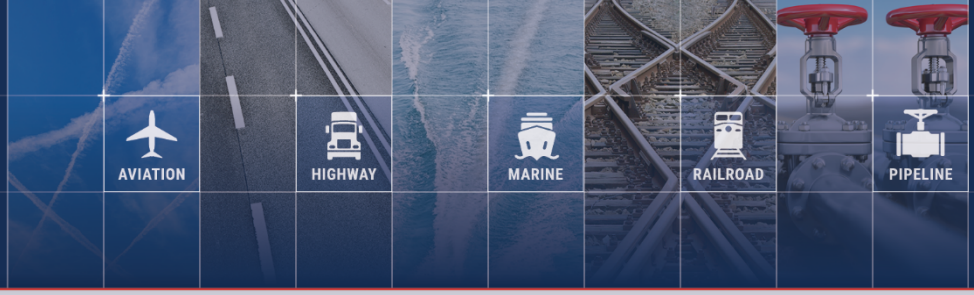

Aviation Investigation Factual Report

Location:	Clarkson, New York	**Accident Number:**	IAD04FA040
Date & Time:	August 20, 2004, 13:34 Local	**Registration:**	N57EF
Aircraft:	Piper PA-31P	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Positioning		

Factual Information

HISTORY OF FLIGHT

On August 20, 2004, at 1334 eastern daylight time, a Piper PA-31P, N57EF, was destroyed when it collided with terrain during a forced landing in Clarkson, New York. The certificated airline transport pilot/owner was fatally injured. Visual meteorological conditions prevailed for the positioning flight that originated at Genessee County Airport (GVQ), Batavia, New York, approximately 1325. No flight plan was filed for the flight conducted under 14 CFR Part 91.

The purpose of the flight was to return the airplane to its home base of Rochester, New York, after completion of an annual inspection and the reinstallation of the right engine following repair.

A review of air traffic control (ATC) radar and voice communication data revealed that, at 1327:36, the pilot contacted ATC and requested the ILS Runway 22 approach to the Greater Rochester International Airport (ROC), Rochester, New York. The controller approved the request and assigned an initial heading of 120 degrees for a vector to the final approach course. The pilot acknowledged the radio call, and the airplane assumed a track of about 120 degrees; at an altitude of 2,500 feet mean sea level (msl), and 197 knots groundspeed.

The airplane continued on the track of 120 degrees for several seconds, then turned to an approximate track of 180 degrees. At 1332:06, the pilot announced that he had "lost" an engine and requested vectors back to Batavia. At 1332:20, the pilot said he could not reach Batavia and opted to land at Ledgedale Airport (7G0), Brockport, New York. By that time, the airplane had slowed to 105 knots and had descended to 1,600 feet msl.

At 1334:01, the pilot said, "I don't think I'm going to make Ledgedale." At that time, the airplane's groundspeed was 97 knots and it had descended to 1,100 feet msl. There were no further communications from the pilot. Over the next 31 seconds, the airplane slowed to 87 knots groundspeed and descended to 700 feet msl, about 350 feet above ground level (agl), before the last radar return was recorded.

Several witnesses around the crash site stated that they observed the airplane maneuvering at a low altitude. They described the engine sound as "rough," and "cutting in and out." Some witnesses said they saw the airplane just above the trees with the wings perpendicular to the ground before it descended out of view, and the sounds of impact were heard.

The accident occurred during the hours of daylight approximately 43 degrees, 15 minutes north latitude, and 77 degrees, 52 minutes west longitude.

PERSONNEL INFORMATION

The pilot held an airline transport pilot certificate with a rating for airplane multi-engine land. He also held a commercial pilot certificate with ratings for airplane single engine land and sea. The pilot also held a flight instructor certificate for airplane single engine land, multi-engine land, and instrument airplane.

The pilot's most recent Federal Aviation Administration (FAA) Second Class Medical Certificate was issued on May 17, 2004. The pilot reported 20,000 hours of total flight experience on that date.

According to the pilot's business manager, the pilot had not kept a logbook for many years. She estimated that the pilot had accrued between 16,000 and 20,000 hours of flight experience. A review of business records revealed that the pilot had approximately 60 hours of flight experience in make and model.

AIRCRAFT INFORMATION

The airplane was built in 1974, and was equipped with two Lycoming TIGO-541-EA1 engines rated at 425 horsepower. The most recent annual inspection was completed on August 18, 2004. An engine run was completed prior to performing the inspection.

