Aviation Investigation Final Report

Location:	San Antonio, Texas	**Accident Number:**	CEN20LA440
Date & Time:	September 4, 2020, 20:02 Local	**Registration:**	N362AE
Aircraft:	Swearingen SA227	**Aircraft Damage:**	Substantial
Defining Event:	Hard landing	**Injuries:**	1 None
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

The pilot was concluding the Part 135 cargo flight when the airplane landed hard and departed off the right side of the runway. The pilot reported that the airplane was flying wings level with the nose aligned with the runway and on a normal glidepath to the runway until it crossed over the runway threshold. He stated that the airplane entered a right roll shortly after he reduced engine power for the landing flare, and that the roll became more pronounced as the landing flare continued. He was unable to regain control of the airplane before it landed hard on the right main landing gear with the airplane rolled about 20° right-wing-down. The airplane then departed off the right side of the runway where the nose landing gear collapsed. The fuselage, right engine nacelle, right-wing main spar, and forward pressure bulkhead were substantially damaged during the hard landing.

A review of automatic dependent surveillance-broadcast (ADS-B) data revealed that the pilot did not fly a stabilized approach as defined by the operator's general operations manual. Specifically, the airplane's descent rate exceeded the operator's 1,000 feet per minute (fpm) limitation, the airplane's airspeed was not maintained at the specified approach speed, and the airplane was not wings level and aligned with the runway at 300 ft above the touchdown zone elevation. At 1,000 ft above the touchdown zone elevation, the airplane was descending on the base leg at 2,055 fpm and was 5 knots below the specified approach speed. During the left turn from base leg to final approach the airplane's descent rate reached 2,929 fpm, which was nearly 3 times the operator's limitation for a stabilized approach. The airplane crossed over the runway threshold about 43 ft above ground level while in a 1,015 fpm descent. About 3 seconds later, the airplane touched down on the runway while descending 733 fpm and 36 ft right of the centerline with a ground track about 1.5° right of the runway course. The airplane came to rest in the grass infield between the runway and a taxiway.

Although the pilot postulated that the right roll during the landing flare was due to a right engine malfunction, his recollection of the airplane's flight path to the runway was not consistent with the recorded ADS-B data. The pilot's failure to fly a stabilized approach resulted in an excessive descent rate, hard landing, and loss of control. Additionally, postaccident examination revealed no evidence of a preexisting mechanical malfunction or failure that would have precluded normal operation of the airplane.

Probable Cause and Findings

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

The pilot's failure to fly a stabilized approach which resulted in a hard landing and loss of control.

Findings

Aircraft	Descent/approach/glide path - Not attained/maintained
Aircraft	Descent rate - Not attained/maintained
Aircraft	Airspeed - Not attained/maintained
Personnel issues	Use of policy/procedure - Pilot
Personnel issues	Aircraft control - Pilot

Factual Information

History of Flight

Approach-VFR pattern final	Miscellaneous/other
Landing-flare/touchdown	Hard landing (Defining event)
Landing	Runway excursion

On September 4, 2020, about 2002 central daylight time, a Swearingen SA227-AC airplane, N362AE, was substantially damaged when it was involved in an accident at the San Antonio International Airport (SAT), San Antonio, Texas. The pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 135 cargo flight.

According to the pilot, the airplane was flying wings level on a ¾ mile final approach to runway 13L when the airplane yawed right, but he was able to regain control of the airplane with a left rudder input as he continued with the landing approach. The pilot stated that airplane remained wings level with the nose aligned with the runway heading and on a normal glidepath to the runway until the airplane crossed over the runway 13L threshold. The airplane entered a right roll shortly after he reduced engine power for the landing flare, and that the roll became more pronounced as the landing flare continued. He was unable to regain control of the airplane before it landed hard on the right main landing gear with the airplane rolled about 20° right-wing-down. The airplane departed off the right side of the runway where the nose landing gear collapsed. The pilot postulated that the right roll during landing flare was due to a right engine malfunction.

