



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	BOXBOROUGH, MA	<b>Accident Number:</b>	NYC98FA063
<b>Date &amp; Time:</b>	02/02/1998, 0900 EST	<b>Registration:</b>	N79588
<b>Aircraft:</b>	Cessna 172K	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>		<b>Injuries:</b>	1 Fatal
<b>Flight Conducted Under:</b>	Part 91: General Aviation - Personal		

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## Analysis

After departure, a witness observed the Cessna 172 at a low altitude with the nose bobbing up and down. Another witness saw the airplane in a left turn and heard a power reduction. The airplane then dove into a wooded area. A post-crash fire consumed the cockpit and wings. The investigation found no evidence of a mechanical failure or malfunction with the engine or airframe. Witnesses reported frost on the wings of airplanes in the area at the time of the accident. Examination of the outside tie down where the airplane had been secured revealed no evidence that the tops of the wings had been examined or de-iced.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of the pilot to remove the frost on the wings before departure, which resulted in a stall

## Findings

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Occurrence #1: LOSS OF CONTROL - IN FLIGHT  
Phase of Operation: TAKEOFF - INITIAL CLIMB

### Findings

1. (F) WEATHER CONDITION - ICING CONDITIONS
2. (C) AIRCRAFT PREFLIGHT - INADEQUATE - PILOT IN COMMAND
3. (C) AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND
4. STALL - INADVERTENT - PILOT IN COMMAND

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Occurrence #2: IN FLIGHT COLLISION WITH OBJECT  
Phase of Operation: DESCENT - UNCONTROLLED

### Findings

5. OBJECT - TREE(S)

## Factual Information

### HISTORY OF FLIGHT

On February 2, 1998, about 0900 eastern standard time, a Cessna 172K, N79588, was destroyed when it struck the ground and burned in Boxborough, Massachusetts, about 1 minute after it departed from the Minute Man Airport (6B6), Stow, Massachusetts. The certificated commercial pilot was fatally injured. Visual meteorological conditions prevailed for the personal flight. No flight plan had been filed for the flight that was conducted under 14 CFR Part 91.

A witness reported that he arrived at the airport by private airplane on the evening of February 1, 1998, and his airplane remained outside during the night. When he returned to the airport on the morning of February 2, 1998, about 0830-0845, he observed frost on the wings of his airplane. He saw the accident pilot and talked to him for a few minutes, and then went inside. He did not observe the accident pilot's pre-flight inspection or departure.

A witness beyond the departure end of runway 03 was about 45 feet off the ground cutting trees, when he observed the airplane about 50 feet over his head. The engine sounded normal to the witness, and the nose was "bobbing up and down." The airplane passed over a stand of trees, descended below the treetops, started a left turn, and disappeared from view.

Another witness observed the airplane as it continued in the left turn. She heard a power reduction, and watched the nose of the airplane drop as it disappeared into tree. She then saw smoke where the airplane had disappeared into the trees.

The accident occurred during the hours of daylight at north 42 degrees, 28.82 minutes latitude, and west 71 degrees, 31.15 minutes longitude.

### PERSONNEL INFORMATION

The pilot held a commercial pilot certificate with ratings for airplane single engine land, glider, and instrument airplane. He was issued a Third Class FAA Airman Medical Certificate on August 8, 1997, with a limitation to wear corrective lenses.

The pilot's flying logbook was not recovered, and the pilot's recency of experience and flight review could not be determined. According to the pilot's last FAA airman medical application, he listed his total time as 1,800 hours with no flight time in the preceding 6 months.

### AIRCRAFT INFORMATION

The airplane had been refueled with 31 gallons of automotive gasoline before the accident. Examination of the maintenance logbooks revealed a supplemental type certificate (STC) for the use of automobile gasoline.

### WRECKAGE AND IMPACT INFORMATION

The airplane was examined at the accident site on February 2, 1998. The accident site was a wooded area with snow on the ground. On-site examination disclosed broken tree limbs on a 45 degree descending path. The wreckage debris was scattered in the general magnetic direction of 250 degrees. The engine and fuselage came to rest 66 feet beyond the first tree strike. All debris was located within a 100 foot radius of the engine and fuselage. The outboard 10 feet of the left wing was found near the base of the first tree strike. The outboard 8 feet of

the right wing was about 30 feet beyond the engine. The cabin and inboard wing panels were consumed by fire. A strong smell of fuel was present at the accident site. The debris and engine were moved to a hangar for further examination.

Flight control continuity was not confirmed due to impact damage. All breaks in flight control cables occurred at other than attach points, and the ends of the cables were puffed, similar to tension overload failures. The wing flap jackscrew corresponded to a flaps up position. The elevator trim jackscrew corresponded to a position of elevator tab 10 degrees up.

The engine could not be rotated due to a bent propeller flange. However, when disassembled, there was no evidence of bearing wear or internal failure. The spark plugs were sooty, and there was no impact damage to the electrodes. Both magnetos had received impact/fire damage and would not generate spark. The propeller blades were wavy in appearance, and had rotational scoring marks.

#### MEDICAL AND PATHOLOGICAL INFORMATION

The toxicological testing report from the FAA Toxicology Accident Research Laboratory, Oklahoma City, Oklahoma was negative for drugs and alcohol for the pilot.

An autopsy was conducted by Sarah Thora-Steffesen, MD, of the Massachusetts Medical Examiners Office on February 3, 1998.