During the inspection, examination of the oil filter and sump screen of the right engine revealed a high concentration of metal particles. After numerous discussions between the pilot/owner and the maintenance facility manager, the right engine was removed and shipped to an overhaul facility for replacement of the camshaft and all lifters.

After replacement of the cam and lifters the engine was returned to the maintenance facility and reinstalled on the airplane. According to the mechanics that performed the work, the installation went smoothly, but an oil leak was detected during the first engine run.

A second engine run was performed, and a leak was detected at the propeller seal. The propeller seal was replaced, and during a third engine run, oil again leaked from the engine. The engine was washed, "Zyglo" developer was applied to the engine case, and a fourth engine run determined that the oil had leaked from the engine starter adapter. The adapter assembly was repaired, and a bushing was modified prior to reinstallation of the starter adapter and the starter. After installation of the starter, a fifth engine run was performed. The engine started and ran without further oil leakage.

Each engine run lasted approximately 15 minutes and included the start, the taxi to the run-up area, the actual run-up, and the return taxi to the hangar. The left engine was always run for the purpose of taxiing the aircraft to the run-up area, but the troubleshooting operations involved higher power settings on the right engine.

The mechanics each stated that the fuel selectors were in the outboard position for all engine runs, and that they noted that the fuel quantity in each of the outboard tanks was "low". When asked to estimate the fuel level on fuel indicator diagrams, each mechanic marked the fuel level near the 1/4 tank striation.

When the pilot/owner took delivery of the airplane, he requested that 2 quarts of oil be added to the right engine after his preflight inspection was completed. The mechanic who added the oil, and adjusted the right cowl flap at the pilot's request, asked the pilot if he had enough fuel for the trip to Rochester. According to the mechanic, the pilot responded, "Yeah, I think I have enough."

METEOROLOGICAL INFORMATION

At 1356, the weather reported at the Greater Rochester International Airport, 11 miles east of the crash site, included winds from 250 degrees at 9 knots, 10 statute miles visibility, a few clouds at 3,000 feet, a broken ceiling at 14,000 feet, and an overcast layer at 18,000 feet. The temperature was 72 degrees Fahrenheit, the dew point 54 degrees Fahrenheit, and the barometric pressure was 29.99 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The wreckage was examined on August 21, 2004, and all major components were located at the scene. The airplane crashed in a small field of low brush prior to a tree line that bordered a larger field to the north. The site was about 5 miles north of Ledgedale Airport.

The wreckage path was approximately 85 feet long and oriented about 030 degrees. The initial impact point was in a tree about 45 feet above the ground. Angular cut wood was found at the base of the tree.

The propeller assemblies were separated from their engines and partially buried in the initial impact crater, about 75 feet beyond the initial impact point. Their respective propeller shafts and spur gearing remained attached to the assemblies.

The airplane came to rest approximately 10 feet beyond the propellers, and was oriented 220 degrees.

The cockpit and cabin area were destroyed by impact and post-crash fire. The aft 10 feet of empennage, which included the vertical fin, rudder, and left horizontal stabilizer were intact. The right horizontal stabilizer was damaged by impact. The deicing boots on the tail surfaces were melted.

Both wings were separated from the airplane, but remained attached by control cables. The right engine was in the nacelle and attached to the wing, the left engine was separated. The landing gear was down and locked.

The left wing was destroyed by fire. The right wing was essentially intact with a small concave dent in the leading edge, outboard of the engine nacelle. Both wing fuel tanks were intact and contained an unknown quantity of fuel. The flap actuators were found in the 'retracted' position.

Control cable continuity was established from the elevator to the cockpit area. Control cables were connected at the rudder bellcrank, and the rudder trim was neutral. Both the left aileron cable and the balance cable were secured at the bellcrank. The right aileron control cable was secured to the bellcrank and was continuous to the wing root. The broken cable end at the wing root was "broomstrawed". The balance cable was pulled from the balance swage and the separated cable end was "broomstrawed".

The fuel selectors were both found in the outboard tank position. The crossfeed lever was in the off position, and both firewall shutoff valves were in the on position.

The wreckage was moved to a heavy-equipment garage for further examination.

The engines and propeller assemblies were examined on August 22, 2004.

The blades of the left propeller assembly were labeled A, B, and C for reference and all were at a low pitch position. The A and C blades displayed some aft bending while the B blade showed a slight 'S' bend along the span and leading edge nicks.

The blades of the right propeller assembly were labeled A, B, and C for reference and all were at a low pitch position. The A and B blades displayed aft bending while the C blade showed a forward bend. The leading edge of the B blade showed several nicks near the blade tip.

