National Transportation Safety Board
Aviation Accident Final Report

Location:	NOVATO, CA	**Accident Number:**	LAX98FA106
Date & Time:	03/05/1998, 1905 PST	**Registration:**	N257NW
Aircraft:	Piper PA-31-350	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General Aviation - Positioning		

Analysis

The airplane was on a VFR dusk cross-country flight when it collided with the 1,500-foot level of a hill. Radar data showed the aircraft in a descent from 2,000 feet until radar contact was lost about 1,500 feet msl, with a final ground speed of 194 knots. The route taken by the pilot was about 5 miles west of the route that the company pilots routinely flew, but while crossing higher terrain, it was a more direct route to the destination. A company pilot flying a few minutes ahead of the accident flight reported it was necessary to descend to between 1,200 and 1,500 feet msl in order to maintain VFR. A low-pressure system approaching the area from the west had resulted in low stratus, rain, and fog. At the time of the accident, a nearby weather reporting facility reported a 1,300-foot broken ceiling with 5- to 6-mile visibility in light rain and mist. On the evening of the accident, the pilot was scheduled to give a speech as her final examination in an evening college course. She had informed the instructor that she might be late, but had been told that he could not hold the class past its scheduled dismissal time to accommodate her late arrival.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot's failure to maintain adequate terrain clearance after initiating a descent over mountainous terrain at night and under marginal VFR conditions. The pilot's self-induced pressure to arrive at class with enough time remaining to take the final examination was a factor in the accident.

Findings

Occurrence #1: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT

Findings
1. LIGHT CONDITION - DUSK
2. (F) WEATHER CONDITION - LOW CEILING
3. (F) TERRAIN CONDITION - RISING
4. TERRAIN CONDITION - MOUNTAINOUS/HILLY
5. (C) CLEARANCE - NOT MAINTAINED - PILOT IN COMMAND
6. (F) SELF-INDUCED PRESSURE - PILOT IN COMMAND

Factual Information

HISTORY OF FLIGHT

On March 5, 1998, about 1905 hours Pacific standard time, Airpac Flight 263, a Piper PA-31-350, N275NW, collided with trees and terrain near Novato, California. The aircraft was destroyed and the airline transport rated pilot, the sole occupant, received fatal injuries. The aircraft was being operated by Airpac Airlines, Inc., as a positioning flight under 14 CFR Part 91 when the accident occurred. The aircraft departed Santa Rosa, California, at 1848. Marginal visual meteorological conditions prevailed at the departure airport and no flight plan was filed.

The airplane was part of a flight of two company aircraft that departed the Sonoma County airport en route to the Oakland Metropolitan International airport. Airpac Flight 1961 was in the lead and Airpac Flight 263 was in trail, about 1 minute behind. The pilot of Flight 1961 stated that they were both navigating by a combination of dead reckoning and pilotage. They both had VOR navigation aids on their routes of flight that could be used to verify their positions and monitor progress.

During the flight, the pilot of Flight 1961 radioed the pilot of Flight 263 and asked about her progress. She reported that she was "still back here." Later, while he was about 20 miles north of the Oakland airport, he began to encounter instrument meteorological conditions. He called to advise the accident pilot, but this time he was not successful in establishing radio contact. Flight 1961 landed at the Oakland airport at 1920.

When Flight 263 did not arrive, the flight was reported overdue and a missing aircraft report was issued. At 0148 on March 6, a U.S. Coast Guard search and rescue helicopter, homing on an ELT signal, located the wreckage near the northern crest of a hill. The accident site was approximately 1,500-feet mean sea level (msl), about 40 miles north of San Francisco.

The pilot of Flight 1961 reported that the accident site was about 5 miles west of the route that Airpac pilots routinely flew between Santa Rosa and Oakland. While the westerly route is a more direct course to Oakland, it does, however, cross higher terrain. The pilot of Flight 1961 also reported that during the flight he found it necessary to descend between 1,200 and 1,500 feet msl in order to maintain VFR conditions.

PILOT INFORMATION

The chief pilot reported that the pilot had flown between Santa Rosa and Oakland 2 to 3 times a week for the past 2 years. A review of her training records showed a Part 135 check dated September 19, 1997, and revealed that she had successfully passed a flight check in the aircraft and route flown as single pilot IFR. No training deficiencies or weaknesses were recorded in her file.