According to automatic dependent surveillance-broadcast (ADS-B) data, at 2001:07, the airplane was on a northeast ground track as it crossed perpendicular over runway 13L at 2,677 ft mean sea level (msl) and 182 knots calibrated airspeed (KCAS), as shown in Figure 1 and Figure 3. At 2001:16, the airplane entered a left turn to join the downwind leg for runway 13L at 2,700 ft msl and 165 KCAS. At 2001:38, the airplane was abeam the runway 13L threshold while on a 1 nautical mile (nm) wide left downwind at 2,629 ft msl, 138 KCAS, and a 702 feet per minute (fpm) descent rate, as shown in Figure 2 and Figure 3. About 10 seconds later, the airplane was in a left turn toward the base leg descending about 1,976 fpm at 135 KCAS.

The operator's general operations manual provides the criteria for a stabilized approach beginning at 1,000 ft above the touchdown zone elevation. Among other criteria, a stabilized approach is defined by the airplane being wings level on final approach at 300 ft above the touchdown zone elevation, the indicated airspeed not more than 10 knots above the specified approach speed (130 knots) for the aircraft landing weight (12,000 lbs) and not less than the required approach speed, the airplane's descent rate shall not exceed 1,000 fpm, and only small changes in heading and pitch are required to maintain a correct flight path to the runway.

The operator's general operations manual requires a go-around in the event an approach is not stabilized at 1,000 ft above the touchdown elevation, or if the approach becomes destabilized at any point. The reference airspeed (V_{ref}) was 106 knots at the airplane's landing weight of 12,000 lbs.

According to ADS-B data, at 2002:08, the airplane was 1,000 ft above the runway 13L threshold while in a 2,055 fpm descent at 125 knots, as shown in Figure 2 and Figure 3. At this time, the airplane was descending more than double the operator's allowed descent rate and was 5 knots below the specified approach speed. At 2002:17, the airplane was descending at 2,929 fpm with an airspeed of 134 KCAS. At this time, the airplane was still in the left turn toward the final approach course with a 31° left-wing-down roll angle, as shown in Figure 4, and the descent rate was nearly 3 times the operator's limitation.

At 2002:28, the airplane was 300 ft above the runway 13L threshold, as it briefly flew through the final approach course for runway 13L. At this time, the airplane had a 16° left-wing-down bank angle and was flying at 135 KCAS while descending at 1,376 fpm.

At 2002:36, the airplane was established on the extended runway centerline and was flying at 120 KCAS while descending at 1,250 fpm. At this time, the airplane was about 0.14 nm and 0.31 nm from the runway 13L threshold and touchdown zone, respectively.

At 2002:41, the airplane crossed over the runway 13L threshold at 840 ft msl (43 ft above ground level) while flying at 111 KCAS (Vref +5 knots) and descending at 1,015 fpm. About 3 seconds later, at 2002:44, as the airplane touched down, the airplane was 36 ft right of the centerline with a ground track about 1.5° right of the runway course. At this time, the airplane's airspeed, descent rate, flight path angle, and roll angle, were 104 KCAS, 733 fpm, -3.9°, and 3.7° right-wing-down, respectively. The airplane came to rest in the grass infield between runway 13L and taxiway M, about 525 ft south-southeast from the final ADS-B track point.