The right engine crankcase was fractured at the spur gear housing by impact. Initially, the engine would not rotate. After the starter and the generator were removed from the damaged spur gear housing, the engine could be rotated by hand.

The engine was rotated through the starter drive quill and continuity was established through the powertrain, valvetrain and accessory section. Compression was confirmed on all cylinders using the 'thumb' method. The engine oil filter was removed and disassembled. The paper filter element was unraveled and contained ferrous and non-ferrous metal particles.

The oil suction screen was removed and it contained pieces of ferrous and non-ferrous metal.

The engine examinations were suspended, and both engines were shipped to Lycoming Engines, Williamsport, Pennsylvania, for further examination.

Fuel samples drained from the right wing tanks were absent of contamination. Approximately 40 gallons of fuel were drained from the inboard and nacelle tanks of the right wing. A small

amount of fuel was visible in the right outboard tank, but the quantity could not be determined.

MEDICAL AND PATHOLOGICAL INFORMATION

The Deputy Medical Examiner of Monroe County, New York, performed the autopsy on the pilot.

Toxicological testing was done at the FAA Toxicology Accident Research Laboratory, Oklahoma City, Oklahoma.

TESTS AND RESEARCH

The right engine was examined at Lycoming Engines, Williamsport, Pennsylvania on August 31, 2004. The engine accessories were removed prior to disassembly.

The left magneto was still attached to the engine. After removal, the left magneto was turned by hand and spark was obtained at all terminal leads.

The right magneto was separated from its mount. Several leads were cut or damaged by impact, or pulled from the ignition harness cap. The terminal cap was removed, the magneto was rotated by had, and spark was observed at the distributor block towers.

The cylinders and pistons were removed, with no damage or abnormal wear noted.

The engine crankcase halves were separated, and the crankshaft, connecting rods, camshaft, and lifters were removed. There was no damage or abnormal wear noted on the bearings or the bearing journals.

The oil pump was disassembled, and it revealed no abnormal wear and was absent of contamination.

The fuel servo was disconnected from the turbo controller adapter and the induction housing assembly. The pressurizing valve assembly was removed and there were no anomalies noted. The fuel servo inlet screen was removed, and was absent of contamination and fuel. Examination of the fuel servo revealed only trace amounts of fuel.

Metallurgical examination of the pieces found in the right engine oil suction screen revealed that they contained high concentrations of magnesium, consistent with the material used to manufacture the oil sump and the induction housing assembly. Close examination of the engine oil sump revealed no pre-impact damage, wear, or deterioration. Detailed examination of the engine and its accessories revealed that the magnesium particles were confined to the oil suction screen.

The left engine was examined at Lycoming Engines, Williamsport, Pennsylvania on September

1, 2004. The engine accessories were removed prior to disassembly.

The oil filter was removed and the paper filter element was unraveled. Examination revealed only trace amounts of metal particles.

The suction screen was removed and was clear and absent of debris.

The engine was rotated by hand through the starter drive. Continuity was established through the power train, valvetrain, and accessory section. Compression was confirmed on all cylinders using the 'thumb' method.

The turbocharger adapter bracket adjacent to the Freon compressor pulley displayed rotational scoring.

The cylinders and pistons were removed, with no damage or abnormal wear noted.

The engine crankcase halves were separated, and the crankshaft, connecting rods, camshaft, and lifters were removed. There was no damage or abnormal wear noted on the bearings or the bearing journals.

The oil pump was disassembled and it showed no abnormal wear and was absent of contamination.

The left magneto was still attached to the engine. After removal, the left magneto was turned by hand and spark was obtained at all terminal leads.

The right magneto was separated from its mount. Two terminal leads were pulled from the ignition harness cap and several leads were cut or damaged by impact. The terminal cap was removed, the magneto was rotated by hand, and spark was observed at the distributor block towers.

The fuel pump to fuel servo fuel line contained fuel. The fuel servo inlet screen was absent of debris with fuel noted. The fuel line from the servo to the fuel flow transducer contained fuel. All fuel injector nozzles were removed and were free of obstruction with no fuel noted.

The propeller assemblies were examined in Clayton, Delaware, on October 23, 2004. Disassembly and examination of each assembly revealed no pre-impact anomalies, and that the blades were at low pitch.

The propeller governors were examined and tested in Rockford, Illinois, on January 20, 2005, under the supervision of an FAA aviation safety inspector.

Both governors displayed impact damage and each contained dirt and debris. The base of the right governor was cracked due to impact.

