National Transportation Safety Board
Aviation Accident Final Report

Location:	ESTACADA, OR	**Accident Number:**	SEA96FA061
Date & Time:	02/16/1996, 0746 PST	**Registration:**	N5198J
Aircraft:	Cessna 402B	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled		

Analysis

Shortly after reaching a cruising altitude of 9,500 feet, the aircraft's course was observed on radar to change from southeasterly to southwesterly. Its average ground speed decreased from 170 knots to 108 knots during this track change. The pilot called ATC with his call sign, and about five seconds later, an unintelligible, one-second-long transmission was heard. At that same time, radar information showed the aircraft at 8,800 feet. Radar and radio contact were lost shortly thereafter. Three days later, wreckage was found where the aircraft had crashed. The crash site was 1,820 feet above sea level and 1/2 mile south-southwest of its last observed radar position; the aircraft's average descent angle from the 8,800-foot-altitude position to the crash site was about 51 degrees. The aircraft was extensively damaged during impact. No damage was noted on tall trees that surrounded the accident site. Also, no preimpact mechanical malfunction or failure of the aircraft or engines was found, and no pre-accident impairment of the pilot was found.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: loss of aircraft control for undetermined reason(s).

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: CRUISE

Findings
1. (C) REASON FOR OCCURRENCE UNDETERMINED

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

HISTORY OF FLIGHT

On February 16, 1996, approximately 0746 Pacific standard time, a Cessna 402B, N5198J, operated by Sports Air Travel, Inc. of Troutdale, Oregon (d/b/a West Coast Air Cargo) as West Coast flight 1420 (WCC1420), was lost from radio and radar contact with Seattle Air Route Traffic Control Center (ARTCC) while on a 14 CFR 135 non-scheduled domestic cargo flight from Troutdale to Redmond, Oregon. The wreckage of N5198J was found 27 nautical miles southeast of the Troutdale airport, in the Mt. Hood National Forest southeast of Estacada, Oregon, on February 19. The aircraft was destroyed and the airline transport pilot, who was the airplane's sole occupant, was fatally injured. Visual meteorological conditions had been forecast for the accident area, and were reported at Troutdale, at the time of the accident. The airplane was on a visual flight rules (VFR) flight plan.

According to the FAA's air traffic control (ATC) record of the accident, the aircraft departed Troutdale at 0735 and checked on to the Seattle ARTCC sector 5 frequency at 0740, reporting out of 5,800 feet for a final altitude of 9,500 feet. After the controller acknowledged this transmission, there were no further communications between WCC1420 and ATC for the next six minutes. During this time, Seattle ARTCC radar tracked the aircraft in a steady climb to 9,500 feet on a southeasterly course toward Redmond. According to National Track Analysis Program (NTAP) radar data provided by Seattle ARTCC, the aircraft reached 9,500 feet at 0745:38 and continued southeast for the next 24 seconds. The aircraft's track symbol changed from a secondary return to a correlated primary return (no altitude reported) at 0746:02.

At 0746:09, the pilot radioed to Seattle ARTCC, "seattle [sic] westcoast uh fourteen twenty." The controller told the pilot to go ahead. At 0746:14, an unintelligible transmission of approximately one second's duration was recorded. At the same time (0746:14), a secondary return was observed from the aircraft, at 8,800 feet, about 1/2 mile southwest of the 1546:02 correlated primary return. Based on the straight-line distance and time between NTAP radar positions, the plot-to-plot average ground speed decreased from 170 knots, between 0745:50 and 0746:02, to 108 knots between 0746:02 and 0746:14. The aircraft's gear-up/flaps-up, zero bank angle, idle power stall speed at 6,300 pounds gross weight, according to the Cessna 402B owner's manual, is 83 knots calibrated airspeed (KCAS) and its single-engine minimum control speed (Vmc) is also 83 KCAS. (NOTE: 83 KCAS corresponds to a true airspeed of 96 knots in standard atmospheric conditions at 9,500 feet). The aircraft's last NTAP radar position was a correlated primary return (no altitude reported) at 0746:26, about 1 mile west of the 0746:14 return. There was no further communication with WCC1420.

The Seattle ARTCC controller subsequently attempted to re-establish radio contact with WCC1420 using several airborne aircraft in the vicinity as radio relays, all without success. He also asked these aircraft to listen for an emergency locator transmitter (ELT) signal on 121.5 MHz, again with negative results. A search was then initiated, but the aircraft wreckage was not located until February 19th. The crash site was 1,820 feet above sea level and was about 1/2 nautical mile south-southwest of the 0746:26 final NTAP radar position. Based on the straight-line, point-to-point horizontal distance traveled versus altitude lost from the 0746:14 radar position to the crash site, the average descent angle from that position to the crash site was calculated to be 50.9 degrees from the horizontal.

