Aviation Investigation Final Report

Location:	PORTLAND, Oregon	**Accident Number:**	SEA98FA047
Date & Time:	March 19, 1998, 09:18 Local	**Registration:**	N600RA
Aircraft:	Aerospatiale SN-601	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	4 None
Flight Conducted Under:	Part 91: General aviation - Executive/Corporate		

Analysis

The cockpit voice recorder (CVR) recording indicated that the pilot was unable to start the right engine before takeoff, and elected to attempt takeoff with the right engine inoperative. Witnesses reported that the airplane's nose lifted off about 4,100 feet down the runway and that it then became airborne with its wings rocking, attaining a maximum altitude of 5 to 10 feet above the ground before settling back to the ground, departing the right side of the runway and entering an upright slide for about 1/2 mile. Investigators removed the right engine starter-generator from the engine after the accident and found the starter-generator drive shaft to be fractured. The aircraft has a minimum crew requirement of two, consisting of pilot and copilot; the copilot's seat occupant, a private pilot-rated passenger, did not hold a multiengine rating and thus was not qualified to act as second-in-command of the aircraft.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot-in-command's decision to attempt takeoff with the right engine inoperative, resulting in his failure to maintain directional control or attain adequate airspeed during the takeoff attempt. Factors included a fractured right engine starter-generator drive shaft, resulting in an inability to perform a normal engine start on the ground.

Findings

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

Findings
1. (F) ACCESSORY DRIVE ASSY,DRIVE SHAFT - FRACTURED
2. 1 ENGINE - INOPERATIVE
3. (C) OPERATION WITH KNOWN DEFICIENCIES IN EQUIPMENT - ATTEMPTED - PILOT IN COMMAND
4. LACK OF CERTIFICATION - COPILOT/SECOND PILOT
5. DIRECTIONAL CONTROL - NOT MAINTAINED - PILOT IN COMMAND
6. AIRSPEED - NOT ATTAINED - PILOT IN COMMAND

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

Factual Information

HISTORY OF FLIGHT

On March 19, 1998, at 0918 Pacific standard time, an Aerospatiale SN-601 Corvette, N600RA, owned by R. L. Riemenschneider Enterprises of Redmond, Oregon, and operated by Redmond Flight Center of Redmond, Oregon under contract to the aircraft owner, experienced a loss of control during an attempted takeoff from runway 10L at Portland International Airport, Portland, Oregon, and impacted signs, lights, and terrain on the airport property. The aircraft slid upright for approximately 1/2 mile following initial ground contact and came to rest on airport property southeast of the runway 10L departure end. The airplane, a transport-category aircraft equipped with two Pratt & Whitney Canada JT15D-4 turbofan engines and a seating configuration of two flight crew and 10 passenger seats, was substantially damaged in the occurrence. The commercial pilot-in-command and three passengers escaped the aircraft without injury; there was no qualified second-in-command aboard. The pilot reported to an on-scene FAA investigator that the flight was a 14 CFR 91 executive/corporate transport flight, and the flight was proceeding under visual flight rules (VFR) to Redmond, Oregon. Visual meteorological conditions prevailed at the time of the accident.

Recordings of Portland air traffic control (ATC) tower communications disclosed that the flight originally received an instrument flight rules (IFR) clearance to Hermiston, Oregon. After taxiing out from the parking ramp at Flightcraft, Inc. (a fixed-base operator [FBO] serving Portland International Airport), the pilot called Portland ground control and stated he wanted to return to Flightcraft. The aircraft was cleared to do so and returned to Flightcraft. In a post-accident interview with NTSB investigators on April 3, 1998, the pilot stated he did not know why he returned to Flightcraft after the initial taxi out.

