



National Transportation Safety Board Aviation Accident Final Report

Location:	Easton, WA	Accident Number:	SEA06FA139
Date & Time:	07/10/2006, 1735 PDT	Registration:	N40ST
Aircraft:	Piper PA-31-350	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	1 Fatal
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled		

Analysis

While cruising en route in VFR conditions, the aircraft lost power on both engines. The pilot attempted an emergency forced landing at a nearby unpaved State airport, but after encountering a 20 mph tailwind on downwind and a 20 mph headwind on final, the aircraft impacted a tall conifer tree while about one-half mile from the approach end of the runway. The reason for the dual engine power loss was not determined.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The loss of power in both engines for undetermined reasons while in cruise flight, leading to an attempted forced landing. Factors include unfavorable winds at the site of the forced landing, and trees off the approach end of the grass runway the pilot was attempting to land on.

Findings

Occurrence #1: LOSS OF ENGINE POWER
Phase of Operation: CRUISE

Findings

1. (C) REASON FOR OCCURRENCE UNDETERMINED

Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY DESCENT/LANDING

Occurrence #3: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings

2. (F) WEATHER CONDITION - UNFAVORABLE WIND
3. (F) OBJECT - TREE(S)

Factual Information

HISTORY OF FLIGHT

On July 10, 2006, approximately 1735 Pacific daylight time, a Piper PA-31-350, N40ST, impacted a tree about one-half mile east of Easton State Airport, Easton, Washington. The commercial pilot, who was the sole occupant, received fatal injuries, and the aircraft, which was being operated by Airpac Airlines, was destroyed by the impact and the post-crash fire. The 14 CFR Part 135 air cargo flight, which departed Spokane International Airport, Spokane, Washington, at 1620, was being operated in visual meteorological conditions on an instrument flight rules (IFR) flight plan. There was no report of an ELT activation.

On the morning of July 10, the pilot departed Boeing Field-King County International (KBFI) approximately 0500, and arrived at Spokane International (KGEG) about 0630. According to Airpac records, at Spokane International the flight on-loaded approximately 220 pounds of cargo, but did not take on any fuel. At 1608 the pilot of Airpac 16 received an instrument flight rules (IFR) clearance from Spokane Flight Data for an IFR flight from Spokane International Airport to King County International-Boeing Field. He was cleared via the Spokane 6 departure to an altitude of 8,000 feet. At 1628 the pilot advised tower that he was ready for takeoff, and after a two-minute hold, the tower cleared Airpac 16 for takeoff on Runway 21. After departure Airpac 16 contacted Spokane approach and advised that he was climbing to 8,000 feet. Spokane approach gave the pilot a heading of 210 degrees to join Victor 2 (low-altitude airway). Airpac 16 then intercepted Victor two and climbed to 8,000 feet without further contact with Air Traffic Control (ATC). At 1644, Airpac 16 was transferred to Grant County Approach, where after checking in at 8,000 feet, he was given the Moses Lake altimeter setting. At 1707, while still at 8,000 feet, Airpac 16 was handed off to Seattle Center Sector 18. Approximately seven minutes later (1714), Airpac 16 was handed off to Seattle Center Sector one (1), and upon making contact, the pilot advised the controller that he was level at 8,000 feet. From 1714 until 1726 there were no transmissions made between the controller and Airpac 16, except for one brief interchange where the controller advised Airpac 16 that Airpac 18 had come up on the same frequency. At 1726, the controller advised Airpac 16 that radar contact was lost (a normal occurrence at this location for aircraft heading West on Victor two at 8,000 feet), and that the pilot of Airpac 16 should report when he was 40 miles southeast of Seattle. The pilot acknowledged the call, and then there was no further contact between the controller and Airpac 16 for the next six (6) minutes.

At 1732:11, the controller asked the pilot of Airpac 16 to "ident" (activate the transponder's mode C identification function), and about three (3) seconds later there was an unintelligible transmission that sounded like it had come from Airpac 16. At 1732:25, the controller advised Airpac 16 that radar contact had been confirmed 45 miles southeast of Seattle, and that the pilot could disregard the 40 mile southeast of Seattle position report that had been requested earlier. Because there was no response from Airpac 16 (the first sign of a possible in-flight issue) at 1732:38, 13 seconds after his last transmission to Airpac 16, the controller repeated the 45-mile radar contact advisement. There was no response, so 12 seconds later, at 1732:50, the controller again attempted to contact Airpac 16. The pilot responded to that transmission by stating that he was "having a bit of engine trouble here" and that he was "unable to maintain altitude." The controller asked the pilot to confirm that he had said that he was having trouble,