The accident occurred during the hours of daylight at 45 degrees 11.0 minutes North and 122

degrees 3.1 minutes West.

PERSONNEL INFORMATION

According to company training records, the pilot received his initial 14 CFR 135 training from Sports Air on the Cessna 310 aircraft on January 8, 1992. His most recent 14 CFR 135 pilot proficiency check was three days before the accident, in a Cessna 402. The check was satisfactory, with satisfactory performance of steep turns, approaches to stalls, specific flight characteristics, powerplant failure, and instrument procedures among the flight maneuvers documented as being evaluated. According to copies of the pilot's payroll records furnished by the operator, the pilot was on the last duty day of a 5-day on/2-day off duty cycle, and had logged 11 hours of rest (from 1945 to 0645) prior to starting duty at 0645 on the day of the accident. The pilot logged 13 hours of duty (0645 to 1945), with 11 hours rest, during each of the previous four days.

AIRCRAFT INFORMATION

The aircraft, a 1975 model, had been operated by Sports Air for approximately the past 10 years. Based on total time at the aircraft's last inspection (as recorded in the aircraft logbook) and hours reported flown by the operator since this inspection, the aircraft had approximately 10,024 hours total time at the time of the accident. Recent major maintenance actions documented in the aircraft logbook included removal and replacement of the right propeller four days before the accident, and removal and replacement of the vertical tail the previous December. Sports Air and its FAA principal maintenance inspector (PMI) also stated that certain elements of Cessna's Model 400 Series Piston Engine Aircraft Continued Airworthiness Program (Cessna document number D5305-2-13), which recommended additional inspections for the accident aircraft, had been incorporated by the FAA PMI into Sports Air's FAA-approved maintenance requirements.

According to the engine logbooks, the right engine, a Continental TSIO-520-E, had 1,836.1 hours since major overhaul at its last inspection, a 100-hour inspection on February 9, 1996. The manufacturer's recommended time between overhauls (TBO) for the engine is 1,400 hours. Sports Air and its FAA principal maintenance inspector (PMI) both stated that Sports Air was operating the engines with an FAA-authorized TBO extension to 2,000 hours, subject to additional maintenance and inspection requirements including engine oil samples at 50-hour intervals. Since June 1994, all six right engine cylinders had, at various times, been documented as being removed and replaced for low compression, cracks, or bad exhaust valves.

According to the operator, the aircraft departed Troutdale with 100 gallons of fuel in the main tanks, 63 gallons of fuel in the auxiliary tanks, 250 pounds of cargo in cargo area A, 150 pounds of cargo in cargo area B, 125 pounds of cargo in cargo area C, and 25 pounds of cargo in cargo bay B. The cargo consisted primarily of bank documents such as canceled checks. The takeoff gross weight reported by the operator was 5,973 pounds. The aircraft's maximum takeoff gross weight is 6,300 pounds. Based on the loading reported by the operator, the aircraft center of gravity was computed at 157.25 inches aft of datum, with an acceptable range of 149.9 to 160.1 inches.

METEOROLOGICAL INFORMATION

The 0746 Troutdale surface observation reported scattered clouds at 10,000, 15,000, and 25,000 feet with 40 miles visibility. The operator reported that the pilot obtained a weather

briefing via company DUATS prior to departure.

WRECKAGE

The aircraft wreckage was examined at the accident site on May 1, 1996. The accident site was located near the bottom of an approximately 700-foot-deep river gorge, on steeply sloping terrain in a remote, heavily wooded wilderness area. The slope at the top of the wreckage area was measured at 37 degrees. The top of the accident area was at an elevation of approximately 1,820 feet above sea level, with the bottom being at approximately 1,720 feet elevation. The wreckage area was on a northwest facing slope, just east of the confluence of the Roaring River and the South Fork of the Roaring River.

