



National Transportation Safety Board Aviation Accident Final Report

Location:	Ely, NV	Accident Number:	WPR13FA070
Date & Time:	12/15/2012, 1000 PST	Registration:	N93CN
Aircraft:	PIPER PA-31T1	Aircraft Damage:	Destroyed
Defining Event:	Inflight upset	Injuries:	2 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The private pilot and passenger departed on the 875-nautical-mile cross-country flight and leveled off at a cruise altitude of 24,000 feet mean seal level, which, based on the radar data, was accomplished with the use of the autopilot. About 1 hour 40 minutes after departure, the pilot contacted air traffic control personnel to request that he would “like to leave frequency for a couple of minutes.” No further radio transmissions were made. About 20 seconds after the last transmission, the airplane banked to the right, continued in a spiral while rapidly descending, and subsequently broke apart. At no time during the flight did the pilot indicate that he was experiencing difficulty or request assistance. Just prior to departing from the flight path, the pilot made an entry of the engine parameters in a flight log, which appeared to be consistent with his other entries indicating the airplane was not experiencing any difficulties.

Portions of the wings, along with the horizontal stabilizers and elevators, separated during the breakup sequence. Analysis of the fracture surfaces, along with the debris field distribution and radar data, revealed that the rapid descent resulted in an exceedance of the design stress limits of the airplane and led to an in-flight structural failure. The airplane sustained extensive damage after ground impact, and examination of the engine components and surviving primary airframe components did not reveal any mechanical malfunctions or failures that would have precluded normal operation.

The airplane was flying on a flight path that the pilot was familiar with over largely unpopulated hilly terrain at the time of the upset. The clouds were well below his cruising altitude, giving the pilot reliable external visual cues should the airplane have experienced a failure of either the flight instruments or autopilot. Further, no turbulence was reported in the area.

The airplane was equipped with a supplemental oxygen system, which the pilot likely had his mask plugged into and available in the unstowed position behind his seat; the passenger’s mask was stowed under her seat.

The airplane’s autopilot could be disengaged by the pilot by depressing the appropriate mode

switch, pushing the autopilot disengage switch on the control wheel, or turning off the autopilot switch on the control head. All autopilot servos were also equipped with a clutch mechanism that allowed the servo to be manually overridden by the pilot at any time.

It is likely that the reason the pilot requested to “leave the frequency” was to leave his seat and attend to something in the airplane. While leaving his seat, it is plausible he inadvertently disconnected the autopilot and was unable to recover by the time he realized the deviation had occurred.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot’s failure to regain airplane control following a sudden rapid descent during cruise flight, which resulted in an exceedance of the design stress limits of the aircraft and led to an in-flight structural failure.

Findings

Aircraft	Aircraft structures - Capability exceeded (Cause) Performance/control parameters - Not attained/maintained (Cause)
Personnel issues	Aircraft control - Pilot (Cause)

Factual Information

HISTORY OF FLIGHT

On December 15, 2012, about 1000 Pacific standard time (PST), a Piper PA31T1 Cheyenne, N93CN, was destroyed during an in-flight breakup near Ely, Nevada. The pilot was operating the airplane under the provisions of Title 14 Code of Federal Regulations (CFR) Part 91. The private pilot and passenger sustained fatal injuries. The cross-country personal flight departed from Falcon Field Airport, Mesa, Arizona, at 0818, with a planned destination of the Portland-Troutdale Airport, Portland, Oregon. Visual meteorological conditions prevailed in the area surrounding the accident site and the flight was operating on a Federal Aviation Administration (FAA) instrument flight rules (IFR) flight plan.

Radar data gathered from both the Cedar City, Utah (CDC) and Battle Mountain, Nevada (BAM) radar sites revealed the airplane departed Mesa and continued on a northerly track for about 30 minutes. The airplane then turned to a northwesterly direction (around a bearing of 335-degrees magnetic) and remained at the cruise altitude of 24,000 feet mean sea level (msl), at about 230 knots ground speed. At 0937 the airplane's heading turned to about 320-degrees and continued on that bearing until the last several radar returns. Those last recorded targets showed the airplane during the last approximate 30 seconds, where it began a steep right spiral, descending from cruise altitude to 14,500 feet msl, which was the last recorded altitude. The final radar target was recorded at 1000 and was located 0.35 nautical miles northeast of the accident site.

The audio transcripts of the pilot's communications with Air Traffic Control were provided by the FAA. The pilot's last radio transmission was at 0959:40 at which time the pilot requested that he would "like to leave frequency for a couple of minutes." The air traffic controller responded that he was approved as requested and to report when he was back on frequency.

PERSONNEL INFORMATION

A review of the airmen records maintained by the Federal Aviation Administration (FAA) disclosed that the pilot, age 84, held a private pilot certificate and ratings for single-engine and multi-engine land, as well as instrument flight. His most recent third-class medical certificate was issued on October 5, 2012 which contained the limitation that he must wear "corrective lenses and possess glasses for near/intermediate vision."