Witnesses at Flightcraft reported that after returning to the Flightcraft ramp, the airplane shut down and opened its main entry door, and that one of the aircraft occupants told Flightcraft ground service personnel the aircraft had an engine problem. Witnesses reported that, at that time, they saw the pilot of the aircraft in the cockpit, talking on a cellular telephone (a cellular phone service record provided by the pilot revealed that a call was placed from his phone to the Redmond Flight Center at 0910; this call took place during a 3 minute and 22 second power interruption to the accident aircraft's cockpit voice recorder.) Flightcraft personnel reported that the pilot did not ask for any assistance from them after returning to the Flightcraft ramp, and that Flightcraft did not provide any assistance to the aircraft at that time. The witnesses reported that after returning to the Flightcraft ramp, the aircraft remained there for approximately 5 minutes, then started back up and taxied back out. In the April 3, 1998 interview with the NTSB, the pilot stated he could not recall what (if anything) was done to resolve the situation for which the airplane returned to Flightcraft. The witnesses stated they could not tell whether or not the airplane started both engines prior to taxiing back out.

After taxiing out from Flightcraft the second time, the pilot canceled his IFR flight plan to Hermiston with ATC, and requested and received a VFR clearance to Redmond, where the accident aircraft was based. In the April 3, 1998 NTSB interview, the pilot stated that the destination changed from Hermiston to Redmond because "something changed", but stated he did not know what changed to cause the change in destination. The Redmond Flight Center employee who took the 0910 cellular phone call from the pilot was contacted and told investigators that during that call, the pilot instructed him to prepare N37HB (a Piper PA-31T Cheyenne twin-engine turboprop airplane also owned by R.L. Riemenschneider Enterprises and operated by the Redmond Flight Center for that company) for flight.

Witnesses who observed the accident sequence from the Flightcraft ramp reported that the airplane's nose lifted off at about taxiway A4 (about 4,100 feet down the 8,000-foot runway), and that the airplane subsequently became airborne with its wings rocking, reaching a maximum altitude of about 5 to 10 feet above the ground. The Flightcraft witnesses, one of whom stated he had seen the accident aircraft operating out of Portland on previous occasions, remarked that the airplane seemed to be going much more slowly than usual at rotation, and seemed much quieter than usual during the takeoff attempt. The witnesses stated the aircraft subsequently settled back to the ground and entered an upright slide. The aircraft struck and demolished the A1 taxiway sign during the event. Immediately following the event, the pilot radioed the Portland tower on the ground control frequency, stating he had experienced an engine failure.

In an initial written statement to the on-scene FAA investigator immediately following the accident, the pilot stated: "[At] V1 started to rotate just lifted off when [right engine] failed causing enough yaw put aircraft back down tried to get control ran off runway surface, tried to keep aircraft as straight as possible, came to stop....Saw a [generator] light come on (R.H.) at time we started to rotate, I think the right [engine] failed at that time. Everything else was a [blur.]" In the April 3, 1998 NTSB interview, the pilot stated that during the takeoff attempt, everything was "going fine" until he pulled back on the wheel at rotation speed, and that the next thing he could recall was sitting in the grass. The pilot stated to NTSB investigators that he was not sure whether or not an engine failed on takeoff. The pilot reported that he used the takeoff flap setting for the takeoff (a modification incorporated to the accident aircraft also allows takeoffs with flaps at 0 degrees.)

One of the passengers was in the copilot's seat during the accident, but stated he did not perform any copilot duties. This passenger holds a private pilot certificate with an airplane single-engine land rating only, and as such did not meet the requirements specified by Federal Aviation Regulations (FARs) to act as second-in-command of the accident aircraft, which specify (among other requirements) that the second-in-command must hold appropriate category and class ratings for the aircraft. (The minimum flight crew for the SN-601 is two, consisting of a pilot and copilot.) This passenger, who was interviewed by telephone on March 24, 1998, stated he first noticed about halfway down the takeoff roll that the airplane was to the right of the runway centerline, and that "somewhere during the takeoff roll, we must have

lost power on one of the engines." He stated that the airplane subsequently went off the runway into the grass.

The two passengers seated in the rear of the aircraft did not answer requests by the NTSB to provide written statements describing the accident sequence.

