date & Time:	October 25, 2018, 11:19 Local	**Registration:**	N555PM
Aircraft:	Piper PA31T	**Aircraft Damage:**	Destroyed
Defining Event:	Inflight upset	**Injuries:**	5 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The two pilots and three passengers were conducting a cross-country flight over the ocean from South Carolina to the Bahamas. About 30 minutes into the flight, while climbing through 24,300 ft to 25,000 ft about 95 miles beyond the coast, the pilot made a garbled radio transmission indicating an emergency and intent to return. At the time of the transmission the airplane had drifted slightly right of course. The airplane then began a descent and returned on course. After the controller requested several times for the pilot to repeat the radio transmission, the pilot replied, "we're descending." About 15 seconds later, at an altitude of about 23,500 ft, the airplane turned sharply toward the left, and the descent rate increased to greater than 4,000 ft per minute, consistent with a loss of control. Attempts by the air traffic controller to clarify the nature of the emergency and the pilot's intentions were unsuccessful. About 1 minute after the sharp left turn and increased descent, the pilot again declared an emergency. No further communications were received. Search efforts coordinated by the U.S. Coast Guard observed an oil slick and some debris on the water in the vicinity of where the airplane was last observed via radar, however the debris was not identified or recovered. According to recorded weather information, a shallow layer favorable for light rime icing was present at 23,000 ft. However, because the airplane was not recovered, the investigation could not determine whether airframe icing or any other more-specific issues contributed to the loss of control.

One air traffic control communication audio recording intermittently captured the sound of an emergency locator transmitter (ELT) "homing" signal for about 45 minutes, beginning near the time of takeoff, and ending about 5 minutes after radar contact was lost. Due to the intermittent nature of the signal, and the duration of the recording, it could not be determined if the ELT signal had begun transmitting before or ceased transmitting after these times. Because ELT homing signals sound the same for all airplanes, the source could not be determined. However, the ELT sound was recorded by only the second of two geographic areas that the airplane flew through and began before the airplane arrived near either of those areas. Had the accident airplane's ELT been activated near the start of the flight, it is unlikely that it would be detected in the second area and not the first. Additionally, the intermittent nature of the ELT signal is more consistent with an ELT located on the ground, rather than an airborne activation. An airborne ELT is more likely to have a direct line-of-sight to one or more of

the ground based receiving antennas, particularly at higher altitudes, resulting in more consistent reception.

The pilot's initial emergency and subsequent radio transmissions contained notably louder background noise compared to the previous transmissions. The source or reason for the for the increase in noise could not be determined.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: An in-flight loss of control, which resulted in an impact with water, for reasons that could not be determined because the airplane was not recovered.

Findings

Not determined	(general) - Unknown/Not determined

Factual Information

History of Flight

Enroute-climb to cruise	Inflight upset (Defining event)

On October 25, 2018, about 1119 eastern daylight time, a Piper PA-31T, N555PM, was presumed to have impacted the Atlantic Ocean about 100 miles southeast of Charleston, South Carolina. The two pilots and three passengers were not found and presumed fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The family of the pilot/owner reported that the airplane departed from its home base, a private runway in Andrews, South Carolina, destined for Governors Harbour Airport (MYEM), Governors Harbour, Bahamas. Radar and air traffic control data provided by the Federal Aviation Administration (FAA) showed the airplane departed the private runway toward the southeast about 1047. The airplane crossed over the coastline and began a climb to an assigned altitude of 25,000 ft. The climb rate was consistent at 500 ft per minute (fpm), and the airplane remained on course flying toward the assigned airspace fix. When the airplane was about 12 miles from the fix (about 95 miles southeast of Charleston Air Force Base/International Airport (CHS), Charleston, South Carolina), while climbing through 24,300 ft, the pilot made a garbled radio transmission (that had a considerably increased background noise level) that included the word "emergency". The pilot of another airplane on the same frequency relayed that he heard N555PM say that he was diverting to CHS. At the time of the transmission, the airplane had drifted slightly to the right (less than 1/4 mile) of course. The airplane then began a descent about 1,000 fpm and returned on course toward the fix. About 23 seconds after the garbled emergency transmission, following several requests from air traffic control requests to repeat it, the pilot (or possibly the co-pilot) stated, "we're descending." About 15 seconds later, at an altitude of about 23,500 ft, the airplane turned sharply toward the left, and the descent rate increased to greater than 4,000 fpm. About 25 seconds after that, the radar data's altitude parameter became invalid; the last reported altitude was 21,500 ft. About 35 seconds later, at 1118:33, the pilot transmitted "emergency emergency," and no further transmissions were recorded. The last radar position was recorded at 1118:50, about 3 miles to the left (northeast) of the airplane's original course toward the fix. That position corresponded to a location about 100 nautical miles east southeast of CHS.

The FAA issued an alert notice (ALNOT) and a search effort was conducted by the U.S. Coast Guard. One of the search airplanes reported an oil sheen on the surface of the water near the last known coordinates; however, neither the airplane nor debris were located. A nearby commercial tanker vessel was requested by the Coast Guard to divert to the area and search. Personnel reported briefly observing a white object just beneath the water surface, about 4.5 miles east of the last recorded radar position, but they were unable to identify it. The search effort was cancelled 2 days later at sunset.