The pilot's personal flight records were not recovered. On his last application for a medical certificate he reported his total flight time to be 6,336 hours, 51 of which were obtained in the 6 months prior. According to the FAA records, the pilot had been involved in two airplane mishaps previously.

AIRCRAFT INFORMATION

The Piper Cheyenne PA-31T1, serial number (s/n) 31T-8004029, was manufactured in 1980. The airplane was equipped with two Pratt and Whitney PT6-11A engines. A review of the logbooks revealed that the most recent Piper Progressive Inspection, Program Number 1 and 2 Inspections were performed on March 23, 2012 at an airframe total time of 5,725 hours. According to an entry dated August 27, 2012, the left engine, s/n 10514, had amassed a total time of 4,600 hours, of which 505 hours were accumulated since the last overhaul; the right engine, s/n 10204, had amassed a total time of 5,800 hours of which 701 hours were

accumulated since the last overhaul.

According to the logbook, the last maintenance performed occurred on October 15, 2012 at an airframe total time of 5,800 hours. At this date the left tip tank nosecone was repaired due to ground damage incurred.

The tachometer at the accident site showed a total time of 5,824.X hours (the last digit could not be determined). The pilot regularly completed a "flight log" that he kept in the airplane where he would record the following parameters (the notations in the parenthesis are the most recent entry): tachometer time when the trend was recorded (5,824.1); the altitude (24,000 feet); outside temperature (-36 degrees Celsius); indicated airspeed (160 kts); torque (900 and 890); interstage turbine temperature, ITT (650 and 675 Celsius); propeller rotation speed, Np (1,900 and 1,910 rpm); gas generator speed, Ng (96.8 and 95.3); fuel flow, FF (214 and 207); oil temperature (65 and 63 degrees Celsius); oil pressure (90 and 95); weight (7,595 pounds).

The airplane was equipped with a King/Bendix KFC250 autopilot which was the originally installed equipment at manufacture. The unit is designed where the pilot could engage the autopilot by depressing the "ON" switch and then selecting the desired mode on the autopilot control head. Once selected, the appropriate light will illuminate on the autopilot annunciator panel. To disengage the autopilot, the pilot could depress the appropriate mode switch a second time, or push the autopilot disengage switch on the control wheel, or turn off the autopilot switch on the control head.

All autopilot servos were also equipped with a clutch mechanism which allows the pilot to physically override the servo at any time.

METEOROLOGICAL INFORMATION

A staff meteorologist with the National Transportation Safety Board (NTSB) conducted a study of the observed and forecast meteorological conditions for the time and location of the accident site area. The complete study is contained in the public docket for this accident.

The National Weather Service (NWS) Surface Analysis Chart for the time of the accident depicted station models in the region of the accident site which indicated light or calm winds with variable directions. Temperatures were generally in the low 30 degrees Fahrenheit (F). A regional Next-Generation Radar (NEXRAD) mosaic did not identify any pertinent areas of reflectivity close to the accident location.

Ely Airport, Ely, Nevada, was located approximately 18 miles northwest of the accident site at an elevation of 6,659 feet. It was the closest official observation station with a ceilometer. Automated reports were issued from the station during the period surrounding the accident time. At 0953, it recorded the wind was from 160 degrees at 5 kts; temperature of 23 degrees F and a dew point of 19 degrees F; clear sky below 12,000 feet agl; and altimeter 29.85 inHg.

A North American Mesoscale (NAM) model for the accident location was retrieved from the National Oceanic and Atmospheric Administration's (NOAA) Air Resources Laboratory. The wind profile indicated the wind remained below 10 kts from varying directions below about 26,000 feet. Calculations made by the Rawinsonde Observation Program (RAOB) did not identify any significant icing or turbulence potential above about 12,000 feet agl. A publically disseminated pilot report was made within 100 miles of the accident site at 1153 a pilot at 40,000 feet reported wind from 240 degrees at 40 kts and no turbulence.

A review of the Satellite Imagery Geostationary Operational Environmental Satellite (GOES)

and infrared data disclosed that there were clouds in the region; however, these clouds were difficult to discriminate from snow covered-terrain below. A loop of the visible imagery indicated that there were partly cloudy skies throughout the region with clouds moving through the immediate vicinity of the accident site. GOES-13 infrared data indicated coldest cloud-top brightness temperatures near the accident site were approximately -28 degrees F, which, when considering the NAM model sounding, corresponded to cloud-top heights of about 16,000 feet.

An Area Forecast that included Utah was issued at 0345 PST. The portion of the Area Forecast directed toward northeastern and east-central Nevada forecasted a cloud ceiling broken between 7,000 and 9,000 feet msl, overcast cloud bases at 12,000 feet msl, clouds tops to 18,000 feet msl, widely scattered light snow showers.