On the evening of the accident, she was scheduled to give a speech as her final examination in an evening college course. She had informed the instructor that she might be late, and had been told that he could not hold the class past its scheduled dismissal time to accommodate her late arrival.

AIRCRAFT INFORMATION

Both altimeters on the accident aircraft were set to 29.69 inHg. The current altimeter setting at 1850 at the departure airport was 29.78 inHg. Since each .01 equals 10 feet, an error of this

magnitude and direction would cause the altimeter to indicate that the aircraft was 90 feet higher than it would be with the current setting.

The aircraft records reflected a current pitot-static system check.

The aircraft had last been refueled on the day of the accident. The fuel log shows that it was filled with 92.8 gallons of 100LL aviation fuel by truck No. 2 at the Hayward Jet Center, Hayward Air Terminal, Hayward, California. The operator estimated that 70 gallons were onboard at the time of the accident.

METEOROLOGICAL CONDITIONS

The 2100 surface analysis chart showed a low pressure approaching the coast from the west. The 1904 Weather Surveillance Radar showed returns of 5 to 25 dBZ or video integrator processor (VIP) level 1 thunderstorm (weakest of 5 levels). At the time of the accident, Napa (APA) the nearest reporting station, reported a 1,300-foot broken ceiling with 5- to 6-mile visibility in light rain and mist.

Sun and moon illumination tables for the time and location of the accident reported nautical twilight with 58 percent moon illumination at an altitude of 69.3 degrees above the horizon.

AIDS TO NAVAGATION

The navigation radios, NAV 1 and 2, were set to 116.80 and 116.60. Oakland visual omni range tactical air navigation (VORTAC) is 116.80; however, 116.60 does not correlate to any very high frequency (VHF) navigational aid in the area. The omni bearing selector (OBS) settings were destroyed on both NAV radios.

The automatic direction finder (ADF) was set to 341 which is the frequency for the RORAY nondirectional beacon (NDB) locator middle marker (LMM). RORAY is associated with the OAK instrument lading system (ILS) 27R approach.

These NAVAIDS were reported to have been in service at the time of the accident. The aircraft maintenance records indicated that all navigation radios were serviceable.

COMMUNICATIONS

The only radio communication reported from the accident pilot was in response to a request for an en route progress check from the pilot of Flight 1961.

The communication radios, COM 1 and 2, were set to the Sonoma County airport tower frequency and the company frequency, respectively.

The pilot had last used the Sonoma County tower frequency on her departure and the company frequency while en route. The aircraft maintenance records indicated that both communication radios were serviceable.

WRECKAGE AND IMPACT INFORMATION

The accident site was located in an area of fully-grown oak trees. The geographic location was 38 degrees 9.19 minutes east latitude and 122 degrees 35.48 minutes west longitude, about the 1,500-foot level of Mount Burdell. The wreckage distribution was along a bearing of 144 degrees and extended about 300 feet from the initial point of impact to the main wreckage. A survey of the debris field revealed that all of the major flight control components were present at the accident site.

The trees on the northwest end of the accident site exhibited a series of broken limbs of up to 10 inches in diameter. The width of the initial swath through the trees was consistent with the tip-to-tip wingspan of the aircraft.

A section of the left wing was found to the left side of the swath near the initial impact point. The aileron was attached and the counterweight was in place. The wing had separated outboard of the fuel tank near the outboard flap hinge.

On the right side of the swath a section of the right wing was found, also near the initial impact point. The section was 3 feet in length measured inboard from the wingtip. A few feet beyond another section of the right wing with the right fuel tank and outboard engine nacelle were found.

The empennage was located about 50 feet beyond the initial impact point. Found nearby was one blade from the left propeller, two propeller hub springs, a "do not push" placard, and a section of burned wing tank with the fuel sender float still attached. Although the tank was sooted, the metal structure did not exhibit any evidence of heat distress.

The majority of the right horizontal stabilizer remained attached to empennage with the elevator and trim tab in place. The major portion vertical and rudder also remained attached and exhibited leading edge crushing. The upper section of the vertical and rudder had separated. A portion of the left horizontal and elevator remained attached to the empennage. The left horizontal had separated about 2 feet outboard of the tip. At the point of separation the spar was bent aft.

