Aviation Investigation Final Report

Location:	Locust Grove, Georgia	**Accident Number:**	ATL06LA028
Date & Time:	December 27, 2005, 17:15 Local	**Registration:**	N53257
Aircraft:	Cessna 177-RG	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Serious, 1 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot was in cruise flight at 2,000 feet AGL. The engine did not appear to be producing full power. The pilot reversed his course back towards the departure airport. The engine oil pressure decreased to zero and the engine lost power. The pilot made an emergency landing to none suitable terrain, and the airplane received substantial damage on the landing roll out. The engine was disassembled. The No.1 cylinder was removed and the No.1 connecting rod was bent and separated from the crankshaft journal. The No.1 connecting rod, piston, and oil suction debris were forwarded to the NTSB Materials Laboratory for further examination. The examination revealed a failure of the No.1 connecting rod bearing.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The total loss of engine power due to failure of the No.1 connecting rod bearing and separation of the No. 1 connecting rod.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: CRUISE

Findings
1. (C) ENGINE ASSEMBLY,BEARING - FAILURE,TOTAL
2. ENGINE ASSEMBLY,CONNECTING ROD - SEPARATION

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

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: LANDING - ROLL

Findings
3. TERRAIN CONDITION - NONE SUITABLE

Factual Information

HISTORY OF FLIGHT

On December 27, 2005, at 1715 eastern standard time, a Cessna 177-RG, N53257, registered to a private owner, operating as a 14 CFR part 91 personal flight, reported a total loss of engine power, and collided with the ground during an emergency landing in the vicinity of Locust Grove, Georgia. Visual meteorological conditions prevailed and no flight plan was filed. The airplane received substantial damage. The commercial pilot reported minor injuries, and one passenger received serious injuries. The flight originated from Clay County-Tara Field, Hampton, Georgia, on December 27, 2005, at 1700.

The pilot stated he departed Tara Field from runway 24, and climbed to 2,000 feet AGL, enroute to Mallards Landing. While in cruise flight at 2,000 feet AGL, the engine did not appear to be producing power. The engine RPM gauge indicated 2,300 RPM and the manifold pressure gauge indicated 22-inches. The pilot stated he had to increase the pitch attitude of the airplane to maintain level flight. The pilot reversed his course and flew back towards Tara Field. The engine oil pressure decreased to zero, and the engine quit. The propeller appeared to seize and stopped. The pilot declared an emergency on Tara Field UNICOM radio frequency, and realized he could not make the airport. The pilot observed an open field to his left and initiated an emergency landing to the field. The airplane touched down on the main landing gear. The landing area was wet, soft, and muddy with holes and depressions. The nose gear touched down and the airplane came to an abrupt stop with about a 60 foot long ground roll. The pilot and the passenger exited the airplane. Examination of the airplane revealed the airframe had received structural damage.

PERSONNEL INFORMATION

Review of information of file with FAA Airman's Certification Division, Oklahoma City, Oklahoma, revealed the pilot was issued a commercial pilot certificate on July 13, 2004, with ratings for airplane single engine land and instrument airplane. The pilot's last flight review was conducted on July 13, 2004. The pilot holds a second class medical certificate issued on April 25, 2005, with the restriction, "must wear corrective lenses." The pilot reported on the NTSB Pilot/Operator Aircraft Accident/Incident Report that he has accumulated 575 total flight hours with 258 hours in the PA32-300.

AIRCRAFT INFORMATION

Review of the airplane log books revealed the last recorded annual inspection was conducted on December 17, 2004, and the airplane has flown 190 hours since the annual inspection. The total time on the engine is 4,070 hours, and the time since overhaul is 1,475.The airframe has a

total of 9,190 hours at the time of the accident. The tachometer at the time of the engine examination by the NTSB was 2615.9 hours.

METEOROLOGICAL INFORMATION

The William B. Hartsfield Atlanta International Airport, Atlanta, Georgia, 1751 eastern standard time surface weather observation was: wind 210 degrees at 13 knots, visibility 8 miles, overcast clouds at 13,000 feet, temperature 52 degrees Fahrenheit, dew point temperature 45 degrees Fahrenheit, and altimeter 30.00.

WRECKAGE AND IMPACT INFORMATION

Examination of the cabin area was conducted at an aircraft recovery facility. The fuel selector was found in the both position. The throttle was one-eighth of an inch from the idle stop on the fuel servo and the throttle cable moved freely by hand. The throttle cable was damaged and could not be moved through its full range. The propeller was in low rpm high pitch and the throttle cable moved freely by hand through its complete range. The mixture cable was one-fourth of an inch from the idle cut off stop on the fuel servo and was extended one and one half inches in the cabin area. The mixture cable moved freely by hand through its complete range.

The left and right main fuel tanks were not ruptured and 30 gallons of 100-low lead fuel was removed from the right main fuel tank. Air was blown through the main fuel tank vent interconnect fuel system and continuity of the vent system was confirmed. Air was blown into the left main fuel tank feed line and air was observed coming out of the right main fuel tank feed line. Air was also observed coming out of the right reservoir fuel tank vent line. In addition, fuel was observed coming from the left fuel tank reservoir fuel tank vent line. The fuel strainer was drained by pulling the drain lever and fuel was observed draining from the strainer. The fuel strainer bowl was removed from the strainer assembly. No contaminants were observed in the fuel strainer bowl or fuel screen. Air blown into the left main fuel tank inlet port and fuel was observed exiting the fuel strainer. Fuel was present in the fuel injector lines going to the No.1 cylinder. Fuel was present in the fuel line from the engine driven fuel pump to the fuel servo. The fuel pressure gage line was disconnected and fuel was present. The fuel pump was removed and the fuel was present in the inlet, and pumping action was observed when the fuel pump actuated by hand. The flow divider was removed and disassembled. The diaphragm was intact and fuel was present. All fuel nozzles were removed and not obstructed. The fuel servo was removed and fuel was present in the fuel servo. The fuel servo screen was free of contaminants.

