Aviation Investigation Final Report

Location:	CAHOKIA, Illinois	**Accident Number:**	CHI98FA353
Date & Time:	September 19, 1998, 13:30 Local	**Registration:**	N611AB
Aircraft:	Barklage REVOLUTION MINI 500	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

A witness watched the helicopter as it climbed out after takeoff. The witness said that the helicopter was higher than the telephone lines which ran northeast of the airport. 'He was level and climbing, going away from me when all of a sudden, the sound (engine sound) went quiet, followed by a pop. It was not a loud pop.' The helicopter began a shallow descent. At about 30 to 40 feet above the field, the helicopter 'leveled out,' but 'kept coming down.' The witness said he saw the helicopter 'hit' and then 'cartwheel.' Examination of the helicopter's engine revealed scoring marks on the power-takeoff cylinder (front cylinder) piston, and impact marks in the head. Small metallic particles were embedded in the piston head. The power-takeoff cylinder wall showed scuff marks, and the cylinder head showed impact marks. The two power-takeoff spark plugs' showed no gap at the electrodes, and impact marks. No other anomalies were revealed.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A loss of engine power due to cold seizure of the power-takeoff cylinder. A factor contributing to the accident was the power lines.

Findings

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

Findings
1. (C) ENGINE ASSEMBLY,PISTON - SEIZED
2. ENGINE ASSEMBLY,PISTON - FOREIGN OBJECT DAMAGE
3. IGNITION SYSTEM,SPARK PLUG - FOREIGN OBJECT DAMAGE

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

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

Findings
4. (F) OBJECT - WIRE,TRANSMISSION

Factual Information

HISTORY OF FLIGHT

On September 19, 1998, at 1330 central daylight time (cdt), a Barklage Revolution Mini 500, N611AB, operated by a commercial pilot, was destroyed when on initial climb, the helicopter's engine lost power. During the subsequent emergency landing, the helicopter impacted into a soybean field. Visual meteorological conditions prevailed at the time of the accident. The personal flight was being conducted under 14 CFR Part 91. There was no flight plan on final. The pilot sustained serious injuries in the accident, and passed away six days later. The cross- country flight originated at Cahokia, Illinois, at 1323 cdt, and was en route to St. Charles, Missouri.

A witness, standing in the parking lot on the northeast side of Helicopters, Incorporated's main hangar, at St. Louis Downtown Parks Airport, Cahokia, Illinois, said that he heard "a Mini 500 either running or hovering behind the hangar." The witness watched the helicopter fly around the south side of the hangar. It made a wide, level turn. The witness estimated that the helicopter was 100 to 150 feet above the ground when it passed in front of him. The helicopter came around the hangar and the parking lot, and then headed toward the north-northeast, toward the river (Mississippi River) and the city (St. Louis). It was approximately 200 feet above the ground. The helicopter was higher than the telephone lines which ran northeast of the airport. "He was level and climbing, going away from me when all of a sudden, the sound (engine sound) went quiet, followed by a pop. It was not a loud pop." The witness said the helicopter began a shallow descent, as if the pilot was extending his glide path. At about 30 to 40 feet above the field, the helicopter "leveled out," but "kept coming down." The witness said he saw the helicopter "hit" and then "cartwheel." The helicopter did not do a nose tuck, and it did not spin before striking the ground.

PERSONNEL INFORMATION

The pilot held a commercial pilot certificate with airplane single-engine land, airplane multi-engine land, rotorcraft- helicopter, and instrument ratings. The pilot also held a flight instructor's certificate in rotorcraft-helicopter.

A friend of the pilot said that the pilot was a local celebrity for a television station in St. Louis, Missouri. He had been the station's "eye-in-the-sky" (airborne traffic reporter) for many years. The friend said that the pilot was en route to St. Charles, Missouri, to make a personal appearance, when the accident occurred.

According to the pilot's brother, the pilot had over 32,000 hours total flight time, the majority of which was in helicopters. The pilot's brother said that the pilot flew his Mini-500 helicopter

four to five times per day, at least four to five days a week. Federal Aviation Administration (FAA) records indicated that on August 28, 1997, the pilot reported having 28,000 hours total flight time. No personal logbook records were recovered on the pilot.