The accident aircraft was equipped with a cockpit voice recorder (CVR). The CVR was removed from the accident aircraft and sent to the NTSB CVR Laboratory in Washington, D.C., where a transcript of the CVR recording was prepared. Pertinent details of the CVR transcript are presented in the FLIGHT RECORDERS section below.

The accident occurred during the hours of daylight at approximately 45 degrees 35.2 minutes North and 122 degrees 34.6 minutes West.

OTHER DAMAGE

During the accident sequence, the aircraft struck taxiway lighting, and struck and destroyed the A1 taxiway sign adjacent to Portland International runway 10L.

PERSONNEL INFORMATION

The pilot-in-command's business card identified him as the director of operations of the Redmond Flight Center (which was a 14 CFR 135 on-demand air taxi certificate holder; however, the accident aircraft was not listed on Redmond Flight Center's 14 CFR 135 operating certificate.) At the time of the accident, the pilot held a commercial pilot certificate with airplane single- and multiengine land ratings, an instrument-airplane rating, and an SN-601 type rating. He received his SN-601 type training through Royal Aviation of Mesa, Arizona, and completed the practical test for his SN-601 type rating in California in October 1997. The pilot also held a flight instructor certificate with airplane single engine and airplane multiengine ratings at the time of the accident. The pilot reported his flight experience as 4,500 hours total including 4,400 hours pilot-in-command, 3,000 hours multiengine, and 125 hours in type.

The occupant of the copilot's seat at the time of the accident held a private pilot certificate with an airplane single-engine land rating only, issued on June 26, 1991. The copilot's seat occupant submitted copies of his pilot logbook to the NTSB. Most entries in the submitted logbook excerpts were incomplete, but indicated that the copilot's seat occupant had logged approximately 615 hours of single-engine airplane time. Additionally, although he was not multiengine rated, the copilot's seat occupant had logged 17 hours of multiengine airplane time, including 5.0 hours of flight time in N37HB, the PA-31T Cheyenne aircraft also owned by R.L. Riemenschneider Enterprises. The most recent entry in the copilot seat occupant's pilot logbook was dated July 23, 1997.

AIRCRAFT INFORMATION

The accident aircraft (Aerospatiale SN-601, serial number 36) was manufactured in France in April 1978. The aircraft was originally operated under French registration, and subsequently operated under Mexican registration, prior to being imported into the U.S. in 1994 by R.L. Riemenschneider Enterprises. The aircraft entered the U.S. in July 1994 under a ferry permit with its original U.S. registration number, N601RC, at Montgomery Field, San Diego, California, where work was begun on the aircraft at Crownair, Inc. in order to obtain original U.S. airworthiness certification. Prior to this work being finished by Crownair, a decision was made by the aircraft owner to finish the work at a different facility, and the aircraft was issued a ferry permit to fly from Montgomery Field to Mesa, Arizona. The aircraft was flown to Mesa in December 1994, where the work required to bring the aircraft into compliance with its U.S. type certificate (number A37EU) was completed at Royal Aviation. Following a test flight for the purpose of demonstrating compliance and a conformity inspection by an FAA-designated airworthiness representative (DAR), an original U.S. transport-category standard airworthiness certificate was issued for the aircraft on May 1, 1995. The aircraft's registration number was changed to N600RA in August 1995. Daily aircraft time sheets supplied by the operator with the aircraft maintenance records indicated that as of March 14, 1998 (five days before the accident), the aircraft had 2,305.2 hours total time in service.

The aircraft was equipped with two Pratt & Whitney Canada (P&WC) JT15D-4 turbofan engines, each rated at 2,500 pounds sea-level takeoff static thrust. The aircraft records indicated that the installed engines (serial numbers PCE 70057 on the left and PCE 70078 on the right) were the original engines delivered with the aircraft when new. The right engine was overhauled by P&WC on June 23, 1994 at 1,782.3 hours and 1,624 cycles since new.

