Aviation Investigation Final Report

Location:	MILWAUKEE, Wisconsin	**Accident Number:**	CHI96FA113
Date & Time:	January 17, 1996, 17:59 Local	**Registration:**	N3326Q
Aircraft:	Piper PA-32	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation		

Analysis

The pilot was flying at night, over Lake Michigan, in IFR conditions when he informed Milwaukee Approach that the engine had quit. He was 20 miles northeast of Milwaukee. He was able to glide about 12 miles before impacting the water. The body of the pilot and airplane were recovered about two months after the accident. Examination of the engine driven fuel pump revealed that a 3/4 inch rubber washer was restricting the fuel flow through the outflow valve of the pump. Airworthiness Directive (AD) 93-11-11 states that the remanufactured fuel pump was to be replaced before the next flight in order 'to prevent disruption of fuel flow to the engine, which can result in a loss of engine power.' The AD had not been complied with.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Inadequate maintenance and inspection in that the Airworthiness Directive which applied to the fuel pump had not been complied with. A factor was the pilot was unable to reach land.

Findings

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

Findings
1. (C) FUEL SYSTEM,PUMP - BLOCKED(PARTIAL)

2. (C) MAINTENANCE,COMPLIANCE WITH AD - NOT COMPLIED WITH - OTHER MAINTENANCE PERSONNEL
3. (C) FLUID,FUEL - STARVATION

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

Occurrence #3: DITCHING
Phase of Operation: EMERGENCY LANDING

Findings
4. (F) TERRAIN CONDITION - WATER

Factual Information

History of Flight

On January 17, 1996, at 1759 central standard time (All times in CST), a Piper PA-32, N3326Q, was reported missing over Lake Michigan, 8 nautical miles northeast of Milwaukee, Wisconsin. The private pilot was reported missing. The 14 CFR Part 91 flight departed Kent County International Airport, Grand Rapids, Michigan, en route to Dane County Regional Airport, Madison, Wisconsin. Instrument meteorological conditions prevailed and an instrument flight plan was filed.

The pilot was attempting to return to Madison, Wisconsin, but a stationary cold front that affected Wisconsin, Michigan, and northern Illinois, prevented him from departing Grand Rapids, Michigan, until about 1700. The pilot had called the Federal Aviation Administration's, Lansing Automated Flight Service Station (AFSS) seven times between 0644 and 1623 to obtain current and forecast weather information.

At 1700, the pilot departed Grand Rapids for a direct flight over Lake Michigan to Madison, Wisconsin. The pilot climbed to 8,000 feet mean sea level (All altitudes in MSL unless noted), and reported that he was in between layers at 8,000 feet. At 1723, the pilot called Lansing AFSS and gave a pilot report 40 miles west of Lansing, Michigan. He also requested the weather and pilot reports for his route of flight.

At 1733, the pilot checked in with the Milwaukee Approach Control and reported that he was at 8,000 feet. The air traffic controller responded that the altimeter was 29.63.

At 1748, the pilot reported to the controller that his engine had quit. The aircraft's position was about 20 miles northeast of Milwaukee's General Mitchell Field at 8,000 feet. The pilot reported that his gliding distance was about 12 miles. The controller provided the pilot with radar vectors to General Mitchell Field.

During the emergency descent, the pilot stated that the engine had quit. He reported to the controller that he had turned on the electric fuel pump and turned the auxillary air on.

At 1751, the pilot stated, "We've got partial power." At 1753, the pilot stated, "We still have partial power and we're descending at five hundred feet a minute."

At 1755, the controller asked the pilot if the aircraft still had partial power. The pilot responded, "Partial, but very little. I can't maintain altitude with it."

At 1756, the controller reported the weather at Milwaukee as, "Indefinite ceiling, zero, sky

obscured, visibility 3/16 mile with fog."

At 1757, the controller asked the pilot again concerning the partial power. The pilot responded, "No. In fact its faltering."

At 1757:43, pilot reported, "I've got good oil pressure,fuel pressure-fuel pressure is low."

The pilot reported that the pitot heat was on and the alternate air bypass was on.

The last transmission the pilot made was at 1759:25 when he reported that his altitude was 600 feet. The mean sea altitude of Lake Michigan was about 580 feet. There was a sound of an open microphone from 1759:29 to 1800:13.

Personnel Information

The pilot had a private pilot's certificate with an instrument rating. The pilot's flight logbooks indicated that he had a total of 2,671 flight hours with 1,504 hours in make and model. He had logged a total of 309 hours of actual instrument time, 48 hours of simulated instrument time, and 150 hours of night time. He had flown 43 hours in the last 30 days.

The pilot had purchased N3326Q on October 10, 1990, and flew about 200 to 300 hours annually in the airplane.

The pilot had a third class medical certificate.

Aircraft Information

The airplane was a Piper PA-32, Lance, with a Lycoming 300 horsepower engine. It was owned and operated by the pilot. The last annual inspection was performed on May 1, 1995. The total airframe hours at the time of the accident was 5,140 hours. The total engine hours at the time of the accident was about 2,072 hours since major overhaul.