At the top of the accident area were three roughly circular ground craters, all approximately 1 foot deep. The upper and lower craters were 5 feet in diameter while the middle crater was 4 feet 4 inches in diameter. The three craters were not aligned; rather, the lines joining the center of the middle crater and the centers of the two end craters formed a "V". The angle formed at the "V" was about 107 degrees. The distance from the middle of the center crater to the lower end crater's center was approximately 6 feet 7 inches, and the distance from the middle of the center crater to the upper end crater's center was about 7 feet 5 inches. By comparison, the distance between the propeller centers on the Cessna 402B is approximately 15 feet 5 inches, and a front view of the aircraft shows the engines and nose to be aligned on a line parallel to the airplane's lateral axis. The propeller arc diameter is 6 feet 4.5 inches. Trees in the area were approximately 150 feet tall, and no trees in the wreckage area (including those immediately surrounding the three ground craters at the top of the area) were observed to be broken.

The aircraft was broken up into numerous sections and its cargo was scattered throughout the entire wreckage area. All wreckage located was within an area approximately 75 yards long and 50 yards wide. The majority of the aircraft wreckage was distributed along a track oriented directly down the slope from the three ground craters at 310 degrees magnetic in the top half of the wreckage path, shifting to 320 degrees magnetic in the bottom half. Pieces of the aircraft including sheet metal fragments, wing tip fuel tank structure, fuel pump and landing light were also found in a sector extending 270 to 285 degrees magnetic from the three ground craters. The oxygen cylinder, combustion heater, all three landing gear, portions of both main (wingtip) fuel tanks, both engines, all six propeller blades, and the empennage were all found at the accident site. All of these components were lying loose and were not attached to the airframe. The oxygen cylinder, which is normally installed transversely in the nose of the aircraft, was fractured approximately two-thirds of the way around its long axis, with the two halves of the cylinder remaining attached to each other along one side, and split open approximately 180 degrees such that the two opposite halves of the cylinder were approximately in plane with one another.

Both engines were themselves broken up into multiple sections. All six propeller blades had broken out of their hubs. The individual blades were distributed throughout the wreckage area; two of the left propeller blades were located relatively close to the left engine remnants (one of these was located underneath the largest section of the left engine), whereas the three right propeller blades were scattered widely throughout the wreckage area and located further from the right engine remnants. The largest readily identifiable portions of the airframe, which were located in the following order proceeding down-slope, consisted of: a fuselage section with the instrument panel attached by control cables; a section of the top of the cabin; a section

of inboard rear wing spar with flap; a section of the rear cabin lower structure approximately 5 feet square; and the empennage. The empennage was found standing vertically in a forward-end-down position. The bottom of the wreckage area was defined by a right propeller blade on a fallen tree at the bottom of the slope.

In a reconstruction and re-examination of the aircraft wreckage conducted at the facilities of HLM Air Services, Inc., Independence, Oregon, on September 25-26, 1996, investigators made additional observations regarding the aircraft wreckage. It was noted that the front and rear wing carry-through spars exhibited deformation and fracture in an upward (positive-G) direction. The rear carry-through spar was fractured in two at a point approximately 7 inches inboard of where the spar passes out of the right side of the fuselage. Inboard of this fracture, the top spar cap was bent upward at approximately a 20-degree angle, and the spar web torn through, to about the aircraft centerline.

The aileron bellcrank, which normally mounts to the front side of the rear carry-through spar web on the aircraft centerline, was missing from the spar. Only the portion of the aileron bellcrank which connects to the ailerons could be located in the wreckage; the portion which connects to the control yoke was broken away and was not located. The aileron bellcrank section was missing the forward left aileron cable. The ends of the other three cables were connected to the bellcrank and the cable ends were broken or cut.

On the front carry-through spar, the left wing upper attach bolt, still in place, had an approximate two-inch section of the left wing spar bolted into place, with the 2-inch-long left wing spar section rotated upward 66 degrees relative to the carry-through spar axis. This section of left wing spar was tightly in place and could not be rotated by manual force. The spar web was missing from the center of the front carry-through spar, and the front carry-through spar was bowed upward to about a 29-degree angle from the aircraft centerline to the spar exit point from the left side of the fuselage. The left horizontal stabilizer outboard leading edge was observed to be fractured in a downward direction. Approximately the outboard 3 feet of the left horizontal stabilizer spar was also buckled aft.

FIRE

Numerous aircraft components had burn damage. There was also burn damage on the ground and vegetation in multiple areas of the accident site. The right horizontal stabilizer leading edge had a burn-through area at the stabilizer root. This area was about 2 feet wide and extended aft into the leading edge for about 2 feet. The ground underneath this burn-through area at the accident site was itself burned, and slag was present on the ground underneath the burn-through area. The right horizontal stabilizer spar was burned/melted through; molten ends of the burned/melted-through portion of the spar had cooled into sharp points which pointed downward toward the ground (in a forward direction along the aircraft longitudinal axis.)