The pilot had successfully completed an FAA Airman Competency/ Proficiency flight check on June 9, 1998, conducted by the FAA's St. Louis, Missouri, Flight Standards District Office. The flight check was conducted in a Bell 206B helicopter. The FAA inspector who conducted the flight check cited no discrepancies.

AIRCRAFT INFORMATION

The helicopter was owned by the pilot and used principally for pleasure.

The helicopter was constructed from a kit which the pilot purchased from Revolution Helicopter Corporation, Excelsior, Missouri. The helicopter was issued a special airworthiness certificate, experimental, amateur-built aircraft, on June 3, 1997.

The helicopter underwent an annual condition inspection on June 30, 1998. At the time of the inspection, the helicopter had 75.0 total airframe hours. The Hobbs indicator in the aircraft, at the time of the accident, indicated 96.1 hours.

WRECKAGE AND IMPACT INFORMATION

The NTSB on scene investigation began on September 21, 1998, at 1730 cdt.

The accident site was located in a soybean field approximately 180 feet east-northeast of Sauget Industrial Parkway, a north- south running paved road, bordering the airport's northeast side.

A set of powerlines paralleled the road approximately 50 feet from the road's eastern edge. The powerlines were suspended approximately 30 feet above the ground. An additional set of powerlines, ran perpendicular to the first set. These powerlines were located 165 feet south-southwest of the accident site.

The accident site began with a ground scar located in the soybean field. The ground scar was 8 feet 5 inches long, 4 feet 2 inches wide, and was oriented on a 345 degree magnetic heading. The ground scar was 6 inches at its deepest point.

The helicopter main wreckage was 24 feet 6 inches from the ground scar on a 330 degree magnetic heading. The helicopter was resting on its right side and its nose was oriented on a 060 degree magnetic heading. The main wreckage consisted of the helicopter's fuselage, cockpit area, engine, main rotor gearbox, main rotor, tail boom, vertical stabilizer, horizontal stabilizer, tail rotor gearbox, and the tail rotor, save the outboard portion of one tail rotor blade.

The structure making up the canopy frame was bent upward, left and aft. The plexiglass bubble canopy was broken out of the frame and fractured into several pieces, which came to rest just south of the ground scar and main wreckage. The instrument column had broken aft at the base and had fallen forward of the cockpit floor. The bottom of the cockpit floor and seat base were crushed upward. The single pilot seat and aft cockpit bulkhead remained intact. The cyclic was broken forward and separated at its floor base.

The bottom aft portion of the helicopter's fuselage and the engine water-cooled radiator were crushed upward. The left aft fiberglass cowling was cracked longitudinally and buckled outward near the engine exhaust pipe.

The left skid was broken off at the fuselage. The front leg of the left skid was separated and found resting south of the helicopter's fuselage. The forward 27 inches of the skid tube was broken upward and aft.

The right skid remained attached to the fuselage. It was bent outward. The aft leg was bent forward 33 degrees and twisted outboard approximately 80 degrees. The forward 27 inches of the skid tube was broken upward and separated.

The main rotor system remained attached to the mast. All flight control linkages showed continuity to the helicopter's cyclic and collective. One of the two main rotor blades was undamaged. The top surface of the blade, approximately 8 inches outboard of the rotor hub, showed chordwise rubs. The other main rotor blade was broken downward 34 degrees, approximately 12 inches outboard of the rotor hub. The blade was bent and broken upward 43 degrees, approximately 25 inches inboard of the blade tip. A 4 inch diameter piece of the rotor blade's trailing edge was broken out at the bend, 25 inches inboard of the blade tip.

The tail boom was bent upward 10 degrees and separated at the junction with the engine cowling. The tail boom was bent and twisted counter-clockwise approximately 135 degrees, 12 inches aft of the fracture.

The helicopter's vertical stabilizer showed minor damage. The top 6 inches of the left forward skin, just beneath the horizontal stabilizer, was broken forward. The helicopter's horizontal stabilizer was broken at the junction where it attached to the vertical stabilizer. The horizontal stabilizer remained attached and was turned forward 90 degrees from the longitudinal axis.