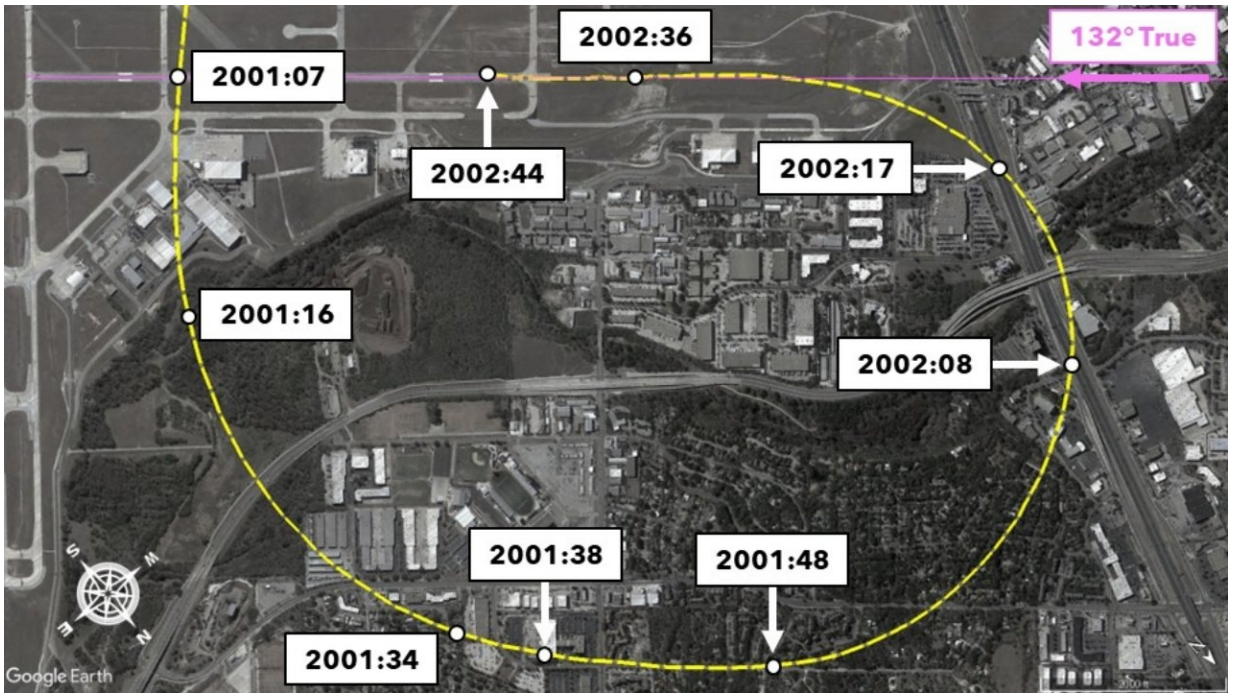

Figure 1 –Airplane's Ground Track During Traffic Pattern

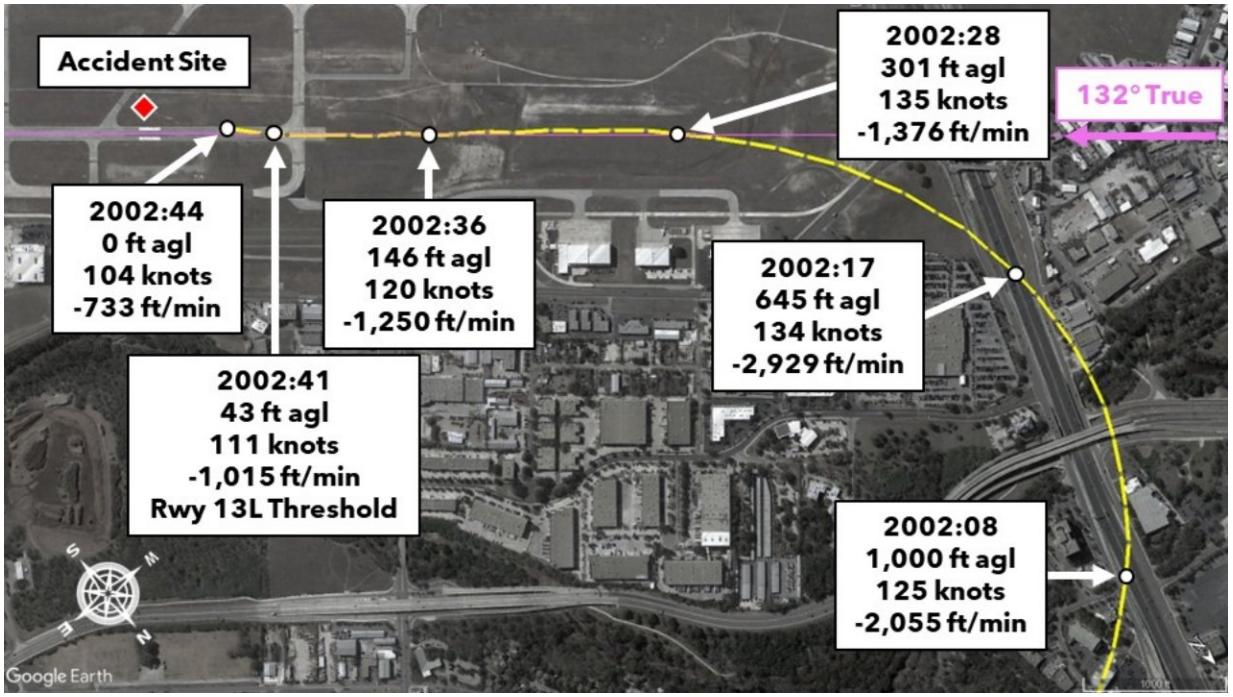

Figure 2 – Airplane's Final Approach to Runway 13L

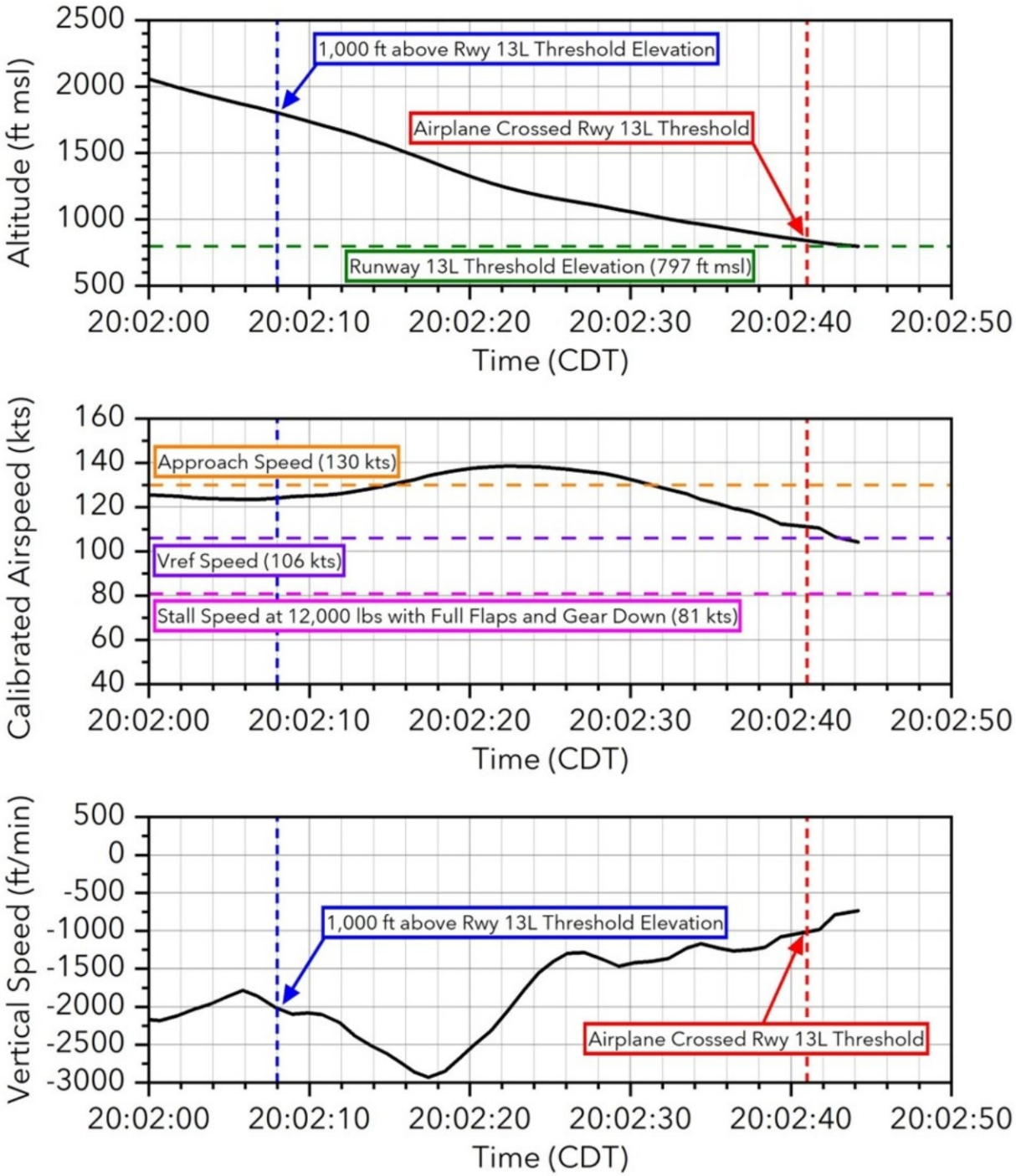

Figure 3 – Airplane Altitude, Calibrated Airspeed, and Vertical Speed

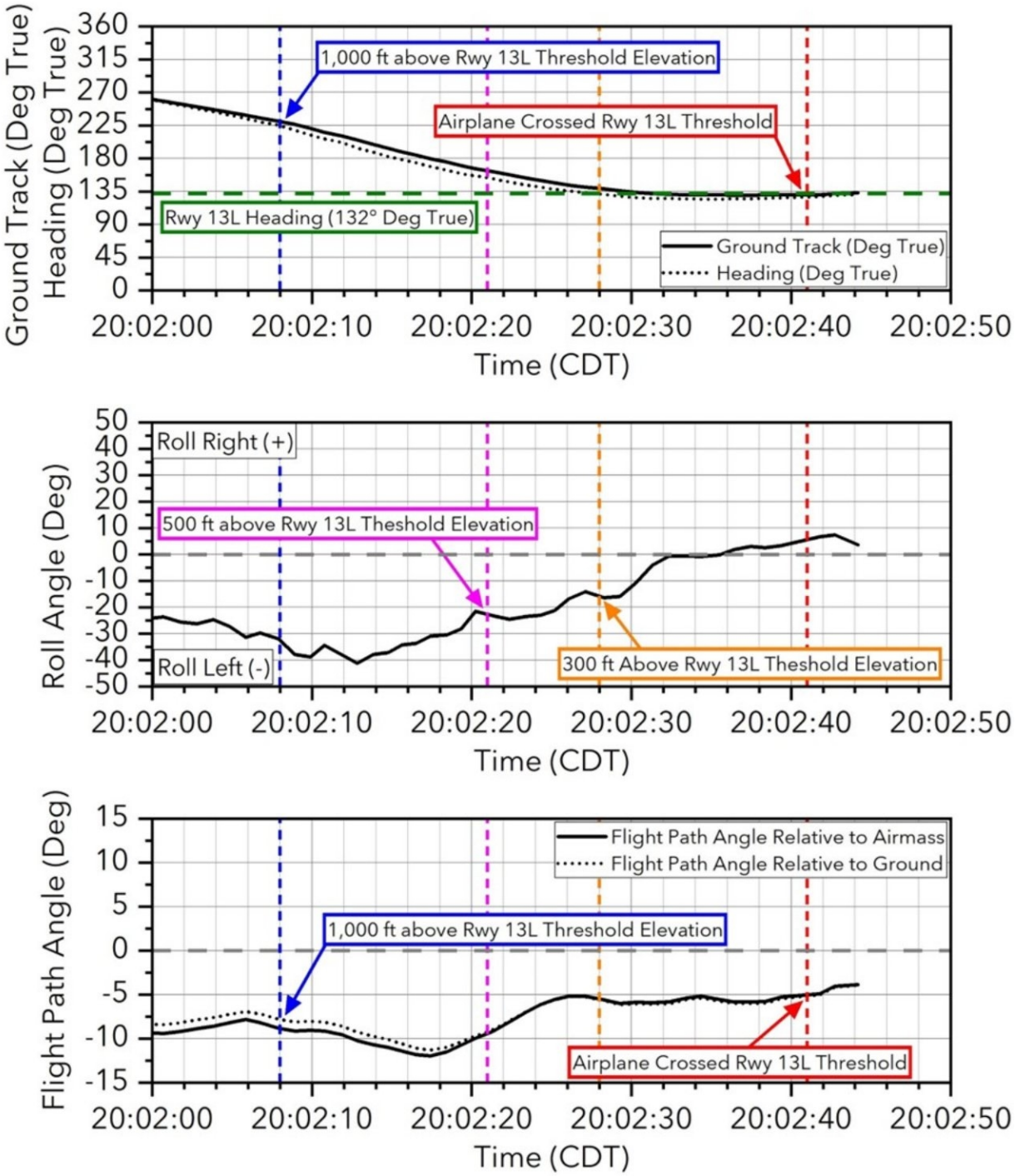

Figure 4 – Airplane Ground Track/Heading, Bank Angle, and Flight Path Angle

Postaccident examination of the airplane revealed substantial damage to the fuselage, right engine nacelle structure, right-wing main spar, and the forward pressure bulkhead. Flight control continuity was confirmed from the individual control surfaces to their respective cockpit controls, and the measured range-of-travel for the aileron, elevator, and rudder where within maintenance manual limits. There were no discrepancies noted with the stabilizer trim

