



Aviation Investigation Final Report

Location:	Yoakum, Texas	Accident Number:	CEN23FA084
Date & Time:	January 17, 2023, 10:36 Local	Registration:	N963MA
Aircraft:	Piper PA46	Aircraft Damage:	Substantial
Defining Event:	Loss of control in flight	Injuries:	4 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Business		

Analysis

A review of air traffic control (ATC) data showed that the airplane departed with an instrument flight rules (IFR) clearance for the destination airport. The pilot requested and was cleared for an RNAV (GPS) approach into the destination airport. When the airplane was descending through 3,500 ft msl, the controller instructed the pilot to report cancelling the IFR clearance and approved a radio frequency change. There was no further communication from the pilot; the ATC facility reported that radar contact was lost when the airplane reached 2,000 ft msl, which was normal for the approach.

The sole surviving passenger reported the airplane was off course during the approach, and the pilot was struggling with the airplane to get it back on course. The passenger remembered hearing a warning alarm several times and the airplane “aggressively pitching up” with more warning alarms and then “aggressively pitching down.” He observed the pilot pulling hard on the yoke and he believed he heard the copilot calling for the pilot to try and get the nose of the airplane up and straightened out. He said that he couldn’t see anything out of the windows due to the clouds and fog until right before the airplane impacted the ground. The airplane came to rest in an open pasture about 1.5 miles from the destination airport.

Low IFR (LIFR) conditions were forecast for the area of the accident site and the destination airport. The National Weather Service (NWS) forecasts were consistent with the weather conditions encountered by the pilot on the approach.

Data recovered from the airplane’s autopilot indicate that the pilot began the approach with the autopilot engaged. When the airplane was about 1 mile from the runway and 500 ft above the airport elevation, the pilot initiated a right climbing turn and disconnected the autopilot. This action was consistent with the initiation of the missed approach procedure. Autopilot data

indicate that the airplane's pitch then increased as high as +20° and roll to +47° (right) during the climbing right turn. These angles suggest that the pilot likely had difficulty controlling the airplane. The pilot then engaged the autopilot's unusual attitude recovery mode. The autopilot made inputs to return to a level flight attitude; however, autopilot data indicate that the pilot made conflicting flight control inputs. As a result, the airplane entered a brief descent, followed by a rapid climb. Indicated airspeed at the top of the climb was 16 knots, well below the airplane's stall speed for any flap configuration. Thus, the airplane likely entered an aerodynamic stall followed by a rapid descent to impact with the terrain. The airplane impacted an open field at a shallow pitch angle, which suggests that the pilot may have attempted a stall recovery maneuver. However, altitude was insufficient for a full recovery.

Postaccident examination revealed no anomalies with the airframe, engine, or autopilot.

Toxicology testing showed trace levels of pheniramine, naltrexone, naltrexol, and CBD in the pilot's system. Although postmortem toxicological testing indicates that the pilot had used these substances, his performance was not likely impaired by effects of those substances at the time of the accident.

Based on the level of meclizine detected in the copilot's heart blood, it is reasonably likely he was experiencing some effects of this medication at the time of the accident. However, whether such effects impaired his performance in a way that contributed to the accident is unknown, particularly considering his uncertain role on the flight and the presence of the other pilot. The copilot's toxicology testing also indicated he had used cetirizine, but this medication was not detected in his blood, so it was not likely causing impairing effects at the time of the accident.

The pilot's difficulty in controlling the airplane when initiating the climbing turn in instrument conditions, along with the activation of the autopilot's unusual attitude recovery mode, and his continued inappropriate control inputs suggest that pilot was experiencing spatial disorientation during the missed approach procedure.

Probable Cause and Findings

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

The pilot's spatial disorientation during a missed approach in instrument meteorological conditions, which led to an exceedance of the airplane's critical angle of attack and a subsequent aerodynamic stall.