The next 5 feet of the left wing contained the left main landing gear assembly in the "up" position. Wing walk material partially covered the upper skin.

The cabin and fuselage section came to rest inverted about 75 feet forward of the tail section. It exhibited extensive crushing and fragmentation. Numerous fragments could be seen along the debris path extending forward from the tail section. Evidence of a ground fire was found that had consumed portions of the remaining structure.

The throttle, mixture, and propeller levers were found in the aft position. The electronic trim indicators were both at bottom of their scales. The fuel control panel was still attached to the cabin. The left selector was found in the "inboard" tank position, the right fuel lever was found between the "off" and "inboard" tank detents, and the cross-feed valve was found in the "off" position. Both cross-feed lockout levers were examined. The first lever was bent while the second was secure.

The electrical circuit panel had been destroyed by fire. The master switch was found in the "on" position.

A fuel gage cluster had separated from the aircraft and was in the debris path between the fuselage and the empennage. The left and right fuel gauges read about 0.5 to 0.75 full. The ammeter was reading about plus 5 amps.

The inboard section of the right wing with the engine nacelle still attached and right main landing gear partially extended was found leaning against a tree. The nacelle exhibited evidence of ground fire.

The left front seat was separated from the aircraft. The seat exhibited downward crushing and the seat back was bent aft. The seat belt was attached to the seat frame although the webbing

was distorted and torn. The shoulder harness was separated about 6 inches from the buckle. The webbing was torn, stretched, and distorted at the point of separation.

The right seat was also separated from the aircraft. The shoulder harness did not appear stretched or distorted.

The left engine was separated from the airframe and was found on the left side of the primary debris path. The accessories, baffles, propeller, and induction system had separated from the case, although portions of the exhaust system were still attached. There was no evidence of catastrophic mechanical malfunction/separation. The No. 2 cylinder rocker box casting was damaged and the two valves were protruding from their respective ports without support.

An attempt to hand-rotate the crankshaft was unsuccessful. The rocker covers from the No. 1, 3, 5, 4, and 6 cylinders were removed to examine the rocker assemblies. The cavities were free of foreign debris and showed indications of lubrication.

The turbocharger impellers and spark plug electrodes were undamaged.

The propeller governor was separated from the engine and exhibited fractures at the point it separated from its mounting pad. Control system continuity could not be determined. The gasket and screen were destroyed.

The single drive magneto was separated from the engine and exhibited fractures in the area of its mounting lobes. The engine timing could not be determined and the magneto could not be tested. The drive was saftied and secure.

The fuel injection servo remained attached to its mounting pad on the plenum casting. The plenum, itself, exhibited multiple fractures. Control continuity could not be determined. The throttle and mixture control cables were severed but the rodends were still attached to the servo arms.

The injector nozzles were present at each cylinder but exhibited evidence of impact damage.

The engine-driven fuel pump remained attached to its mounting pad that itself had separated from the accessory section.

The exhaust system showed evidence of crushing and bending. The pipes remained attached at each cylinder and the clamps were snuggly attached. The exhaust bypass valve was undamaged. The differential controller was destroyed. The exhaust system gas path coloration was unremarkable.

The left 3-bladed constant speed propeller was found along the left side of the debris path with 1 blade detached. The separated blade was found in the vicinity of the initial impact point. The propeller was separated from the engine and the propeller hub was fractured. A portion of the hub remained attached to the crankshaft flange. All three blades were equipped with de-icing boots.

The right engine was separated from the airframe and was also found on the left side of the primary debris path. The accessories, baffles, propeller, and the complete induction system had separated from the case. The engine case still had portions of the exhaust system attached. The case was separated near the front exposing the crankshaft, camshaft, and connecting rods for the forward cylinders. The camshaft was separated aft of the No. 2 cylinder exhaust lobe. The No. 1 cylinder exhibited impact damage and was partially displaced. The No. 6 cylinder exhibited impact damage in the area of the rocker box casting. There was no evidence

catastrophic mechanical malfunction.

An attempt to hand-rotate the crankshaft was unsuccessful. The rocker covers from the No. 1, 3, 5, 2, and 4 were removed to examine the rocker assemblies. The cavities were free of foreign debris and showed indications of lubrication.

The turbocharger impellers and spark plug electrodes were undamaged.

