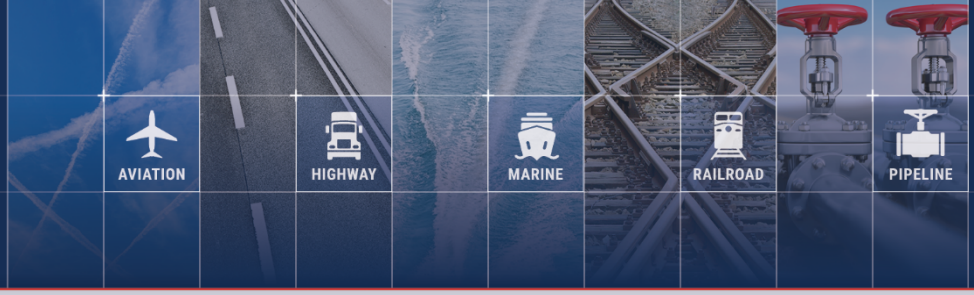

Aviation Investigation Factual Report

Location:	QUAKERTOWN, Pennsylvania	**Accident Number:**	NYC96FA003
Date & Time:	October 6, 1995, 17:20 Local	**Registration:**	N976BT
Aircraft:	ENSTROM 280C	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Factual Information

HISTORY OF FLIGHT

On October 6, 1995, at 1720 eastern daylight time, an Enstrom 280C, a helicopter, N976BT, was destroyed during a forced landing near Quakertown, Pennsylvania. The private pilot and passenger were fatally injured. Visual meteorological conditions prevailed for the personal flight that originated at Quakertown Airport (UKT), at 1715. No flight plan had been filed for the flight conducted under 14 CFR Part 91.

Witnesses stated the pilot/owner offered to fly a friend in the local area. The helicopter departed UKT, and circled the airport 2 to 3 times at an altitude of 200 to 300 feet above the ground.

A pilot who witnessed the accident stated:

...I observed the gold helicopter turning north over the hanger area at the south end of the field, at approximately 200 feet altitude...I heard three (3) sharp "pops," as if the engine was backfiring through the carburetor. The helicopter appeared to be at approximately 300 feet of altitude when the engine then quit, the rotor slowed immediately and the blades coned upward. The helicopter lost altitude rapidly and disappeared from view...

An airplane mechanic who also witnessed the accident stated:

...I first saw the helicopter just after it had taken off from UKT...It was operating normally, a high power setting, a high airspeed, but at a low altitude about 200 to 300 feet AGL...about 1 1/2 or 2 minutes later... I heard a popping sound like an engine backfiring and saw small puffs of black smoke behind the aircraft. The engine sound dropped to a low RPM, but was still running. The aircraft fish tailed for a moment, and pitched-up to a high angle of attitude, 20 degrees or more. The aircraft...descended at a very high speed, all the time maintaining the same pitch. It hit the trees and started to burn immediately.

The accident occurred during the hours of daylight about 40 degrees, 26 minutes north latitude, and 75 degrees, 23 minutes west longitude.

PERSONNEL INFORMATION

The pilot, Mr. Daniel T. Shay, held a Private Pilot Certificate with ratings for airplane single engine land, multi-engine land, rotorcraft helicopter, and instrument airplane.

His most recent Federal Aviation Administration (FAA) Second Class Medical Certificate

was issued on July 29, 1994.

Mr. Shay's pilot log books were located; however, the last entry was dated January 17, 1993. Mr. Shay's total flight time was estimated to be about 1,932 hours, of which approximately 212 hours were in helicopters, and 82 hours in this make and model.

WRECKAGE AND IMPACT INFORMATION

The helicopter wreckage was examined at the accident site on October 7, 1995. The examination revealed that all major components of the helicopter were accounted for at the scene, and it came to rest on an approximate magnetic bearing of 300 degrees.

A 50 foot high telephone pole, 35 feet northeast of the wreckage, was not damaged. Impact scars were observed at the top of a 75 foot high tree, approximately 15 feet northeast of the wreckage. Numerous broken tree limbs and branches were observed on the southwest side of the tree.

Examination of the wreckage revealed the helicopter was laying on its left side. A post crash fire damaged the cockpit, and engine compartment areas.

Control continuity was established from the pilot's collective and cyclic control, to the main rotor system. The collective was observed to be in the full-up position. Control continuity was also established from the pilot's anti-torque pedals to the tail boom.

The tail rotor gear box and hub were separated from the tailboom, and located about 25 feet northeast of the wreckage. One tail rotor blade remained attached to the hub and displayed a chord wise compression wrinkle, about 6 inches from the blade attaching point. Indentations were also observed on the leading edge of the blade. The other tail rotor blade was separated near the tail rotor hub.

Drive train continuity was established from the engine, through the drive belts, to the main transmission. Continuity was further established from the transmission, to the tail rotor drive shaft and the main rotor mast.

The three main rotor blades displayed coning, "S" bending, wrinkling, and chord wise scratches along the length of the blades.