Each engine is equipped with a 10.5 kilowatt, 28.5 volts direct current (VDC) starter-generator driven through the engine high-pressure (N2) spool. The starter-generator installed on the accident aircraft's right engine bore a data plate identifying it as being manufactured by SEB of Boulogne-Billancourt, France, in July 1976. The data plate identified the unit as a type 8046-1, serial number 145. The most recent entry in the right engine log pertaining to starter-generator installation stated that on October 13, 1995, an overhauled starter-generator, serial number 77097A52, was installed on the right engine by Royal Aviation of Mesa, Arizona. There was no associated hours-in-service entry made with this logbook entry. The serial number 77097A52 referenced in this log entry did not match any numbers observed anywhere on the installed starter-generator.

The aircraft log indicated that the airplane was to be inspected and maintained in accordance with the manufacturer's (Aerospatiale's) recommended program, document number 601A.100.10F, in accordance with 14 CFR 91.409(f)(3). The referenced document, Aerospatiale's maintenance planning document (MPD) for the SN-601, gives requirements for A, B, and C (minor maintenance) and D (major maintenance) checks at specified intervals of flight hours and/or calendar months. According to the aircraft log, the most recent aircraft inspection was an A check, signed off by a Redmond Flight Center mechanic, on October 1, 1997 at 2,159.9 hours in service. Additionally, A, B, and C, and D inspections were signed off as complied with by the same Redmond Flight Center mechanic on March 15, 1997 (there was

no associated hours in service entry made with this signoff.) Based on comparison of these log entries with copies of the MPD inspection cycle supplied by the operator, the aircraft was in compliance with the MPD inspection cycle at the time of the accident and was due for A check not later than April 30, 1998 or 2,379.9 hours in service, and for B check not later than May 31, 1998.

The SN-601 MPD identifies the starter-generators as utilization limits items, with specific maintenance tasks including bearing replacement specified at 750-hour intervals. Additionally, there is a 1,200-hour time between overhauls (TBO) interval on the starter-generators. No service tracking records pertaining to any of the utilization limits items listed in the SN-601 MPD were found in the aircraft maintenance records supplied by the operator to investigators.

The aircraft records indicated that the accident aircraft was fitted with modification M.1382, which provided a maximum gross weight increase to 7,000 kilograms (15,432 pounds). The pilot reported a takeoff gross weight of 5,703 kilograms (12,573 pounds) including a fuel load at takeoff of 320 U.S. gallons, or 2,144 pounds.

Performance information in the SN-601 airplane flight manual (AFM) indicated that under conditions approximating those of the accident (airplane gross weight 5,700 kilograms or 12,569 pounds; temperature 10 degrees C or 50 degrees F; pressure altitude 0 feet; flaps at takeoff setting; 7 knots tailwind component; and anti-ice off), the following values of takeoff data existed: V1 (critical engine failure speed) 103 knots indicated airspeed (KIAS); VR (rotation speed) 109 KIAS; V2 (takeoff safety speed) 115 KIAS; and balanced field length 1,245 meters or 4,084 feet. The airplane's maximum nose gear steering speed is 70 KIAS, and its inflight minimum control speed (VMC) is 93 KIAS with flaps at takeoff setting and 110 KIAS with flaps at 0 degrees. Stall speed at a gross weight of 5,700 kilograms (12,566 pounds) is 97.5 KIAS with flaps at takeoff setting and 108 KIAS with flaps up.

Performance data in the AFM further indicated that under the takeoff conditions given above, and with failure of one engine at V1, the SN-601 is capable of a net climb gradient (defined as actual climb capability minus 0.8 per cent) of 4.5 percent during first segment (liftoff to 35 feet above the takeoff surface) with landing gear down, and 6.3 percent during second segment (35 feet above takeoff surface to 400 feet above takeoff surface) with landing gear up.

The minimum flight crew for the aircraft is two, consisting of one pilot and one copilot.

METEOROLOGICAL INFORMATION

The 0856 Portland hourly observation gave conditions pertinent to computation of takeoff performance as: winds from 300 degrees magnetic at 7 knots; temperature 11 degrees C (52 degrees F); and altimeter setting 30.07 inches Hg. Visual meteorological conditions were reported, and the pilot gave the runway condition as dry in his accident report.