Findings

Personnel issues	Aircraft control - Pilot
Personnel issues	Task monitoring/vigilance - Pilot
Personnel issues	Spatial disorientation - Pilot
Aircraft	Altitude - Not attained/maintained
Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Capability exceeded
Environmental issues	Fog - Effect on operation
Environmental issues	Below VFR minima - Effect on operation

Factual Information

History of Flight

Approach-IFR missed approach	Loss of control in flight (Defining event)
Approach-IFR missed approach	Aerodynamic stall/spin
Approach-IFR missed approach	Attempted remediation/recovery
Approach-IFR missed approach	Collision avoidance alert
Approach-IFR initial approach	Controlled flight into terr/obj (CFIT)
Post-impact	Evacuation

On January 17, 2023, about 1036 central standard time, a Piper PA-46-350P JetProp DLX airplane, N963MA, sustained substantial damage when it was involved in an accident near Yoakum, Texas. The pilot, copilot, and two passengers sustained fatal injuries. One passenger sustained serious injuries. The airplane was operated as a Title 14 *Code of Federal Regulations (CFR)* Part 91 business flight.

According to the pilot's wife, the purpose of the flight was a day trip for the pilot to visit his business. The copilot and the passengers were going to visit the surviving passenger's property to observe his cattle ranching operation. The Yoakum Municipal Airport (T85), Yoakum, Texas, was the intended destination.

A review of ATC data showed that the airplane departed from the Memphis International Airport (MEM), Memphis, Tennessee, at 0748, on an IFR clearance. The intended destination of T85 was not served by a control tower.

As the airplane was traveling to the southwest and descending to 10,000 ft mean sea level (msl), the pilot established communication with the controller. The controller instructed the pilot to maintain 3,000 ft msl. The pilot requested the RNAV (GPS) Runway 31 approach at T85; the controller cleared the airplane direct to the initial approach fix, FOSAL waypoint. The controller instructed the pilot to maintain 3,000 ft msl until reaching FOSAL and cleared the airplane for the RNAV (GPS) runway 31 approach procedure. When the airplane was descending through 3,500 ft msl, the controller instructed the pilot to report the IFR clearance cancellation and approved a radio frequency change. There was no further communication from the pilot and the ATC facility reported that radar contact was lost when the airplane reached 2,000 ft msl, which was normal for the approach. Emergency services were notified

about 23 minutes after the accident. The Alert Notice (commonly referred to as an ALNOT) was issued 30 minutes after the accident.

A review of ADS-B and OpsVue flight track data showed that the airplane departed MEM and traveled southwest to T85. The flight track data showed that about 1 mile southeast of the approach end of runway 31, while on final approach, the airplane turned and climbed to the east, descended, climbed, and then rapidly descended before the flight track data terminated. Before the rapid descent, the airspeed dropped to a low of 16 knots.

The surviving passenger reported that he listened in on the pilot's conversation for about half of the flight and he didn't hear any discussion out of the ordinary and that he wasn't listening to the two pilots right before the accident occurred. When the airplane was approaching T85, the passenger reported the airplane was off course, and the pilot was struggling with the airplane to get it back on course.

The passenger remembered hearing a warning alarm several times and the airplane "aggressively pitching up" with more warning alarms and then "aggressively pitching down." He observed the pilot pulling hard on the yoke and he believed he heard the copilot calling for the pilot to try and get the nose of the airplane up and straightened out. He said that he couldn't see anything out of the windows due to the clouds and fog present until right before the airplane impacted the ground.

The airplane came to rest in a grass field on private property used for cattle ranching about 1.5 miles southeast of T85. After the airplane impacted the ground and the passenger regained consciousness, he unbuckled his three-point restraint system and was able to egress from the cabin via the cabin door. The passenger used another passenger's cellular phone that he found and used it to contact first responders, who arrived at the accident site about 15 minutes later.

Pilot Information

Certificate:	Commercial	Age:	64, 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:	Yes
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 2 With waivers/limitations	Last FAA Medical Exam:	March 21, 2022
Occupational Pilot:	No	Last Flight Review or Equivalent:	January 10, 2021
Flight Time:	(Estimated) 3295 hours (Total, all aircraft)		

Co-pilot Information

Certificate:	Commercial; Flight instructor	Age:	33, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	3-point
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane single-engine	Toxicology Performed:	Yes
Medical Certification:	Class 1 Without waivers/limitations	Last FAA Medical Exam:	March 28, 2018
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 700 hours (Total, all aircraft)		

Pilot

According to the pilot's wife, the pilot would sometimes fly the airplane for business reasons from his home in Tennessee to the manufacturing facility in Yoakum.