#### ADDITIONAL INFORMATION

Another pilot at the Minute Man Airport reported he arrived after dark on February 1, 1998, in a Piper PA-28, and parked on the ramp area. He reported that frost was present on the top surface of both wings of his airplane, at 0900, the next morning, with the airplane parked in the sun. He estimated the depth of the frost at 1/16 inch. He also commented that he was concerned about the amount of frost and would have removed it from the wings before flight.

Examination of the parking area where N79588 was parked, on February 3, 1998, revealed snow on the ground except for the cement pad, which was used for the landing gear. The rungs on a ladder lying on the ground matched the patches of melting ice on the ground. There were no holes in the snow from a ladder, or footprints in the snow. There was no evidence that any anti-icing fluid had been applied to the top surface of the wings.

Inspectors from the Federal Aviation Administration (FAA), and from the Massachusetts Department of Aeronautics reported frost on the top surface of airplanes at nearby airports about the time of the accident.

The 0900 observation at Bedford, Massachusetts, located 10 nautical miles east of Minute Man airport, on a heading of 103 degrees, included high scattered clouds, visibility 5 miles, temperature 25 degrees Fahrenheit, dewpoint 21 degrees Fahrenheit, calm winds, and mist in the air.

References to the hazards of frost have been found in advisory circulars (AC) published by the FAA. Following are some references:

AC-61-23C - PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE \ CHAPTER 5 - WEATHER \ MOISTURE AND TEMPERATURE \ Dew and Frost

"When the ground cools at night, the temperature of the air immediately adjacent to the

ground is frequently lowered to the saturation point, causing condensation. This condensation takes place directly upon objects on the ground as dew if the temperature is above freezing, or as frost if the temperature is below freezing."

"Dew is of no importance to aircraft, but frost creates friction which interferes with the smooth flow of air over the wing surfaces, resulting in a higher stall speed. Frost should always be removed before flight."

AC-00-6A - AVIATION WEATHER \ For Pilots and Flight Operations Personnel \ Part one - WHAT YOU SHOULD KNOW ABOUT WEATHER \ Chapter 10 - ICING \ FROST

"...Frost does not change the basic aerodynamic shape of the wing, but the roughness of its surface spoils the smooth flow of air thus causing a slowing of the airflow. This slowing of the air causes early air flow separation over the affected airfoil resulting in a loss of lift. A heavy coat of frost will cause a 5 to 10 percent increase in stall speed. Even a small amount of frost on airfoils may prevent an aircraft from becoming airborne at normal takeoff speed. Also possible is that, once airborne, an aircraft could have insufficient margin of airspeed above stall so that moderate gusts or turning flight could produce incipient or complete stalling...."

AC 00-6A - AVIATION WEATHER \ For Pilots and Flight Operations Personnel \ Part One - WHAT YOU SHOULD KNOW ABOUT WEATHER \ Chapter 10 - ICING \ IN CLOSING

"...Always remove ice or frost from airfoils before attempting takeoff."

#### Wreckage Release

The aircraft wreckage was released to the insurance adjuster, Mr. Daniel S. Klein, on February 3, 1998.

#### Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	66, Male
<b>Airplane Rating(s):</b>	Single-engine Land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	Glider	<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 3 Valid Medical--w/ waivers/lim.	<b>Last FAA Medical Exam:</b>	08/08/1997
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	1800 hours (Total, all aircraft)		

## Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N79588
Model/Series:	172K 172K	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal; Utility	Serial Number:	17258199
Landing Gear Type:	Tricycle	Seats:	4
Date/Type of Last Inspection:	10/01/1997, Annual	Certified Max Gross Wt.:	2300 lbs
Time Since Last Inspection:	7 Hours	Engines:	1 Reciprocating
Airframe Total Time:	1951 Hours	Engine Manufacturer:	Lycoming
ELT:	Installed, not activated	Engine Model/Series:	O-320-F2D
Registered Owner:	HERBERT L. HARDY	Rated Power:	150 hp
Operator:	HERBERT L. HARDY	Operating Certificate(s) Held:	None

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	BED, 133 ft msl	Distance from Accident Site:	10 Nautical Miles
Observation Time:	0900 EST	Direction from Accident Site:	110°
Lowest Cloud Condition:	Scattered / 20000 ft agl	Visibility	5 Miles
Lowest Ceiling:	None / 0 ft agl	Visibility (RVR):	0 ft
Wind Speed/Gusts:	Calm /	Turbulence Type Forecast/Actual:	/
Wind Direction:		Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	-4° C / -6° C
Precipitation and Obscuration:			
Departure Point:	(6B6)	Type of Flight Plan Filed:	None
Destination:		Type of Clearance:	None
Departure Time:	0900 EST	Type of Airspace:	Class G

## Airport Information

Airport:	MINUTE MAN (6B6)	Runway Surface Type:	Asphalt
Airport Elevation:	268 ft	Runway Surface Condition:	Dry
Runway Used:	3	IFR Approach:	None
Runway Length/Width:	2770 ft / 48 ft	VFR Approach/Landing:	None

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Destroyed
<b>Passenger Injuries:</b>	N/A	<b>Aircraft Fire:</b>	On-Ground
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Fatal	<b>Latitude, Longitude:</b>	

## Administrative Information

<b>Investigator In Charge (IIC):</b>	ROBERT L HANCOCK	<b>Report Date:</b>	08/27/1999
<b>Additional Participating Persons:</b>	JAMES VOLNER; BEDFORD, MA RICHARD BUNKER; BOSTON, MA GREGORY SCHMIDT; WICHITA, KS GREGORY ERIKSON; WILLIAMSPORT, PA		
<b>Publish Date:</b>			
<b>Investigation Docket:</b>	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at <a href="mailto:pubinq@ntsb.gov">pubinq@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> .		

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).