and the pilot responded that that was "affirmative." The controller then asked what the nature of the problem was, and the pilot responded with "We're unable to maintain maximum engine power here, standby." At 1734:20, one minute and seven seconds after the pilot asked the controller to standby, the controller transmitted that he had lost radar contact with the aircraft. For another eight seconds there were no other transmissions, and then, because Airpac 16 was transmitting from an altitude too low for Seattle Center to receive the transmission, Horizon Flight 245 advised the controller that the pilot of Airpac 16 had transmitted "he was going to Easton." The controller asked Horizon Flight 245 to confirm that the Airpac pilot had said he was going into Easton, and to ask Airpac 16 how many souls were on board. Then at 1735:01, the Horizon flight informed the controller that the Airpac pilot had stated that there was one soul on board, that he had "insufficient power to make it over the mountains," and that he was "planning to land Easton" (and unpaved State airport). The controller then asked the Horizon flight to query Airpac 16 as to whether he was in visual meteorological conditions, which he did. The Horizon flight then reported back that there had been no response, but that the clouds did not start until the Horizon flight's present position (well west of Easton). This was the last direct attempt by either the controller or the Horizon crew to communicate directly with Airpac 16.

At about the same time (1735) a number of witnesses saw the aircraft on what appeared to them to be a left downwind for runway 27 at Easton State Airport (KESW). All of the witnesses that saw the aircraft on the downwind stated that the aircraft was much lower and much faster than they were used to seeing when an aircraft was in that location. Some described it as "very low," or "way too low." Although some witnesses could not remember for sure if the landing gear was down or not, two of the witnesses said that they were sure that all three landing gear were fully extended. Some described the engines as being at "low power," "very little rpm," or "at idle power." One witness said it sounded like an engine was "missing or coughing" as the plane turned from the downwind onto a base leg, but no other witnesses reported hearing any abnormal sounds from the engines (except that they appeared to be running at a low rpm or low power setting). All of the witnesses who said that they could still see the aircraft as it turned north (base leg) reported that it was at that time in a very steep angle of bank. Some of the witnesses lost sight of the aircraft behind the trees while it was still in a bank, but others saw it roll almost to a wings level attitude on what they described as an angled final approach to the east end of runway 27 (heading west or northwest). Soon thereafter the aircraft impacted a tree, and then continued to the west about 220 feet before impacting the terrain.

PERSONNEL INFORMATION

The pilot held a commercial pilot certificate, with single and multi engine land ratings, an instrument airplane rating, an instructor rating for single-engine and multi-engine airplanes, and an instrument airplane instructor rating. At the time of the accident he had accumulated 1,430 total flying hours, of which 102 hours were in a Piper PA-31. He completed his initial FAR Part 135 qualification flight check, in a Piper PA-34, on March 25, 2006. He completed his FAR Part 135 Piper PA-31 transition flight check on March 30, 2006. Prior to the flight check he completed 6.5 hours of PA-31 ground training and 4.4 hours of PA-31 flight training. He completed a Cessna 404 FAR Part 135 transition flight check on June 2, 2006. His first class medical, without limitations or waivers, was issued on November 7, 2005.

METEOROLOGICAL INFORMATION

According to the aviation surface weather report (METAR) recorded at Stampede Pass

(KSMP), which is located approximately eight nautical miles west of the accident site, at 1756 PDT, the sky was clear, the temperature was 16 degrees Celsius, the dew point was 08 degrees Celsius, there was at least 10 statute miles of visibility, and the winds were blowing variably from 210 degrees to 280 degrees at nine knots, gusting to 18 knots.

The 1753 PDT METAR recorded at Bowers Field (KLEN), Ellensburg, Washington, which is located about 30 nautical miles east of the accident site, indicated the sky was clear, with at least 10 miles visibility, the temperature was 24 degrees Celsius, the dew point 02 degrees Celsius, and the wind was blowing from 320 degrees at 18 knots.

According to the KLEN METAR recorded at 1653 (about 42 minutes prior to the accident) the winds were blowing from 310 degrees at 17 knots, gusting to 22 knots. The 1835 KLEN METAR recorded winds coming from 340 degrees at 16 knots, gusting to 26 knots.