The pilot's son-in-law, who works as a commercial airline pilot, had flown with the pilot about 50 times over the last several years. The son-in-law described his father-in-law as a very competent pilot.

According to the surviving passenger, he had flown with the pilot several times in the past and he felt the pilot was very organized and competent.

The pilot's final logbook entry was dated January 10, 2021, and the investigation was unable to determine the pilot's recent flight experience.

Copilot

According to the copilot's wife, the copilot used to fly daily, but more recently, he would only fly a few times a year.

The copilot's logbook was not available for review.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	Registration:	N963MA
Model/Series:	PA46 350P	Aircraft Category:	Airplane
Year of Manufacture:	2008	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	4636453
Landing Gear Type:	Retractable - Tricycle	Seats:	6
Date/Type of Last Inspection:	May 11, 2022 Annual	Certified Max Gross Wt.:	4340 lbs
Time Since Last Inspection:	122.8 Hrs	Engines:	1 Turbo prop
Airframe Total Time:	1714.8 Hrs at time of accident	Engine Manufacturer:	Pratt & Whitney Canada
ELT:	C126 installed, activated, did not aid in locating accident	Engine Model/Series:	PT6A-35
Registered Owner:	SCT ENTERPRISES LLC	Rated Power:	750 Horsepower
Operator:	On file	Operating Certificate(s) Held:	None
Operator Does Business As:	None	Operator Designator Code:	None

According to FAA registration records, the pilot purchased the airplane on December 31, 2020. A review of the airframe maintenance records showed the airplane was modified on February 11, 2020, via FAA supplemental type certificate ST00541SE, as a JetProp DLX model.

The airplane was equipped with a stall warning system that is activated between five and ten knots above the stall speed, with mild airframe buffeting and pitching preceding the stall. When the landing gear and the flaps are both retracted, the stall speed is 69 knots (indicated airspeed).

The airplane was also equipped with a suite of advanced avionics including an Electronics International MVP-50T engine monitoring system, an Avidyne multi-function display, an Avidyne primary function display, an Avidyne DFC-90 autopilot system, and a Honeywell KMH 820 enhanced ground proximity warning system (EGPWS).

A review of the laminated checklist booklet found in the wreckage, for the approach and landing sections, displayed several variations from the checklist published in the JetProp DLX Pilot's Operating Handbook and FAA-approved Airplane Flight Manual. The FAA has published Safety Alert For Operators 17006 Safety Concerns with Using Commercial Off-the-Shelf (COTS) or Personally Developed Checklists. This document states in part:

Pilots and operators, other than those operating an aircraft under 14 CFR Part 121 or 135 that choose to use COTS or personally developed checklists should meticulously compare them to the manufacturer's checklist and placards contained in the POH/AFM to confirm they are

consistent. This action will ensure the pilot has all pertinent manufacturer's information during aircraft flight operations.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	Condition of Light:	Day
Observation Facility, Elevation:	KVCT, 111 ft msl	Distance from Accident Site:	28 Nautical Miles
Observation Time:	10:30 Local	Direction from Accident Site:	160°
Lowest Cloud Condition:	Scattered / 1300 ft AGL	Visibility	7 miles
Lowest Ceiling:		Visibility (RVR):	
Wind Speed/Gusts:	3 knots / None	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	180°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	29.88 inches Hg	Temperature/Dew Point:	21°C / 19°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Memphis, TN (MEM)	Type of Flight Plan Filed:	IFR
Destination:	Yoakum, TX (T85)	Type of Clearance:	IFR
Departure Time:	07:48 Local	Type of Airspace:	Class G

The weather forecast information applicable for the accident time indicated that a Center Weather Advisory (CWA) and both the text NWS Airmen's Meteorological Information (AIRMET) and the Graphical AIRMET (G-AIRMET) were both valid for the accident site and the destination airport for low IFR and IFR conditions through 1200.