AERODROME AND GROUND FACILITIES

Portland International runway 10L is an 8,000 by 150 foot grooved asphalt runway. The airport elevation is 27 feet above mean sea level (MSL), with both ends of runway 10L being 25 feet above MSL.

FLIGHT RECORDERS

The accident aircraft was equipped with a Fairchild model GA-100 CVR, serial number 1622, which was installed in the aft fuselage bay. An FAA aviation safety inspector from the Hillsboro, Oregon, Flight Standards District Office took possession of the CVR at the accident site. The CVR was then shipped to the NTSB CVR Laboratory in Washington, D.C., where a transcript of the last 23 minutes of the CVR recording was prepared. The exterior of the CVR showed no signs of impact damage, and no signs of any fire or heat damage were noted. The CVR laboratory reported that the CVR recording contained three channels of good quality audio information, consisting of one channel from the cockpit area microphone (CAM) and two channels of audio information obtained from the captain's and first officer's radio/hot mike intercom selector panels (HOT-1 and HOT-2, respectively.) The CVR transcript indicated that the sequence of events was recorded as follows.

At 0856, the pilot called Portland clearance delivery and requested and received an IFR clearance to Hermiston. The CAM then recorded sounds of an engine starting between 0857:56 and 0858:24. At 0900:24, the pilot called for taxi and received taxi clearance.

The CAM then recorded the sound of an engine starter being activated two times, at 0901:08 and again at 0902:15. At 0902:31, the copilot's seat occupant asked, "you startin' the right engine?" The pilot replied, "yeah tryin' to." The copilot's seat occupant then said, "right generator, right pressure." At 0904:07, the CAM recorded the sound of an engine starter being activated a third time.

At 0904:27, the pilot stated: "It's not runnin." The copilot's seat occupant replied, "at all", then said "fuel's on I take it." At 0904:53, the pilot called ground control and requested and received clearance to taxi back to Flightcraft.

At 0905:23, the copilot's seat occupant asked, "normally like in the Cheyenne when you start it you see the fuel spraying, you know it goes ch ch ch it's not even doing that is it?" The pilot replied, "nah uh, it's like we've got no starter." The copilot's seat occupant asked, "like the starter-generator maybe?" The pilot replied, "yeah." The copilot's seat occupant subsequently asked, "we've got two brand new ones on here don't we?" The pilot replied, "well I'd thought they'd replaced that one on the right." A discussion between the pilot and the copilot's seat occupant then ensued for approximately one minute (until 0906:51), consisting mainly of questions by the copilot regarding starter-generator system operation and the pilot's attempts to resolve the problem, and associated replies by the pilot. At 0908:28, the CAM recorded the sound of engine shutdown. Power was then interrupted to the CVR for approximately 3 minutes and 22 seconds, from 0908:41 to 0912:03.

At 0912:03, the CAM recorded the sound of an engine starter being activated a fourth time. The CAM then recorded the pilot saying, "nothin." The CAM then recorded the copilot's seat occupant saying, "that's that", and the pilot replying, "that's that." The CAM then recorded the pilot stating "hear it runnin' - it's not -", and the copilot's seat occupant asking, "what is it that's runnin?" The CAM then recorded the pilot replying, "well I think it's just the generator side it's not engaging the starter." At 0912:25, the CAM recorded the sound of an engine starter being activated a fifth time, then the copilot's seat occupant saying, "hmm." The CAM then recorded the sound of an engine starter being activated two more times, at 0912:39 and again at 0912:43. At 0912:46, power to the CVR was again interrupted, for approximately 16 seconds.

At 0913:02, the CAM recorded the sounds of engine starter and ignition being activated, and at 0913:12, the sound of an engine starting. The CAM then recorded one of the rear seat passengers asking, "do you have to compression start it?" The CAM then recorded the pilot's reply, "might be", and the sound of a laugh. At 0913:27, the pilot called ground control for taxi and received taxi clearance to runway 10L. At 0913:58, the pilot asked the ground controller to cancel his IFR clearance to Hermiston, and stated that he wanted VFR to Redmond.