In addition to these surface observations, a number of witnesses estimated that the winds near the accident site were out of the west at 20 to 25 miles per hour. This created the situation where the pilot was experiencing a tailwind of at least 20 mph on downwind, and then contending with a headwind of at least 20 mph once he turned final (a 40 mph wind differential).

WRECKAGE AND IMPACT INFORMATION

When the aircraft was about one-half mile from the end of runway 27, and approximately one-quarter mile south of the extended runway centerline, it impacted a 100-foot tall conifer tree about 20 feet from its top, and then descended into the terrain. After impacting the terrain, the wreckage erupted into intense flames. The tree the aircraft impacted was approximately eight inches in diameter at the point of impact. Although there were no clean constant-angle cuts/slices in the trunk of the tree itself, five of the branches near where the tree broke off showed smooth angled slice marks, all approximately parallel to each other, and all about 12 inches out from the trunk. Approximately one-half of the aircraft's left wing, from a point just outboard of the engine cowl to the wingtip, was located on the ground about 20 feet to the northwest of the tree. The top of the tree that had been broken off by the impact was laying on top of the wing, and the leading edge, just outboard of the engine cowl had been crushed almost directly aft and slightly upward to a point aft of the forward wing spar. A clearly defined eight to ten inch diameter circular indentation was located in the center of the area that had been crushed aft, and numerous small shredded pieces of tree bark were clinging to its surface. According to measurements, after the outboard portion of the aircraft's left wing was sheared by impact with the tree, it passed over a mobile home about 80 feet northwest of the tree, and then impacted the ground 220 feet past the point at which it had initially impacted the tree. The initial ground impact point was on a magnetic heading of 300 degrees from the tree, and at the very beginning of the impact crater was a number of small pieces of the aircraft's windshield, some pieces of the windshield center support post, and one of its windshield wipers. The crater itself was about four feet wide, four feet long, and approximately eight to ten inches deep at its center. Approximately six feet outward on both sides of this crater where two smaller/shallower craters that clearly showed the impact outline of the aircraft's three-bladed propellers. The propeller from the right engine, which had sheared from its crankshaft, was imbedded in the crater on the southwest side of the track. The left propeller remained attached to its respective engine, and came to rest with the rest of the main wreckage. Examination of the propeller slash marks in the two craters showed that the blades of the left propeller rotated less than one-eighth of a revolution prior to exiting the soil, and the blades of the right propeller

rotated approximately one-quarter of a revolution before coming to a stop.

Except for the outboard section of the left wing, and the right propeller imbedded in the crater, all other primary structural components of the aircraft came to rest in the inverted position about 260 feet past the initial point of impact with the tree. Except for the horizontal stabilizers and the elevators, the majority of the aircraft structure had either been consumed by the post-impact fire, or suffered extensive thermal damage. The left main landing gear was determined to be in the fully extended position, but the position of the right main gear and the nose gear could not be determined due to impact and thermal damage. The left flap actuator showed two jackscrew threads exposed, which approximates an almost fully retracted position (fully retracted is zero threads exposed, and 15 degrees extended is 13 threads exposed). Thermal damage made it impossible to positively determine the position of the right flap. Flight control activation continuity could not be positively determined due to the extent of thermal damage, but the only clear evidence of failure in the flight control activation system was the overload failure of the cables leading to the separated outboard portion of the left wing.

After being removed from the accident site, both engines, as well as components of the fuel system, underwent further examination. The right engine and its accessory section had suffered extensive thermal damage, and its crankshaft could not be turned by hand. The engine was subjected to an extensive teardown inspection, to include splitting the case, removing all the reciprocating and rotational components, including the associated bearings. The internal examination revealed no anomalies, with the gear train intact and the camshaft free to rotate. All connecting rods were free to rotate, and there was no damage, unusual scarring, or abnormal deposits on the pistons or cylinder walls. The engine's propeller governor screen and the oil filter contained no contaminants, and its turbo-charger was free to rotate and showed no indication of pre-impact malfunction. Approximately one-half of the magneto was melted away, and no determination as to its functionality could be made. There was a one-half inch diameter round hole in the crankcase above cylinder number one. After splitting the case halves the pieces of metal that came from that location were located, and there was no evidence that those pieces had entered the case while the engine's reciprocating and rotational movements were still taking place.