Both the engine and cooling fan were fire damaged. The cooling fan blades were all intact, and not bent or distorted. The airframe fuel filter contained fuel, and was absent of debris. The single-drive dual-magneto, was observed to be separated from the engine. The engine was removed from the wreckage for examination.

The examination of the engine revealed that its external components were fire damaged. The mixture control was full rich, the throttle was full open, and the oil screen contained a few

small metal particles. The engine rotated freely, and compression and valve train continuity were established on all cylinders. The four upper, and the number two and four lower spark plugs, were gray in color and absent of debris. The number one and three lower spark plugs contained a light coating of oil. When turned by hand, the fuel pump and turbocharger rotated freely.

When the engine was rotated, the oil scavenger drive, the fuel pump drive, and the magneto drive gear also rotated. The engine's magneto drive gear teeth were intact, and there was no visible damage to the gear. The two magneto attaching studs extending from the engine case were intact, and covered evenly with soot. There were no nuts, washers, or flange clamps attached to the studs. When cleaned, the threads of the studs were observed to be undamaged. The magneto was fire damaged, and a hole was burned into one side. No damage was observed to the flange of the magneto.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on Mr. Daniel T. Shay, on October 8, 1995, by Dr. Ian Hood, Medical Examiner, of the Bucks County Coroners Office, Doylestown, Pennsylvania.

Toxicological testing was conducted on Mr. Daniel T. Shay, by the FAA Toxicology Accident Research Laboratory, Oklahoma City, Oklahoma.

ADDITIONAL INFORMATION

The helicopter was maintained by Flight 'C' Helicopters Srvs., INC., and kept in a Flight 'C' hangar at UKT. Flight 'C' was not a Federal Aviation Administration Certificated maintenance facility.

On July 3, 1995, an annual inspection completed by Flight 'C,' required six typed pages in the helicopter's maintenance log book. The log book entries revealed that the inspection was performed by six different personnel. At the completion of the annual, the helicopter's total time was 968.3 hours.

On August 19, 1995, the helicopter experienced a complete loss of engine power, and was autorotated to the ground by the pilot. A hard landing inspection revealed no further damage to the helicopter. According to the helicopter's maintenance records, the single-drive dual-magneto was examined, and both sets of points were found closed. The points were reset, and a satisfactory engine run-up was completed. This occurred at a total time of 979.3 hours.

At the request of the pilot, an overhauled replacement magneto was installed on October 1, 1995. The installation and ground run-up were performed by a Flight 'C' mechanic. The helicopter's total time was not recorded at the time of the maintenance.

The mechanic's entry in the helicopter's maintenance records stated:

Removed magneto S/N 26597 and replaced with another of same type -D4LN-2021, S/N 61579. Replacement unit was overhauled, tested, and supplied by Mattituck Avn. Corp. Installed magneto and timed to engine as per Enstrom M/M [maintenance manual]. Engine test run and mag check found satisfactory.

The helicopter's engine was also run-up by the operator of Flight 'C.' The first flight after the magneto change was the accident flight.

On November 17, 1995, the wreckage was examined by representatives of the owners estate, and Flight 'C.' Statements submitted by both parties revealed that during the examination they found two metal clips. One of the statements said:

...two clips which are normally used to retain the magneto on the engine...one clip was found amongst the yellow powder... apparently fire extinguisher residue ...at the bottom of the firewall in an undamaged condition...The second clip was found amongst dirt and debris in the engine cover door of the helicopter, but otherwise appeared undamaged...

The helicopter wreckage was released on October 7, 1995, to Joseph B. Shelby, a representative of the owners insurance company.

Pilot Information

Certificate:	Private	**Age:**	48,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	July 29, 1994
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	1932 hours (Total, all aircraft), 82 hours (Total, this make and model), 1671 hours (Pilot In Command, all aircraft), 14 hours (Last 90 days, all aircraft), 3 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	ENSTROM	**Registration:**	N976BT
Model/Series:	280C 280C	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	1142
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	July 3, 1995 Annual	**Certified Max Gross Wt.:**	2350 lbs
Time Since Last Inspection:	14 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	982 Hrs	**Engine Manufacturer:**	LYCOMING
ELT:	Not installed	**Engine Model/Series:**	HIO-360-E1AD
Registered Owner:	DANIEL T. SHAY	**Rated Power:**	190 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:	GAMMA LEASING COMPANY	**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	UKT ,526 ft msl	**Distance from Accident Site:**	
Observation Time:	16:55 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Scattered / 12000 ft AGL	**Visibility**	7 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	180°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	26°C / 18°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(UKT)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	17:15 Local	**Type of Airspace:**	Class E

Airport Information

Airport:	QUAKERTOWN UKT	**Runway Surface Type:**	
Airport Elevation:	526 ft msl	**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	40.430683,-75.339195(est)

Administrative Information

Investigator In Charge (IIC):	Pearce, Robert
Additional Participating Persons:	ROBERT H SHAPIRO; ALLENTOWN , PA JAMES BROWN; WILLIAMSPORT , PA WILLIAM E TAYLOR; MENOMINEE , MI
Report Date:	May 9, 1996
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=39073