The tail rotor gear box showed no damage. One tail rotor blade was undamaged. The other tail rotor blade was bent outward and broken, 5 inches outboard of the tail rotor hub. Control continuity from the control pedals to the tail rotor gear box was confirmed.

The helicopter's engine and related components were retained for further examination.

MEDICAL AND PATHOLOGICAL INFORMATION

Following the accident, the pilot was taken, in critical condition, to Barnes-Jewish Hospital, St. Louis, Missouri, were he was admitted at 1859 cdt. The pilot survived six days before succumbing to his injuries. The pilot was pronounced deceased on September 25, 1998, at 1236 cdt.

An autopsy of the pilot was conducted by the City of St. Louis, Missouri, Medical Examiner, on September 25, 1998, in St. Louis, Missouri.

FAA toxicology testing of specimens from the pilot was not requested.

TESTS AND RESEARCH

An examination of the helicopter's Rotax Type 582 U/L engine was conducted at the National Transportation Safety Board North Central Regional Office - Aviation, Chicago, Illinois, on November 18, 1998. The examination revealed longitudinally- running scoring marks on the power-takeoff cylinder (front cylinder) piston at the 10, 2 and 5 o-clock positions. The top of the piston showed foreign material impact strikes in the squish-band area. Small particles of foreign metallic material were found embedded in the piston head. Longitudinally-running scuff marks were revealed on the power-takeoff cylinder wall, corresponding to the 10, 2, and 5 o-clock cylinder positions. Impact marks were found in the top dome of the power-takeoff cylinder. The two power-takeoff cylinder spark plugs' electrodes showed no gap. The bottom of both electrodes showed impact marks. A fuel sample taken from the fuel line downstream of the fuel filter revealed some small metallic particles. Examination of the fuel filter showed a small amount of metal fibers on the incoming side of the element.

The engine's cylinder head, power-takeoff cylinder, piston, and spark plugs, the metallic particles, and the fuel sample were sent to the NTSB's Materials Laboratory for further examination. The Materials Laboratory examination of the engine components and samples was concluded on May 5, 1999. The Material's Laboratory Factual Report is attached as an addendum to this report.

ADDITIONAL INFORMATION

Parties to the investigation were the Federal Aviation Administration Flight Standards District Office, St. Louis, Missouri, and Rotax Aircraft Engines, Vernon, British Columbia, Canada.

All aircraft wreckage was released and returned to the pilot's family.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	50,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	Gyroplane; Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	Helicopter	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	August 28, 1997
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	28000 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Barklage	**Registration:**	N611AB
Model/Series:	REVOLUTION MINI 500 REVOLUTION	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	0294
Landing Gear Type:	Skid	**Seats:**	1
Date/Type of Last Inspection:	June 30, 1998 Annual	**Certified Max Gross Wt.:**	840 lbs
Time Since Last Inspection:	21 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	96 Hrs	**Engine Manufacturer:**	Rotax
ELT:	Not installed	**Engine Model/Series:**	582
Registered Owner:	ALLEN G. BARKLAGE	**Rated Power:**	64 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	STL ,605 ft msl	**Distance from Accident Site:**	15 Nautical Miles
Observation Time:	12:53 Local	**Direction from Accident Site:**	304°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	190°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	28°C / 17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(CPS)	**Type of Flight Plan Filed:**	None
Destination:	ST. CHARLES (3SQ)	**Type of Clearance:**	None
Departure Time:	13:23 Local	**Type of Airspace:**	Class B

Airport Information

Airport:	ST. LOUIS DOWNTOWN PARKS CPS	**Runway Surface Type:**	
Airport Elevation:	413 ft msl	**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	38.56998,-90.169181(est)

Administrative Information

Investigator In Charge (IIC):	Bowling, David
Additional Participating Persons:	SYDNEY M BUFF; ST. ANN , MO DALE H MUELLER; ST. ANN , MO ERIC TUCKER; VERNON
Original Publish Date:	March 31, 2000
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=44003