The left engine underwent a partial disassembly, with the number one and number three cylinders being removed, and an internal visual and bore scope inspection taking place through the area where the cylinders had been mounted. As with the right engine, the accessory section of the left engine had suffered extensive thermal damage, and the magneto had been essentially destroyed by the fire. The left engine still had its propeller attached, and after the removal of the melted accessory section, the crankshaft, camshaft, and the gear train were able to be rotated. A number of the push-rods had been bent during the impact, but all of the individual valves were free to operate. There was no indication of internal mechanical failure or damage due to lack of lubrication. Both the oil filter and the propeller governor screen were found to be without contamination. The associated turbocharger had been deformed by heat, but once the interference between the deformed body and the impellers was removed, the impellers rotated freely. As with the right engine, all connecting rods were free to rotate, and there was no damage, unusual scarring, or abnormal deposits on the pistons or cylinder walls.

An inspection of the fuel selector valves from both the right and left systems determined that the right valve was on the inboard (main) tank, although not fully centered in that position. The left fuel selector valve was partially aligned with the inboard tank position. The right fuel

shutoff valve was determined to be between ON and OFF at the accident scene, but it moved very freely, and had become repositioned to the ON position by the time the wreckage arrived at the inspection/teardown facility. The left shutoff valve was in the ON position. The location where the cross-feed valve should have been located had melted and then hardened into a mass of aluminum slag, and the valve itself could not be positively distinguished from the remainder of the mass. Both the right and left continuous fuel pumps and both emergency fuel pumps were disassembled and inspected, and except for the damage caused from exposure to the extreme temperatures of the fire, there were no anomalies or indications of a malfunction in any of the pumps. The fuel injector throttle bodies and fuel metering units had been exposed to extreme heat, and upon disassembly it was determined that the non-metallic components from both left and right engine injection systems had melted or burned, but there was no indication of damage or failure of the metallic portions of the units. The injector nozzles on both engines were determined to be unobstructed.

All three blades of the right propeller were determined to be against their low-pitch stops, and only one of the blades showed direct chord-wise scarring, which was located along the most outboard portion of its span. Along the same portion of its leading edge were two very small indentations. This blade, as well as one other was bent back about 60 degrees in a fairly consistent arc along its entire span. The third blade showed no damage or scarring. The propeller spinner had been pushed almost straight back, taking on the contour of the propeller hub. The spinner's surface showed neither rotational twisting of its structure, nor rotational scarring of its paint or primer.

The left propeller was still connected to the end of the crankshaft, and two of the blades were against their low-pitch stops. The third blade had partially broken loose in the hub, and had rotated to a position normally associated with a feathered propeller. The outboard most eight to ten inches of one of the blades had melted in the fire, and the most outboard three inches of the blade in the feathered position had curled back past 90 degrees. All of the blades were bent aft about 40 degrees at a fairly constant arc along their entire span. None of the blades showed any discernable chord-wise scarring or leading edge indentations. Most of the spinner had melted away, but what remained did not display any circumferential scratching or scarring.

The spark plugs from both engines were examined, and there was no evidence of electrode shorting, excessive heat, unusual wear, excessive lead buildup, or contamination.

At the conclusion of the series of teardown inspections, tests, and evaluations of the aircraft, its engines, and its systems, no clear evidence had been found of any malfunction, failure, or anomaly that would have contributed to a loss of engine power.

ADDITIONAL DATA AND INFORMATION

The aircraft's last recorded refueling prior to the flight was completed on Saturday morning, July 8, two days prior to the accident. On Friday night, July 7, Airpac Airlines faxed a fuel request to Galvin Flying Service requesting that the fuel tanks of four of their aircraft be topped off with 100LL aviation fuel. The annotation for both N27594 and N40ST included the abbreviation "INBD/OUTBD," indicating that both the inboard and outboard tanks were to be topped off. According to the records of Galvin Flying Service, N40ST was topped off with 66.8 gallons of 100LL aviation fuel. The recorded meter reading of the truck indicated 229510.7 prior to refueling, and 229577.5 after refueling.

As part of the investigation, a records review determined that the total flight time for the two-leg flight from Seattle, Washington to Portland, Oregon and back on July 7, the day before the last refueling, was 1.9 hours of total time, with 1.5 hours of that total being Hobbs (wheels up) time. Calculations were then made to determine approximately how much fuel should have been required to top the tanks off on July 8, if no other refueling had taken place after the aircraft departed Seattle (KBFI) on July 7. Airpac refueling records indicate that prior to that two-leg flight, the inboard and outboard tanks of N40ST had been full. Based upon Airpac's flight planning estimate of 240 pounds per hour fuel burn (approximately 41 gallons per hour), which is compatible with the fuel burn data in the Piper PA-31 Operators Manual, the aircraft would have burned a little over 360 pounds (62 gallons) during the two legs of the flight. That total is within five gallons of the total fuel used to top off the tanks the next morning (Saturday, July 8).