WRECKAGE AND IMPACT

The accident site was located in a canyon in the Schell Creek mountain range about 17 nautical miles (nm) southeast of Ely. The main wreckage was located at an estimated 39 degrees 05.233 minutes north latitude and 114 degrees 35.017 minutes west longitude, at an elevation of about 6,850 feet msl. The distance from Mesa (departure city) and Portland (destination city) is about 875 nm on a bearing of about 317 degrees.

The wreckage debris was scattered over an estimated 1,500-foot area of hilly terrain. At the far south parameter of the debris field was the main wreckage, with the far north area containing sections of tail skin panels. The main wreckage, which consisted of the cabin, right wing, inboard left wing, both engines, empennage, and a portion of the vertical stabilizer, came to rest inverted on a heading of 284 degrees.

A complete pictorial of the wreckage location and surrounding terrain is contained in the public docket for this accident.

MEDICAL AND PATHOLOGICAL INFORMATION

The Clark County Coroner of Las Vegas, Nevada completed an autopsy on the pilot and passenger. The examiner's pathological diagnosis as cause of death was noted as, "Blunt force injuries."

The FAA Civil Aeromedical Institute (CAMI) performed toxicological screenings on the pilot. According to CAMI's report (#201200291001), the toxicological findings were negative for ethanol (alcohol). The anticoagulant warfarin, the beta blocker Metoprolol, and the non-sedating decongestant pseudoephedrine was detected in the muscle and liver. Carbon monoxide testing was not conducted as no blood was available for testing.

No medical conditions that would cause impairment or incapacitation were identified by the autopsy. Currently, there are no laboratory tests that would identify pilot hypoxia. Therefore, this investigation is unable to determine if this pilot experienced impairment or incapacitation from a medical condition or hypoxia that could have contributed to this accident.

TESTS AND RESEARCH

A complete examination report and structures factual report is contained in the public docket for this accident.

Fuselage

The upper portion cabin area had sustained significant crush damage and the skin was wrinkled and molded around the longerons. The vertical crush deformation was more prominent in the forward section of the airplane with the nose baggage compartment compressed into itself. The empennage vertical deformation was minimal from the baggage door area aft. There was no evidence of any forward motion of the airplane relative to ground at the time of impact. All of the examined fracture surfaces exhibited features consistent with overstress failures with no evidence of fatigue.

The cockpit had sustained major crush deformation and it was not possible to determine reliable control positions. The landing gear and flap levers were in the retracted position. The static pressure selector valve was in the "normal source" position.

The oxygen knob was aft one inch and bent downward, which would be near the off position. The pilot's oxygen mask was found tucked under the seat compartment in the stowed position and the passenger's mask and hoses were entangled around her in the wreckage. The oxygen microphone toggle switch was selected on. The oxygen mask was plugged in the quick connect on the pilot's side and there was a quick donning storage hook behind the pilot's seat (to his left). The oxygen tank valve was in the off position.

The cockpit gauge lights were examined and the filament was stretched on the following lights: navigation, altitude hold, autopilot engaged, navigation function engaged, ILS (instrument landing system) inner marker beacon. The bulbs were broken or missing for the flight director and trim warning, making the illumination at the time of the event not possible to discern. The heading bug on the VOR (very high frequency omnidirectional range) gauge was set at 310-degrees, consistent with the direction of travel.

All of the examined fracture surfaces of the left and right wing, vertical and horizontal stabilizer exhibited features consistent with overstress failures with no evidence of fatigue.

Passenger Doors

The main cabin door was open and all six locking pins were extended consistent with the fully latched position. The upper 16 inches of the door was bent about the center 2 locking pins. The door handle was in the stowed and latched position.

Landing Gear

The nose and main gears were in the retracted position.

Left Engine

A post accident examination of the left engine revealed that the firewall structure, engine mounts, exhaust stubs, propeller, starter generator, torque system, and the cowling remained attached, with severe impact damage and deformation.

Severe impact damage of the casing precluded a complete disassembly of the turbine and gas generator sections. The engine was mechanically sectioned between the fuel nozzle ports and engine mount collar for separation of the gas generator and power sections.

The compressor 1st stage was inspected through the inlet screen. There were no indications of operational distress. The combustion chamber liner displayed severe impact deformation around the upper circumference and there were no indications of pre-impact distress. Inspection of the compressor turbine guide vane ring revealed that the vane airfoils were intact. The compressor turbine shroud displayed light circumferential scoring consistent with

contact with the compressor turbine blade tips during impact. The compressor turbine was partially disassembled revealing the downstream side disc outer diameter displayed very light circumferential rubbing due to contact with the power turbine guide vane ring and interstage baffle.