No soot shadowing behind rivets, streamlined burn patterns, or aluminum broomstrawing was observed on any wreckage components.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was conducted by the Oregon State Medical Examiner's Office, Portland, on March 12, 1996. The autopsy report gave the cause of death as multiple fractures and internal injuries. Toxicology tests were not performed due to lack of suitable specimens.

SURVIVAL ASPECTS

A search was initiated when communication with WCC1420 could not be re-established following the disappearance from radar contact. A medical examiner's report of the event stated that a "weak locator beacon was received but it was of little assistance in locating the site." The medical examiner's report stated that an Air National Guard rescue helicopter and the Civil Air Patrol checked an area of smoke and suspected broken treetops in the vicinity shortly after the disappearance, but initially determined that the crash site was not at that location. Air National Guard helicopter search crews returned to the same area three days after the disappearance, and spotted debris after noting a change in the color of the vegetation surrounding the site. There was no suitable helicopter landing area nearby at the time. The area was later confirmed as the crash site, and the pilot found dead at the scene, by ground rescue personnel. Photos of the ELT taken by investigators at the accident site showed the ELT loose in the wreckage and disconnected from its antenna.

TESTS AND RESEARCH

A copy of the Seattle ARTCC position R-05 frequency recording was sent to the NTSB Engineering and Computer Services Division in Washington, D.C. for a sound spectrum analysis of the aircraft's final radio call and the unintelligible one-second 0746:14 transmission. The Engineering and Computer Services Division reported that the transmissions' duration was too short to allow the analysis to be performed, and that no information could be obtained from the recording.

The aircraft's front and rear fuselage carry-through spars, and the aircraft's oxygen cylinder, were sent to the NTSB Materials Laboratory in Washington, D.C. for examination of the fracture surfaces. The Materials Laboratory reported that all fracture surfaces examined were indicative of overstress separation, with no evidence of pre-existing metal defects found.

ADDITIONAL INFORMATION

The aircraft wreckage was telephonically released to Mr. John Bensley of Northwest Aviation Claims, Portland, Oregon, on November 15, 1996. Mr. Bensley is the insurance adjuster for Sports Air Travel.

Pilot Information

Certificate:	Airline Transport	**Age:**	30, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane Single-engine; Instrument Airplane	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	03/07/1995
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	4600 hours (Total, all aircraft), 1600 hours (Total, this make and model), 4500 hours (Pilot In Command, all aircraft), 167 hours (Last 90 days, all aircraft), 60 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N5198J
Model/Series:	402B 402B	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	402B0885
Landing Gear Type:	Retractable - Tricycle	**Seats:**	2
Date/Type of Last Inspection:	02/09/1996, 100 Hour	**Certified Max Gross Wt.:**	6300 lbs
Time Since Last Inspection:	11 Hours	**Engines:**	2 Reciprocating
Airframe Total Time:	10024 Hours	**Engine Manufacturer:**	Continental
ELT:	Installed, activated, aided in locating accident	**Engine Model/Series:**	TSIO-520-E
Registered Owner:	SPORTS AIR TRAVEL, INC.	**Rated Power:**	300 hp
Operator:	WEST COAST AIR CARGO	**Operating Certificate(s) Held:**	Air Cargo
Operator Does Business As:	WEST COAST AIR CARGO	**Operator Designator Code:**	GLXA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	TTD, 35 ft msl	**Distance from Accident Site:**	27 Nautical Miles
Observation Time:	0746 PST	**Direction from Accident Site:**	307°
Lowest Cloud Condition:	Scattered / 10000 ft agl	**Visibility**	40 Miles
Lowest Ceiling:	None / 0 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	15 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	100°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	6°C / 2°C
Precipitation and Obscuration:			
Departure Point:	TROUTDALE, OR (TTD)	**Type of Flight Plan Filed:**	VFR
Destination:	REDMOND, OR (RDM)	**Type of Clearance:**	VFR
Departure Time:	0735 PST	**Type of Airspace:**	Class E

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:**	Unknown
Total Injuries:	1 Fatal	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	GREGG NESEMEIER	**Report Date:**	05/23/1997
Additional Participating Persons:	JERRY L BAAS; HILLSBORO, OR WILLIAM B WELCH; WICHITA, KS R. S BOYLE; ARVADA, CO		
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/.		