A further review of the refueling records of Galvin Flying Service determined that Airpac 16 was the sixth of twenty-five aircraft that received fuel from Galvin truck #1 from the last time that truck was filled until it became low on fuel and had to be refilled again. During that period of time 895 gallons of 100LL fuel were dispensed from truck #1 to these 25 aircraft. There were no reports of any of those aircraft experiencing engine or fuel system problems.

To investigate further the possibility of any other refueling, the records of both fuel vendors at Spokane International Airport were reviewed (Spokane Airways and XN Air, LLC). The period reviewed was the day before the accident flight, the day of the flight, and the day after the flight. The records for both the 100LL (reciprocating engine) aviation fuel and the Jet A (turbine engine) aviation fuel were reviewed. In addition, individuals responsible for the distribution of fuel at those operators were interviewed. There was no record of N40ST taking on any fuel from either of these operators during this period of time, and no one at either operator remembered fuel being provided to the subject aircraft.

As part of the investigation, the NTSB IIC requested that the Horizon Captain who had relayed transmissions from the pilot of N40ST to Seattle Center evaluate the demeanor of the accident pilot. According to the Horizon Captain, the pilot of N40ST spoke in a "normal voice," and maintained what seemed to him to be a "calm demeanor" throughout the entire sequence of events. He said that he detected nothing in the pilot's tone or delivery that made him think that the situation was especially serious. The only qualification to his statement was that he noticed the pilot's statement of the number of souls on board was brief, but he attributed that to the pilot getting busier as he got closer to the airstrip.

The aircraft was released to PAC Northwest, a representative of the owner, on August 8, 2006. At the time of the release, the wreckage was located at AvTech Services, LLC., in Maple Valley, Washington.

According to the autopsy performed by the Kittitas County Coroner, the cause of death of the pilot was due to an airplane accident, and the manner of death was accidental.

A forensic toxicology examination performed on samples from the pilot by the FAA's Forensic Toxicology Research Laboratory was negative for carbon monoxide and cyanide in the blood, and for ethanol in the urine. Azacyclonol (a metabolite of a common antihistamine) was detected in the urine, but not in the blood.

Pilot Information

Certificate:	Flight Instructor; Commercial	Age:	26, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land; Single-engine Sea	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	Toxicology Performed:	
Medical Certification:	Class 1 Without Waivers/Limitations	Last FAA Medical Exam:	11/01/2005
Occupational Pilot:		Last Flight Review or Equivalent:	06/01/2006
Flight Time:	1430 hours (Total, all aircraft), 102 hours (Total, this make and model), 1366 hours (Pilot In Command, all aircraft), 196 hours (Last 90 days, all aircraft), 61 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	Registration:	N40ST
Model/Series:	PA-31-350	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	31-7405183
Landing Gear Type:	Retractable - Tricycle	Seats:	2
Date/Type of Last Inspection:	06/01/2006, AAIP	Certified Max Gross Wt.:	7000 lbs
Time Since Last Inspection:	7 Hours	Engines:	2 Reciprocating
Airframe Total Time:	3646 Hours at time of accident	Engine Manufacturer:	Lycoming
ELT:	Installed, not activated	Engine Model/Series:	TIO-540-J2BD
Registered Owner:	Pioneer Leasing Inc.	Rated Power:	350 hp
Operator:	Airpac Airlines	Operating Certificate(s) Held:	On-demand Air Taxi (135)
Operator Does Business As:	Airpac Airlines	Operator Designator Code:	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:		Distance from Accident Site:	
Observation Time:		Direction from Accident Site:	
Lowest Cloud Condition:	Clear	Visibility	10 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	20 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	270°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:		Temperature/Dew Point:	16 °C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Spokane, WA (KGEG)	Type of Flight Plan Filed:	IFR
Destination:	Seattle, WA (KBFI)	Type of Clearance:	IFR
Departure Time:	1630 PDT	Type of Airspace:	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	47.248333, -121.178611

Administrative Information

Investigator In Charge (IIC):	Orrin K Anderson	Report Date:	06/27/2007
Additional Participating Persons:	Chuck Roberts; Spokane FSDO; Spokane, WA		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinquiry@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

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](#).