The power turbine guide vane ring and interstage baffle were intact. The upstream side disc inner drum and baffle face displayed light circumferential rubbing consistent with contact with the compressor turbine. The power turbine shroud was radially deformed inward due to deformation of the exhaust duct. The shroud face displayed very light circumferential scoring consistent with contact with the power turbine blade tips. The power turbine blades around the upper circumference were deformed and fractured which appeared to be a result of contact with the deformed shroud housing. A fractured blade tip was recovered in the exhaust duct. The blade tip displayed light circumferential rubbing consistent with contact with the shroud. The fracture surface displayed coarse dendritic features characteristic of impact fracture.

There were no indications of fatigue or any other progressive fracture mechanism. The reduction gearbox chip detector was clean of debris. The oil and fuel filter were both clean.

Right Engine

The right engine firewall structure, engine mounts, exhaust stubs, starter generator, torque system, and the cowling remained attached, with severe impact damage and deformation.

Severe impact damage of the casing precluded a complete disassembly of the turbine and gas generator sections. The engine was mechanically sectioned between the fuel nozzle ports and engine mount collar for separation of the gas generator and power sections.

The compressor 1st stage was inspected through the inlet screen revealing that there were no indications of operational distress. The compressor turbine guide vane ring was intact and displayed no indications of operational distress. The shroud displayed light circumferential scoring consistent with contact with the compressor turbine blade tips. The compressor turbine downstream side disc outer diameter displayed very light circumferential rubbing consistent with contact with the power turbine guide vane ring and interstage baffle.

The power turbine housing displayed no indications of distress. The power turbine guide vane ring and interstage baffle were intact. The upstream side disc inner drum and baffle face displayed light circumferential rubbing consistent with contact with the compressor turbine. The power turbine shroud housing was radially deformed inward due to deformation of the exhaust duct. The shroud face displayed very light circumferential scoring due to contact with the power turbine blade tips. The power turbine blades around the upper circumference were deformed and fractured which was apparently a result of contact with the deformed shroud housing. A fractured blade tip was recovered in the exhaust duct. The blade tip displayed light circumferential rubbing consistent with contact with the shroud. The fracture surface displayed coarse dendritic features characteristic of impact fracture. There were no indications of fatigue or any other progressive fracture mechanism.

The reduction gear box chip detectors on both engines were clean of debris.

Propellers

Both propellers had very similar damage. Each one had one blade that was straight, one blade that had a very mild forward bend, and one blade that had a very sharp aft bend and a very sharp forward bend.

The right propeller had separated from the engine and the left propeller had separated. According to the propeller manufacture, neither propeller appeared to be feathered at the time of impact. Both spinner domes were hydro-formed over the piston and counterweights indicating that the propellers were in a low-operating blade angle position (at or near flight idle position) at the time of impact. There were no discrepancies noted that would preclude normal operation. All damage was consistent with impact damage.

History of Flight

Enroute-cruise	Inflight upset (Defining event)
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Pilot Information

Certificate:	Private	Age:	82
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 With Waivers/Limitations	Last FAA Medical Exam:	10/05/2012
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	6336 hours (Total, all aircraft), 51 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	PIPER	Registration:	N93CN
Model/Series:	PA-31T1	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	31T-8004029
Landing Gear Type:	Retractable - Tricycle	Seats:	7
Date/Type of Last Inspection:	03/23/2012, Continuous Airworthiness	Certified Max Gross Wt.:	
Time Since Last Inspection:		Engines:	2 Turbo Prop
Airframe Total Time:	5725 Hours as of last inspection	Engine Manufacturer:	Pratt and Whitney
ELT:	Installed, not activated	Engine Model/Series:	PT6-A
Registered Owner:	JERRY NOTHMAN	Rated Power:	500 hp
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	KELY, 6259 ft msl	Distance from Accident Site:	17 Nautical Miles
Observation Time:	0953 PST	Direction from Accident Site:	130°
Lowest Cloud Condition:	Clear	Visibility	10 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	5 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	160°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.85 inches Hg	Temperature/Dew Point:	-5° C / -7° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Mesa, AZ (FFZ)	Type of Flight Plan Filed:	IFR
Destination:	Portland, OR (TTD)	Type of Clearance:	IFR
Departure Time:	0818 PST	Type of Airspace:	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	1 Fatal	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Fatal	Latitude, Longitude:	39.087222, -114.583611

Administrative Information

Investigator In Charge (IIC):	Zoe Keliher	Report Date:	01/27/2015
Additional Participating Persons:	Gerald W Rose; Federal Aviation Administration; Reno, NV Micheal McClure; Piper Aircraft; Vero Beach, FL Daniel Boggs; Hartzell Propeller Inc.; Piqua, OH Thomas Berthe; Pratt and Whitney; Montreal,		
Publish Date:	01/27/2015		
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=85822		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).