Pilot Information

Certificate:	Private	**Age:**	47,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	March 18, 2018
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 2778 hours (Total, all aircraft)		

Flight instructor Information

Certificate:	Commercial; Flight instructor	**Age:**	70,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	March 9, 2017
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 12000 hours (Total, all aircraft)		

The airplane was certificated for single pilot operation. The second pilot on board, who also held a flight instructor certificate, was serving as co-pilot.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N555PM
Model/Series:	PA31T	**Aircraft Category:**	Airplane
Year of Manufacture:	1976	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	31T-7620028
Landing Gear Type:	Retractable - Tricycle	**Seats:**	8
Date/Type of Last Inspection:	September 5, 2018 Annual	**Certified Max Gross Wt.:**	8999 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo prop
Airframe Total Time:	7718 Hrs as of last inspection	**Engine Manufacturer:**	Pratt & Whitney Canada
ELT:	Installed	**Engine Model/Series:**	PT6A-28A
Registered Owner:	Bulldog Flying Club Inc	**Rated Power:**	620 Horsepower
Operator:	Bulldog Flying Club Inc	**Operating Certificate(s) Held:**	None

A review of airplane records revealed that the airplane's most recent annual inspection included routine maintenance, the replacement of the starter generators on both engines, replacement of the cabin oxygen bottle, and compliance with several airworthiness directive (AD) inspections, including AD 2017-02-06, which addressed a potential issue with electrical wiring arcing and fire risk. The airplane was equipped with an airframe and propeller deicing system, an autopilot, airborne weather radar, and an satellite-based weather data receiver.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KCHS,40 ft msl	**Distance from Accident Site:**	106 Nautical Miles
Observation Time:	10:56 Local	**Direction from Accident Site:**	290°
Lowest Cloud Condition:	Scattered / 12000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 20000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots / 18 knots	**Turbulence Type Forecast/Actual:**	Clear air /
Wind Direction:	30°	**Turbulence Severity Forecast/Actual:**	Moderate /
Altimeter Setting:	30.18 inches Hg	**Temperature/Dew Point:**	17°C / 8°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Andrews, SC (PVT)	**Type of Flight Plan Filed:**	IFR
Destination:	(MYEM)	**Type of Clearance:**	IFR
Departure Time:	10:46 Local	**Type of Airspace:**	

A review of weather records revealed that there were no convective or precipitation echoes in the area at the time of the accident. Satellite imagery depicted a mid-level layer of clouds in the area with tops estimated at 15,500 ft. An AIRMET advisory for moderate turbulence was in effect for the region. Atmospheric model results characterized the atmosphere as stable, with a freezing level around 13,000 ft. Icing conditions were likely between the freezing level and the estimated cloud tops. Additionally, a shallow layer favorable for light rime icing was present at 23,000 ft. Pilot reports from the region indicated light to moderate turbulence.

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	3 Fatal	**Aircraft Fire:**	Unknown
Ground Injuries:	N/A	**Aircraft Explosion:**	Unknown
Total Injuries:	5 Fatal	**Latitude, Longitude:**	37.634952,-72.860855(est)

Additional Information

At the time of the pilot's initial emergency radio transmission, the air traffic control audio recording included the sound of an emergency locator transmitter (ELT) 'homing' signal, obscuring the pilot's voice. The only intelligible portion of the transmission was the call sign and the word "emergency." The pilot's intention to return to CHS was overheard by the pilot of another airplane in the area and relayed back to the ATC controller.

The ATC communications recording provided by the FAA included audio sources from all of the radio frequencies and land line telephones used and monitored by the controllers during their shifts, mixed together into a single recorded channel or stream. As a result, the audio from any one radio frequency (or other source, such as land line telephone calls) cannot be separated or isolated from any other source during playback. In this case, the sound of the pilot's voice could not be separated from the simultaneous sound of the ELT signal. Efforts to filter and reduce the ELT noise failed to enhance the intelligibility or clarity of the pilot's initial "emergency" radio transmission.

Further, the frequency on which the ELT signal was transmitting, could not be determined. Air traffic controllers monitor both the 121.5 and 243 MHz emergency frequencies through a network of remote antennas on the ground, which correspond to the geographic area or "sector" that they control. Because the recording mixed all frequencies together, it was not possible to determine if the ELT was transmitting on either (or both) of these frequencies. All ELTs transmit the same audible "homing signal" which all sound alike. Some military ELTs transmit exclusively on 243 MHz, while all civilian ELTs always transmit on at least 121.5, some also transmit simultaneously on 243 MHz. Some ELTs additionally transmit a unique digital code on 406 MHz, but also transmit the 'homing' signal on 121.5 MHz. The type of ELT installed on the accident airplane was not recorded in the available aircraft records.

The ELT signal was recorded intermittently from 1039 (about 7 minutes before the airplane was first detected on radar, as it took off from Andrews, South Carolina) until 1124, about 5 minutes after the airplane's last recorded radar position. The signal was at times present for several seconds, and frequently only for a fraction of a second. The duration of time during which the signal was not heard, varied from a fraction of a second to several minutes. The overall duration spanned nearly the entire recording, which began at 1030 and ended at 1130. The ELT signal was captured only on the recording of the "R52" controller position at the Jacksonville air route traffic control center, which was the 2nd controller position at Jacksonville to talk to N555PM. As the flight continued south into Jacksonville airspace, it first encountered the "R71" controller position. There were no ELT signals heard on the R71 recording. As the flight proceeded further south, it was handed off to the R52 position.

According to the Air Force Rescue Coordination Center 2018 annual report, 60 percent of the emergency beacons (about 5,900) detected in 2018 were non-distress related (accidental activation, improper testing, etc).

Administrative Information

Investigator In Charge (IIC):	Brazy, Douglass
Additional Participating Persons:	Eric West; FAA/AVP; Washington, DC
Original Publish Date:	August 25, 2020
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=98544