At 0914:48, the CAM recorded an unidentified aircraft occupant asking, "did you get the right engine started?", and the pilot's reply, "no." The CAM then recorded an unidentified aircraft occupant asking, "are you gunna", and the pilot's reply, "I doubt it." The CAM then recorded an unidentified aircraft occupant asking, "(it's able to) fly on one engine isn't it?", and an unidentified aircraft occupant replying, "yeah." At 0915:00, the CAM recorded the sound of an engine starter being activated for the eighth time.

At 0915:06, the copilot's seat occupant asked, "why?" and the pilot replied, "well we're not going to get any were [sic] sittin' here." The copilot's seat occupant asked, "have some, we can have somebody bring the Cheyenne can't we?" At 0915:16, Portland ground control called the pilot and gave the pilot a VFR clearance to Redmond.

At 0916:00, the pilot said, "should be able to compression start it once it gets in the air." The copilot's seat occupant replied, "seriously?", and the pilot stated, "yeah." The copilot's seat occupant asked, "why would, why would you say that? I mean is there something that the air will do that you can't do here on the ground?" The pilot replied, "yeah it ah it turns the blades over." The copilot's seat occupant asked, "when will, when will you start it?" The pilot replied, "well we're gunna pull the ignition on as soon as we start ah as soon as we get rolling." (NOTE: The SN-601 AFM abnormal procedures section specifies that N2 RPM be greater than 50% for use of the immediate engine relight procedure, and the minimum airspeed in the normal relight envelope for a normal engine relight without starter is 200 KIAS.) At 0916:48, the pilot called the tower, stating he was ready for departure. The tower cleared the flight for takeoff on runway 10L at 0917:01.

The CAM recorded the sound of increasing engine noise at 0917:12. At 0917:46, the copilot's seat occupant said, "there's seventy." At 0918:03, the pilot said, "come on." Three seconds

later, at 0918:06, the CAM recorded the sound of a beeping horn starting; the beeping horn sound continued to the end of the recording. At 0918:10, the CAM recorded the start of a rumbling sound, which continued until the recording ended six seconds later, at 0918:16.

WRECKAGE

The airplane wreckage was examined at the accident site and on the parking ramp at Portland International Airport on March 19 and 20, 1998. Initial on-site examination revealed a 10 to 20 foot long skid mark going off the right side of runway 10L, at a point approximately 5,600 feet down the runway from the approach end. A series of scuff marks along with taxiway light debris was found on the A1 taxiway (at the departure end of runway 10L, to the right of the runway between the runway and parallel taxiway A), and the A1 taxiway sign, located northwest of and adjacent to the intersection of taxiways A1 and A, was completely demolished. The aircraft had come to rest on its belly approximately 1,100 feet southeast of the runway 10L departure end, approximately 1/2 mile from the initial skid mark observed on the runway.

Examination of the aircraft following the accident revealed the principal damage to the aircraft to be to its belly, both wing tip fuel tanks, and the leading edge of the right wing. The aircraft was otherwise largely undamaged. The landing gear and flaps were observed to be in the up position. The aircraft's elevator and rudder were found to be functional. The control wheels were bound in roll; the left aileron and spoileron had good movement but the linkage to the right aileron and spoileron was observed to be broken in the same general area of the wing as other right wing damage.

No significant external damage was noted to either engine. Both engines would rotate freely through 360 degrees by hand, with good N1 (fan to power turbine) rotational continuity and with no binding or unusual noises noted. Both engines contained an adequate quantity of clean oil. The right engine inlet was observed to have grass in the fan and grass seed in the bypass duct. The left engine did not have any grass in any of these areas. No significant problems with the right engine were noted during a cowl-open inspection of that engine. The fuel line from the right engine fuel-cooled oil cooler was removed, and fuel was found in this line.