The engine and airframe logbooks were not recovered during the accident investigation. The aircraft mechanic and the wife of the pilot reported that the logbooks were routinely kept on board the airplane, but they were not recovered during the recovery and salvage of the airplane.

The pilot had purchased 22.6 gallons of fuel in Grand Rapids, Michigan, on January 17, 1996. The fuel source in Grand Rapids was inspected for contamination and none was found.

Meteorological Conditions

At 1612, the pilot had called Lansing AFSS for the current and forecast weather. The conditions reported for Grand Rapids, Michigan, were:

100 overcast, 1/4 mile visibility in fog, temperature 42 degrees, dewpoint 41 degrees, winds 090 at 8 knots.

The Madison forecast through 1800 was:

1000 overcast, 3 miles visibility, occasionally 600 overcast, 1 mile in light rain and fog, winds 140 at 15 knots, gusting to 25.

At 1635, the weather at Rockford, Illinois, was reporting:

300 scattered, 600 scattered, measured 1,800 overcast, 1 1/2 mile visibility in fog.

The reported weather in Milwaukee at 1745 was:

Indefinite ceiling, 100, sky obscured, visibility less than 1/4 mile in fog, temperature, 40, dewpoint 39, winds 150 at 6 knots, altimeter 29.64

Wreckage and Impact Information

Radar data indicated that the airplane had impacted Lake Michigan about 8 nautical miles northeast of the General Mitchell Airport. The airplane sank in about 192 feet of water and was later discovered by a company specializing in underwater salvage operations. The pilot and airplane were recovered about two months after the accident.

The diver who first saw the aircraft resting on the bottom of the lake reported that the aircraft was intact except for the right wing. The right wing was in about an 80 degree vertical position and was blocking access to the front door of the aircraft. The nose of the aircraft was buried in the silt with the propeller and spinner just below the surface of the sand and silt. The left wing was laying on the bottom and the tail was about five feet off the bottom. The diver reported that both door latches were in the closed and latched postion.

The diver removed the body of the pilot from the aircraft during his second dive. The diver encountered some difficulty removing the pilot due to the pilot having tied a life raft, a raft inflator bottle, a first aid kit, and a bag of miscellaneous items to his belt. The life raft was wedged between two of the seats. The body was in the rear of the aircraft.

The aircraft was recovered by attaching lifting cables to the engine mounts at the firewall. The aircraft was raised to a point just below the surface of the water and towed to the Milwaukee Harbor. The aircraft was then craned onto the dock.

The inspection was made of the pilot's seat belt and shoulder harness. The seat belt was found open on the floor of the aircraft with the shoulder harness detached. No defects were found and the release operated normally.

Water was present in the fuel system. Fuel was present in the wing tanks and in the fuel lines.

Examination of the engine revealed that the engine had continuity and compression. The fuel servo and dual magneto were bench tested and determined to be in operational condition.

The AC engine driven fuel pump, part number 41234, serial number 91F030 was inspected. The unit was mounted in a vice and solvent from a fuel flow bench was put into a bucket. The hose to the suction side of the pump was put into the solvent and the pump arm was cycled. It would not pump the solvent, and the arm would not return to its starting position without being moved manually.

The fuel pump was disassembled and it was determined that a rubber washer about 3/4 inch in diameter was covering the outflow valve of the fuel pump. The pump was reassembled without the rubber washer and tested again. The pump was operated manually and it pumped the solvent without restrictions to the flow.

The engine driven fuel pump was tested on a fuel bench. The rubber washer was placed over the outflow valve, as it had been originally discovered. Fuel pressure equal to the amount delivered by the electric boost pump was added. The fuel flow on the outlet side of the pump was restricted and only a small amount of fuel was delivered. When the rubber washer was removed and the test repeated, the fuel flow was not restricted.

The electric boost pump was bench tested and it was determined that it operated normally. The boost pump was designed to operate in series with the engine driven fuel pump. If the engine driven fuel pump was restricting the flow of fuel to the engine, the electric boost pump was unable to deliver fuel to the engine because of the restriction in the engine driven fuel pump.

It was determined that the Airworthiness Directive (AD) 93-11-11 applied to the AC engine driven fuel pump, part number 41234, serial number 91F030. The AD required that the affected high pressure diaphragm fuel pumps be replaced with a serviceable fuel pump prior to further flight. The reason for the immediate removal of the fuel pump was, "To prevent disruption of fuel flow to the engine, which can result in a loss of engine power."

AD 93-11-11 became effective on June 21, 1993. It superseded AD 93-05-21.

AD 93-05-21 contained amplifying information concerning the rubber washer used in the Aero Accessories, Inc., rebuilt fuel pumps. The AD stated:

Certain AC, Textron Lycoming, and Rajay/Rotomaster-modified diaphragm fuel pumps overhauled by AAI between November 1, 1991, and August 20, 1992, may contain a rubber washer manufactured from an improperly cured material. The material can absorb fuel and expand, causing the washer to dislodge from its position and block off the outlet valve of the

pump. The FAA's investigation revealed three additional high pressure diaphragm fuel pumps with the washer dislodged. That condition, if not corrected, can result in disruption of fuel flow to the engine, which can result in a loss of engine power.