The engine assembly was displaced downward and to the left. The right upper engine mount, lower left and right engine mount remained attached to the firewall. The engine inlet air box was crushed upward. The propeller assembly remained attached to the crankshaft flange. The propeller spinner was crushed. One propeller blade was intact and not damaged. The remaining propeller blade was bent aft about 20-degrees approximately 8-inches outboard of

the propeller hub, and the propeller blade was loose in the propeller hub.

All engine accessories remained attached to the engine and were not damaged. All fuel and oil lines remained attached. The top spark plugs and rocker covers were removed and exhibited "worn out normal" when compared to the Champion Check A Plug chart. The engine was rotated by hand and continuity to the rear engine gears and valve train was observed. Compression and suction was observed on cylinder 2, 3, and 4. No compression and suction was observed on cylinder No.1 and the piston could not be observed to move up and down inside the cylinder. The bottom spark plugs were removed and exhibited "worn out normal" when compared to the Champion Check A Plug chart. The No.1 bottom spark plug was oil soaked. The engine oil indicated six quarts of oil on the dipstick. The oil suction screen was removed from the oil sump and contained silver colored metallic flakes. The oil filter was removed and opened. The oil filter element contained silver colored metallic flakes. The vacuum pump was removed and disassembled. The carbon rotor and vanes were intact, and the drive rotated freely when turned by hand. The magneto was removed and spark was noted at all ignition towers when the magneto drive was turned by hand. The oil cooler was not damaged and all connections were tight.

The No.1 cylinder was removed and the No.1 connecting-rod was bent and separated from the crankshaft journal. The rod bolts remained attached to the rod and the rod separated in three pieces. The No.1 piston was free to move in the cylinder and all piston rings were stuck in the ring grooves. The No. 2, 3, and 4 cylinders were removed and the valves were not damaged. The piston domes were not damaged and all piston skirts were scored and scuffed. The piston rings were free in the ring groves. The engine case halves were separated. The camshaft was not damaged. The crankshaft main bearings were not damaged. The No. 2, 3, and 4 rod bearings were scored and exhibited extrusions of the bearing material. The crankshaft was intact. The main bearing journal was not damaged. The No.1 rod-bearing journal was rough and black in color and exhibited scoring. The No. 2, 3,and 4 rod bearing journals were scored and transfer of bearing material was present. Bearing material was present in the No.2, 3, and 4, rod journal oil holes. The crankshaft counterweights were intact and moved freely. The engine oil pump cavity exhibited scoring. The oil pressure relief valve was removed and found unobstructed.

The No.1 piston, separated connecting rod, and oil suction screen debris were forwarded to the NTSB Materials Laboratory for further analysis. Examination of the connecting rod and cap revealed it was fractured into three pieces with two fractures through the strap arms of the rod and one fracture through the cap. The rod bolts were intact and appeared tight. The journal end of the rod and the three separated pieces were darkly discolored consistent with exposure to high temperatures.

Initial optical examinations found extensive mechanical damage and smearing that obliterated some fracture features on all three fractures. The rod bolts were removed, one by loosening the nut, the other by cutting the bolt, and the rod cap and rod pieces were separated from each other. All pieces were cleaned in Alconox and water, which removed some of the dark

deposits from the fracture faces.

Magnified optical and scanning electron microscope examinations of the fractures uncovered features consistent with high stress fatigue cracking at the two rod fractures, and bending overstress at the cap fracture, The fatigue initiated on the exterior of the rod in the nut cut out and propagated inward toward the bearing journal. The extents of fatigue progression was not clear as the inner portion of the fractures were damaged. The exposed split line faces between the rod and cap exhibited moderate to heavy fretting on both rod and cap faces.

The debris from the oil suction screen consisted mostly of thin slivers and flakes of aluminum along with several thin pieces of iron material. No copper colored bearing material was noted in the debris.

MEDICAL AND PATHOLOGICAL INFORMATION

No toxicology specimens were requested from the pilot by the NTSB and law enforcement personnel.

ADDITIONAL INFORMATION

The airplane log books were release to the insurance adjuster on January 19, 2006, by the FAA. The airplane was released to Atlanta Air Recovery on January 19,2006.The No.1 connecting rod, piston, and oil suction debris was released to Atlanta Air recovery on June 8, 2006.

Pilot Information

Certificate:	Commercial	**Age:**	50,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	April 1, 2005
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	July 1, 2004
Flight Time:	575 hours (Total, all aircraft), 258 hours (Total, this make and model), 530 hours (Pilot In Command, all aircraft), 29 hours (Last 90 days, all aircraft), 13 hours (Last 30 days, all aircraft), 8 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N53257
Model/Series:	177-RG	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	177RG1363
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	December 1, 2004 Annual	**Certified Max Gross Wt.:**	2800 lbs
Time Since Last Inspection:	180 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	9191 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-360-A1B6D
Registered Owner:	Albert Van Lengen	**Rated Power:**	200 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	ATL,1026 ft msl	**Distance from Accident Site:**	15 Nautical Miles
Observation Time:	17:51 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:		**Visibility**	8 miles
Lowest Ceiling:	Overcast / 13000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	13 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	210°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	11°C / 7°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	HAMPTON, GA (4A7)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	17:00 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious, 1 Minor	**Latitude, Longitude:**	33.386665,-84.332221

Administrative Information

Investigator In Charge (IIC):	Smith, Carrol
Additional Participating Persons:	Thomas Rivera; College Park FSDO-11; College Park, GA
Original Publish Date:	October 3, 2006
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=63003