A search of archived information indicated that the pilot did not request weather information from Leidos Flight Service. The pilot did request and receive a weather briefing package from ForeFlight at 0705, and the weather briefing package at 0705 contained all the standard weather forecast information valid at that time, including CWA 102 and the text AIRMET and G-AIRMETs. The pilot did not view any weather imagery information on the ForeFlight App before the flight. It is unknown what additional weather information, if any, the pilot checked or received during the accident flight.

The landowner where the airplane came to rest stated that shortly after the accident occurred, he noticed a lot of fog at the accident site with a calm wind. In addition, an air medical helicopter dispatched from Victoria, Texas, to fly to the accident site cancelled its flight due to the heavy fog in the area around 1100.

The closest meteorological reporting station to T85 was the Roger M. Dreyer Memorial Airport (T20), Gonzales, Texas. The T20 Automated Weather Observing System (AWOS) was located

about 23 miles northwest of the accident site. In addition, the Victoria Regional Airport (VCT), Victoria, Texas, was located about 29 miles south-southwest of the accident site.

Cloud tops were noted around 1,800 to 2,300 ft based on the High-Resolution Rapid Refresh (commonly called HRRR) sounding data and pilot reports (commonly called PIREPs). As the low clouds and fog formed during the early morning hours and passed over VCT and T20, the lowest cloud ceilings were noted at 100 to 300 ft above ground level with visibilities down to 1.5 miles.

CWA 102 was valid from 0658 and until 0900. CWA 102 called for LIFR conditions for the area, which included the accident location. CWA 102 was later updated by CWA 103, which also called for LIFR. CWA 103 was issued at 0859 and valid until 1100. A review of ATC services provided by the Houston Air Route Traffic Control Center was conducted by the National Transportation Safety Board. The review found that the controller failed to disseminate CWA 103 to the pilot. The review also found that the weather conditions reported by the pilot were not entered as a PIREP, as required.

Airport Information

Airport:	YOAKUM MUNI T85	Runway Surface Type:	Asphalt
Airport Elevation:	365 ft msl	Runway Surface Condition:	Vegetation
Runway Used:	13/31	IFR Approach:	Global positioning system;RNAV
Runway Length/Width:	3444 ft / 60 ft	VFR Approach/Landing:	None

The published missed approach procedure for the RNAV (GPS) Runway 31 approach at T85 stated:

Climb to 1,000 then climbing right turn to 2,000 direct to FOSAL and hold.

Wreckage and Impact Information

Crew Injuries:	2 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	2 Fatal, 1 Serious	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	4 Fatal, 1 Serious	Latitude, Longitude:	29.306388,-97.111106(est)

The airplane came to rest upright near a barbed wire fence, and both wings were separated from the fuselage. The cockpit area sustained impact damage, while the cabin and empennage were attached and remained mostly intact. The nose wheel was found separated. The airplane sustained substantial damage to both wings and the fuselage.

The main landing gear was found extended. The landing gear handle was in the extended (gear down position). The flap handle and flap indicator showed the flaps were retracted. Flight control continuity was established for the airframe.

A download and review of the Avidyne DFC-90 autopilot system data showed that there were no mechanical anomalies with the autopilot system. During the approach, the autopilot was engaged; it was then disconnected when the airplane entered a climbing right turn. Autopilot data indicate that pitch increased as high as +20° and roll to +47° (right) during the climbing right turn. The autopilot was then re-engaged via the unusual attitude recovery (commonly called the UAR) button during the climbing right turn. The UAR mode was disabled by the pilot shortly after being enabled, before the impact with terrain. A download and review of the Honeywell KMH 820 EGPWS data showed that once the airplane entered a climbing right turn, a “sink rate” caution alert occurred and then shortly after a “pull up” warning alert occurred.

Examination of the seats and restraint systems did not reveal any mechanical anomalies.

The engine, which sustained some impact damage, was found attached to the airframe. All fluid and air lines and connections appeared to be intact. No fluid leaks were noticed on the engine and the engine accessories. A download and review of the Electronics International MVP-50T engine monitoring system data showed that the engine performance parameters were normal during the accident flight.

The four-blade wood propeller was destroyed from the impact sequence. All four wood blades were found separated at the blade root.