control system, and its full travel time was within maintenance manual limits. A borescope inspection of both engines did not reveal any evidence of an internal gas path component failure. The turbine of each engine rotated freely during the borescope inspection. No airfoil damage or debris was observed during the borescope inspection. Both fuel control unit filter bowls contained fuel. Both propellers exhibited impact-related damage.

Pilot Information

Certificate:	Airline transport	**Age:**	53,Male
Airplane Rating(s):	Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	January 6, 2020
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	June 13, 2020
Flight Time:	(Estimated) 4760 hours (Total, all aircraft), 928 hours (Total, this make and model), 95 hours (Last 90 days, all aircraft), 33 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Swearingen	**Registration:**	N362AE
Model/Series:	SA227 AC	**Aircraft Category:**	Airplane
Year of Manufacture:	1987	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	AC-677B
Landing Gear Type:	Retractable - Tricycle	**Seats:**	3
Date/Type of Last Inspection:	August 27, 2020 AAIP	**Certified Max Gross Wt.:**	16000 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo prop
Airframe Total Time:	28987.1 Hrs at time of accident	**Engine Manufacturer:**	Honeywell
ELT:	C91 installed, not activated	**Engine Model/Series:**	TPE331-11U-611G
Registered Owner:	UAS Transervices Inc	**Rated Power:**	1100 Horsepower
Operator:	Ameriflight LLC	**Operating Certificate(s) Held:**	Commuter air carrier (135)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Dusk
Observation Facility, Elevation:	SAT,809 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	20:11 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Few / 4400 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 7000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots / None	**Turbulence Type Forecast/Actual:**	Unknown / Unknown
Wind Direction:	40°	**Turbulence Severity Forecast/Actual:**	Unknown / Unknown
Altimeter Setting:	30.1 inches Hg	**Temperature/Dew Point:**	26°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Del Rio, TX (DRT)	**Type of Flight Plan Filed:**	IFR
Destination:	San Antonio, TX	**Type of Clearance:**	IFR
Departure Time:	19:28 Local	**Type of Airspace:**	Class C

Airport Information

Airport:	San Antonio International Airport SAT	**Runway Surface Type:**	Asphalt
Airport Elevation:	809 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	13L	**IFR Approach:**	None
Runway Length/Width:	5519 ft / 100 ft	**VFR Approach/Landing:**	Full stop;Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	29.537858,-98.475308(est)

Administrative Information

Investigator In Charge (IIC):	Fox, Andrew
Additional Participating Persons:	Jose M. Ojeda; Federal Aviation Administration; San Antonio, TX
Original Publish Date:	July 26, 2023
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=102619