The propeller governor was separated from the engine and exhibited fractures at the point it separated from its mounting pad. Control system continuity could not be determined. The gasket and screen were destroyed.

The single drive magneto was separated from the engine and was destroyed. The engine timing could not be determined and the magneto could not be tested. The drive was saftied and secure.

The fuel injection servo was separated from the engine and had been destroyed. The data plate was missing and was not recovered. Control continuity could not be determined. The throttle and mixture control cables were severed and the control arms were detached.

The injector nozzles were present at each cylinder but exhibited evidence of impact damage. The engine driven fuel pump was not recovered.

The exhaust system showed evidence of crushing and bending. The pipes remained attached at each cylinder but were distorted. The clamps were secure at each location. The exhaust bypass valve was undamaged. The differential controller was destroyed. The exhaust system gas path coloration was unremarkable.

The right 3-bladed constant speed propeller was found near the main fuselage with all 3 blades attached to the hub. The propeller was separated from the engine and the propeller hub was fractured. A portion of the hub remained attached to the crankshaft flange. All three blades were equipped with de-icing boots.

The three blades exhibited various combinations of S-bending, torsional twisting, midspan bending and curling with leading and trailing edge damage. Of the three blades, two were turned in the hub while one was found at low pitch.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was conducted on March 6, 1998, by the Marin County Coroner's Office, with specimens retained for toxicological examination. The toxicological tests were negative for alcohol and all screened drug substances.

FIRE

Evidence of ground fire was found most notably in the area of the right wing and fuselage.

TESTS AND RESEARCH

Utilizing radar data provided Federal Aviation Administration Quality Assurance office a radar plot was generated depicting profile altitude and distance information. Radar data showed the aircraft as it departed Santa Rosa and climbed to about 2,000 feet msl. It maintained 2,000 feet plus or minus 100 feet until beginning a descent. The last three returns showed the aircraft in a descent from to 2,000 feet until radar contact was lost about 1,500 feet msl. During the last three returns, the aircraft traveled about 1.94 nautical miles. Radar returns are

sequenced once every 12 seconds.

ADDITIONAL INFORMATION

The aircraft wreckage was released to Peter Gordon of the Thomas Howell Group, a representative of the registered owner on April 21, 1998.

Pilot Information

Certificate:	Airline Transport; Commercial	**Age:**	33, Female
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	08/05/1997
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	4300 hours (Total, all aircraft), 63 hours (Last 90 days, all aircraft), 23 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N257NW
Model/Series:	PA-31-350 PA-31-350	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	31-7952014
Landing Gear Type:	Retractable - Tricycle	**Seats:**	2
Date/Type of Last Inspection:	02/12/1998, AAIP	**Certified Max Gross Wt.:**	7045 lbs
Time Since Last Inspection:	3 Hours	**Engines:**	2 Reciprocating
Airframe Total Time:	6881 Hours	**Engine Manufacturer:**	Lycoming
ELT:	Installed, activated, aided in locating accident	**Engine Model/Series:**	TIO-540-J2BD
Registered Owner:	AIRPAC AIRLINES, INC.	**Rated Power:**	350 hp
Operator:	AIRPAC AIRLINES, INC.	**Operating Certificate(s) Held:**	On-demand Air Taxi (135)
Operator Does Business As:		**Operator Designator Code:**	APCA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	**Condition of Light:**	Dusk
Observation Facility, Elevation:	STS, 125 ft msl	**Distance from Accident Site:**	24 Nautical Miles
Observation Time:	1950 PST	**Direction from Accident Site:**	317°
Lowest Cloud Condition:	Unknown / 0 ft agl	**Visibility**	5 Miles
Lowest Ceiling:	Broken / 3000 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	330°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	6°C / 5°C
Precipitation and Obscuration:			
Departure Point:	SANTA ROSA, CA (STS)	**Type of Flight Plan Filed:**	None
Destination:	OAKLAND, CA (OAK)	**Type of Clearance:**	None
Departure Time:	1850 PST	**Type of Airspace:**	Class G

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:**	

Administrative Information

Investigator In Charge (IIC):	ROBERT R CRISPIN	**Report Date:**	06/22/2000
Additional Participating Persons:	RICHARD M BROWN; OAKLAND, CA MARK W PLATT; VAN NUYS, CA CHARLES R LITTLE; CHINO HILLS, CA		
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 pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		