AAI issued a Mandatory Service Bulletin 002 on February 25, 1993, concerning the AC/Lycoming and Ray Jay (Rotomaster) high pressure diaphragm fuel pumps. The service bulletin stated:

Before further flight - to prevent possible engine fuel starvation - all HIGH PRESSURE AC/Lycoming diaphragm type fuel pumps serviced or overhauled by Aero Accessories, Inc. beginning on June 18, 1991 and ending on November 24, 1992, included in the following listing of model and serial numbers, must be removed from service immediately - before further flight.

The Mandatory Service Bulletin 002 applied to the engine driven fuel pump used on the accident airplane.

It was determined that the pilot had purchased the airplane on August 10, 1990. In August of 1991, the pilot had a G & N Inc., remanufactured Lycoming IO-540-K1G5D, serial number L-19962-48A, engine installed on the aircraft. The yellow tag for the fuel pump identified the fuel pump installed on the remanufactured engine as the same fuel pump found on the accident airplane.

According to the maintenance invoices, the Airframe and Powerplant (A&P) mechanic who installed the rebuilt engine on the airplane, also performed the routine maintenance on the airplane, including annual inspections. The mechanic had performed the last annual inspection on the aircraft on May 1, 1995. He had also performed maintenance on the aircraft in January 1996.

The mechanic reported that he had not put a fuel pump on the engine. He reported that to his knowledge, the fuel pump had not been changed.

The AD list that the mechanic had used on January 4, 1996, did not list AD 93-11-11 as an applicable AD to the aircraft. The mechanic reported that the AD listing he used was a report that he had developed for keeping track af AD's applicable to the aircraft. The mechanic reported that the fuel pump was not covered by the AD's.

Medical and Pathological Information

An autopsy was performed on the pilot at the Milwaukee County Medical Examiner's office on March 13, 1996. The cause of death was listed as fresh water drowning secondary to a plane crash.

A Forensic Toxicology Fatal Accident Report was prepared by the Federal Aviation

Administration's Civil Aeromedical Institute. The report incicated the following results:

17.00 (mg/dl) Ethanol detected in Urine
18.00 (mg/dl) Ethanol detected in Blood
2.00 (mg/dl) Acetaldehyde detected in Blood
4.00 (mg/dl) 1-Butanol detected in Blood

Atenolol was detected in Blood
Atenolol was detected in Urine

The examiner reported that Atenolol was used for controlling high blood preesure, and that the levels of ethanol, acetaldehyde, and 1-butanol were innocuous.

Search and Rescue

The search for the airplane was hindered by incliment weather and ice formations on Lake Michigan.

Additional Information

Parties to the investigation included Textron Lycoming and the Federal Aviation Administration.

The aircraft wreckage was released to Myers Aviation, Inc., on March 15, 1996. The engine driven fuel pump, magneto, fuel servo, electric boost pump, engine, and the fuel pump rubber washer were released to Myer's Aviation, Inc., on June 19, 1996. The pilot's logbooks were returned to Mrs. Donna Volkert on June 19, 1996. The maintenance invoices were returned to Mrs. Donna Volkert on July 30, 1996.

Pilot Information

Certificate:	Private	**Age:**	49,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:**	Yes
Medical Certification:	Class 3 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	August 22, 1995
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	2671 hours (Total, all aircraft), 1504 hours (Total, this make and model), 2584 hours (Pilot In Command, all aircraft), 58 hours (Last 90 days, all aircraft), 43 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N3326Q
Model/Series:	PA-32 PA-32	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	32R-7780305
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	May 1, 1995 Annual	**Certified Max Gross Wt.:**	3600 lbs
Time Since Last Inspection:	194 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	5140 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Installed	**Engine Model/Series:**	IO-540-K
Registered Owner:	EGBERT W. VOLKBERT	**Rated Power:**	300 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night/dark
Observation Facility, Elevation:	MKE ,723 ft msl	**Distance from Accident Site:**	8 Nautical Miles
Observation Time:	18:10 Local	**Direction from Accident Site:**	250°
Lowest Cloud Condition:	Unknown	**Visibility**	0.25 miles
Lowest Ceiling:	Overcast / 100 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	160°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	6°C / 6°C
Precipitation and Obscuration:	N/A - None - Fog		
Departure Point:	GRAND RAPIDS , MI (GRR)	**Type of Flight Plan Filed:**	IFR
Destination:	MADISON , WI (MSN)	**Type of Clearance:**	IFR
Departure Time:	18:00 Local	**Type of Airspace:**	Class C

Airport Information

Airport:	GENERAL MITCHELL INTL MKE	**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**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:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	42.980133,-87.89949(est)

Administrative Information

Investigator In Charge (IIC):	Silliman, James
Additional Participating Persons:	BILL COPPERNOLL; MILWAUKEE , WI GREG A ERIKSON; WAYNE , IL
Original Publish Date:	September 19, 1996
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=10075