Both governors were run on a test stand, and each displayed the proper pump capacity, and regulated the pressure as designed.

The nominal range for the maximum rpm setting was 2,550 to 2,570 rpm. When set at maximum, the right governor ran at 2,548 rpm, and the left governor ran at 2,349 rpm.

ADDITIONAL INFORMATION

There were two bladder-type fuel tanks in each wing and one bladder-type cell in each nacelle. The inboard tanks held 56 gallons each, and the nacelle tanks held 25 gallons each. The outboard fuel cells held 40 gallons each.

A review of records revealed that the airplane's last fuel service was in Hartford, Connecticut, on April 15, 2004, and the tanks were filled at that time. The charter pilot that flew the airplane that day stated that he flew the airplane directly from Hartford to the airplane's home base of Rochester, New York. He logged 1.9 hours of flight time during the flight, and ran the engines for 1.7 hours on the outboard tanks. He estimated that the airplane consumed 39 gallons of fuel from the outboard tanks during the 1.7 hours, and a total of 63 gallons for the entire 1.9-hour flight.

The charter pilot was the only company pilot besides the pilot/owner to fly the accident airplane. The airplane was not serviced with fuel at Rochester. The airplane was next flown by the pilot/owner to Batavia, New York, for the annual inspection. The airplane was not serviced with fuel at Batavia.

The Pressurized Navajo Pilot's Operating Manual cited the following fuel consumption rates in gallons-per-hour (gph) for a standard day at sea level.

High Cruise	(1800 rpm both engines)	(gph)	54.0
Intermediate Cruise	(1600 rpm both engines)	(gph)	43.0
Long Range Cruise	(1600 rpm both engines)	(gph)	34.0
Maximum Endurance	(1600 rpm both engines)	(gph)	28.0

According to the Pressurized Navajo Information Manual, the outboard fuel tanks are not to be used during takeoff or landing, and the outboard fuel gauges are placarded as such. When the outboard tanks fall below 1/2 capacity, they may be used for level flight only. The first step in the DESCENT checklist prescribes that the fuel selectors be placed in the inboard position when the outboard tanks fall below 1/2 capacity.

In the SAFETY TIPS section of the manual, section 10.3, paragraph (j):

"The shape of the wing fuel tanks is such that in certain maneuvers the fuel may move away

from the tank outlet. If the outlet is uncovered, the fuel flow will be interrupted and a temporary loss of power may result. Pilots can prevent inadvertent uncovering of the outlet by having adequate fuel in the tank selected and avoiding maneuvers which would result in uncovering the outlet."

"Prolonged slips or skids of 30 seconds or more, in any pitch attitude or other unusual or abrupt maneuvers which could cause uncovering of the fuel outlet must be avoided when outboard tanks are being used..."

The airplane wreckage was released on January 24, 2005.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	57,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):		**Restraint Used:**	
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 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	May 17, 2004
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	April 30, 2004
Flight Time:	20000 hours (Total, all aircraft), 60 hours (Total, this make and model), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N57EF
Model/Series:	PA-31P	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	31P-7400215
Landing Gear Type:	Retractable - Tricycle	**Seats:**	7
Date/Type of Last Inspection:	August 17, 2004 Annual	**Certified Max Gross Wt.:**	7800 lbs
Time Since Last Inspection:	1 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	3516 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	TGIO-54PEIA
Registered Owner:	William M. Law	**Rated Power:**	425 Horsepower
Operator:		**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:	Bill Law Aviation	**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	ROC,559 ft msl	**Distance from Accident Site:**	11 Nautical Miles
Observation Time:	13:54 Local	**Direction from Accident Site:**	109°
Lowest Cloud Condition:	Few / 3000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 14000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	250°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.98 inches Hg	**Temperature/Dew Point:**	22°C / 17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Batavia, NY (GVQ)	**Type of Flight Plan Filed:**	None
Destination:	Rochester, NY (ROC)	**Type of Clearance:**	IFR
Departure Time:	13:25 Local	**Type of Airspace:**	Class E

Airport Information

Airport:	LEDGEDALE AIRPARK 7G0	**Runway Surface Type:**	Grass/turf
Airport Elevation:	666 ft msl	**Runway Surface Condition:**	Dry
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	43.251388,-77.868888

Administrative Information

Investigator In Charge (IIC):	Rayner, Brian
Additional Participating Persons:	Gene Conway; Federal Aviation Administration; Rochester, NY Mike McClure; New Piper; Prosper, TX Aaron Spotts; Lycoming Engines; Williamsport, PA
Report Date:	February 7, 2005
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=59951