Inside the cockpit, the left engine oil temperature indicator was observed to be captured at an indication of 72 degrees C (approximately midrange in the normal operating arc), with the right engine oil temperature indicating approximately at bottom of scale, less than 20 degrees C (in the yellow arc at bottom of scale.) (NOTE: The oil temperature indicators are powered by 28 VDC.) Flightcraft personnel reported that they found the landing gear handle in the up position at the site, and placed it to the down position while attempting to lower the gear during post-accident aircraft recovery operations.

Investigators from the FAA and P&WC removed the starter-generator from the accident aircraft's right engine during a follow-up examination in Portland on March 24, 1998. Upon

removal of the starter-generator, the starter drive shaft was found to be fractured, with the starter drive shaft separated from the starter input spline portion of the starter shaft. Upon removal of the small splined portion of the fractured starter shaft from the engine accessory gear box, the engine accessory drive could be rotated via the starter gear using a turning tool, and the engine rotated with no unusual noises. The investigators then took the starter-generator to Flightcraft's maintenance shop, where electrical power was applied to the unit for a function check. The starter-generator operated normally when electrical power was applied.

The starter-generator and fractured input shaft section were subsequently sent to the NTSB Northwest Regional Office in Seattle, Washington, where the NTSB investigator-in-charge visually examined the shaft fracture surfaces. The shaft was fractured on a 45-degree plane to its axis of rotation, with two separate zones of scalloping observed.

An on-aircraft functional check of the aircraft's right engine oil temperature indicating system was conducted at Portland on April 13, 1998, under FAA supervision. This check revealed the right engine oil temperature indicating system to be functional.

MEDICAL AND PATHOLOGICAL INFORMATION

Post-accident toxicology tests on the pilot and copilot's seat occupant were not performed.

ADDITIONAL INFORMATION

The airplane wreckage was released to Mr. Robert L. Riemenschneider of Redmond, Oregon, on April 13, 1998. Mr. Riemenschneider is the president of R.L. Riemenschneider Enterprises, which owns the accident aircraft.

Pilot Information

Certificate:	Commercial	**Age:**	46,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**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	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	September 9, 1997
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	4500 hours (Total, all aircraft), 125 hours (Total, this make and model), 4400 hours (Pilot In Command, all aircraft), 75 hours (Last 90 days, all aircraft), 30 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Aerospatiale	**Registration:**	N600RA
Model/Series:	SN-601 SN-601	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Transport	**Serial Number:**	36
Landing Gear Type:	Retractable - Tricycle	**Seats:**	12
Date/Type of Last Inspection:	October 1, 1997 AAIP	**Certified Max Gross Wt.:**	15432 lbs
Time Since Last Inspection:	146 Hrs	**Engines:**	2 Turbo fan
Airframe Total Time:	2306 Hrs	**Engine Manufacturer:**	P&W
ELT:	Installed, not activated	**Engine Model/Series:**	JT15D-4
Registered Owner:	R.L. RIEMENSCHNEIDER ENT.	**Rated Power:**	2500 Lbs thrust
Operator:	REDMOND FLIGHT CENTER	**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	OHGA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PDX ,27 ft msl	**Distance from Accident Site:**	
Observation Time:	08:56 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Scattered / 14000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 25000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	300°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	11°C / 2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:		**Type of Flight Plan Filed:**	None
Destination:	REDMOND , OR (RDM)	**Type of Clearance:**	VFR
Departure Time:	00:00 Local	**Type of Airspace:**	Class C

Airport Information

Airport:	PORTLAND INTERNATIONAL PDX	**Runway Surface Type:**	Asphalt
Airport Elevation:	27 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	10L	**IFR Approach:**	None
Runway Length/Width:	8000 ft / 150 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	3 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 None	**Latitude, Longitude:**	45.529327,-122.679725(est)

Administrative Information

Investigator In Charge (IIC):	Nesemeier, Gregg
Additional Participating Persons:	TERRY L WILMETH; HILLSBORO , OR JAMES C LONSDALE; VANCOUVER , WA RICHARD W OBER; REDMOND , OR
Original Publish Date:	February 15, 2001
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=42707