Flight recorders

The airplane was not equipped with a crashworthy flight data recorder or a cockpit voice recorder, nor was it required to be.

Medical and Pathological Information

Pilot

The Fort Bend County Medical Examiner Office performed the pilot's autopsy. According to the pilot's autopsy report, his cause of death was multiple blunt force trauma. His autopsy did not identify significant natural disease.

The FAA Forensic Sciences Laboratory performed toxicological testing of postmortem specimens from the pilot. Pheniramine was detected at a trace level in femoral blood and was also detected in liver tissue. Naltrexone was detected in liver tissue; naltrexone was not detected in heart blood. The naltrexone metabolite 6-beta-naltrexol was detected at a trace level in heart blood and was also detected in liver tissue. Cannabidiol (commonly known as CBD) was detected in heart blood and liver tissue.

Copilot

The Fort Bend County Medical Examiner Office performed the copilot's autopsy. According to the copilot's autopsy report, his cause of death was multiple blunt force trauma. His autopsy did not identify significant natural disease.

The FAA Forensic Sciences Laboratory performed toxicological testing of postmortem specimens from the copilot. Meclizine was detected in heart blood at 36.5 ng/mL; meclizine was not detected in urine. Cetirizine was detected in urine; cetirizine was not detected in heart blood.

Additional Information

The FAA Pilot's Handbook of Aeronautical Knowledge, FAA-H-8083-25C, discusses the use of advanced avionics and states in part:

The advanced avionics aircraft adds an entirely new dimension to the way GA aircraft are flown. The electronic instrument displays, GPS, and autopilot reduce pilot workload and increase pilot situational awareness. While programming and operation of these devices are fairly simple and straightforward, unlike the analog instruments they replace, they tend to capture the pilot's attention and hold it for long periods of time. To avoid this phenomenon, the pilot should plan in

advance when and where the programming for approaches, route changes, and airport information gathering should be accomplished, as well as times it should not. Pilot familiarity with the equipment, the route, the local ATC environment, and personal capabilities vis-à-vis the automation should drive when, where, and how the automation is programmed and used.

The pilot should also consider what his or her capabilities are in response to last minute changes of the approach (and the reprogramming required) and ability to make large-scale changes (a reroute for instance) while hand flying the aircraft. Since formats are not standardized, simply moving from one manufacturer's equipment to another should give the pilot pause and require more conservative planning and decisions.

The JetProp DLX Pilot's Operating Handbook and FAA-approved Airplane Flight Manual discusses stall recovery and states in part:

Loss of altitude during stalls can be as great as 1,000 feet, depending on configuration and power. An aggressive stall recovery may lead to a secondary stall; therefore, smoothly apply back pressure during the recovery.

The FAA Civil Aeromedical Institute's publication, "Introduction to Aviation Physiology," defines spatial disorientation as a loss of proper bearings or a state of mental confusion as to position, location, or movement relative to the position of the earth. Factors contributing to spatial disorientation include changes in acceleration, flight in IMC, frequent transfer between visual meteorological conditions (VMC) and IMC, and unperceived changes in aircraft attitude.

The FAA Airplane Flying Handbook, FAA-H-8083-3C, discusses some hazards associated with flying when the ground or horizon are obscured. The handbook states, in part:

The vestibular sense (motion sensing by the inner ear) in particular tends to confuse the pilot. Because of inertia, the sensory areas of the inner ear cannot detect slight changes in the attitude of the airplane, nor can they accurately sense attitude changes that occur at a uniform rate over a period of time. On the other hand, false sensations are often generated; leading the pilot to believe the attitude of the airplane has changed when in fact, it has not. These false sensations result in the pilot experiencing spatial disorientation.

Administrative Information

Investigator In Charge (IIC):	Hodges, Michael
Additional Participating Persons:	Ramon Reyes; FAA Houston FSDO; Houston, TX Kris Wetherell; Piper Aircraft; Vero Beach, FL Brad Bocko; Avidyne Corporation; Melbourne, FL Beverley Harvey; Transportation Safety Board of Canada; Gatineau, OF Robert Duma; Pratt & Whitney Canada; Longueuil, OF
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Note:	
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=106588

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