



# Aviation Investigation Final Report

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<b>Location:</b>	Fitchburg, Massachusetts	<b>Accident Number:</b>	ERA11LA050
<b>Date &amp; Time:</b>	November 6, 2010, 13:10 Local	<b>Registration:</b>	N164US
<b>Aircraft:</b>	NORTH AMERICAN/SCHWAMM AT-6F	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Loss of engine power (total)	<b>Injuries:</b>	1 Fatal, 1 Serious
<b>Flight Conducted Under:</b>	Part 91: General aviation - Other work use		

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## Analysis

The pilot was performing a local, revenue sightseeing flight with a passenger in the aft seat. The flight was recorded on a glareshield-mounted personal video recorder. About 12 minutes into the flight, the pilot commented about an unspecified problem; however, the flight continued. Conversation regarding the airplane's fuel state indicated that there was adequate fuel on board for the flight. After air work and sightseeing, the flight returned to the local traffic pattern. After turning onto final approach for landing, the engine completely lost power. The pilot was unable to restart the engine, and the airplane crashed short of the runway.

Postaccident examination of the carburetor revealed a visible crack in the soldered seam on one of the metal floats. Although there was some impact damage to the carburetor, the cracked float was located inside a fuel chamber that was undamaged. Further examination of the float fracture revealed that it was the result of a dent in the float. The fracture surface was coated with a lead-based corrosion product that was also on the inside of the float, suggesting that the crack had been open and corroding for an extended time period. It is likely that the crack in the float provided a fuel path that allowed the float to fill with fuel, resulting in a carburetor malfunction. Examination of the airplane's records did not reveal documentation of recent carburetor maintenance.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:  
A total loss of engine power due to a cracked carburetor float and resulting carburetor malfunction.

## Findings

<b>Aircraft</b>	Fuel control/carburetor - Damaged/degraded
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## Factual Information

### History of Flight

<b>Approach-VFR pattern final</b>	Loss of engine power (total) (Defining event)
<b>Emergency descent</b>	Off-field or emergency landing
<b>Emergency descent</b>	Collision with terr/obj (non-CFIT)

### HISTORY OF FLIGHT

On November 6, 2010, about 1310 eastern daylight time, a North American/Schwamm AT-6F, N164US, was substantially damaged following a loss of engine power and collision with terrain during the approach to Fitchburg Municipal Airport (FIT), Fitchburg, Massachusetts. The certificated commercial pilot, who was the aircraft operator, was killed, and a passenger received serious injuries. Day, visual meteorological conditions prevailed at the time, and no flight plan was filed for the local, revenue sightseeing flight. The flight originated about 1223 and was conducted under the provisions of 14 Code of Federal Regulations Part 91.

An inspector with the Federal Aviation Administration (FAA) reported that the airplane was approaching FIT after a local, revenue sightseeing flight. The pilot was seated in the front seat and the passenger was in the rear seat. On final approach for landing on runway 32, the engine lost power and stopped running. The airplane collided with terrain short of the runway and came to rest inverted in the Nashua River. The passenger was able to egress the cockpit unassisted.

### PERSONNEL INFORMATION

The certificated commercial pilot, who was acting as pilot-in-command and was seated in the front cockpit seat, held airplane single engine land and glider ratings. He reported 2,621 civilian flight hours on his FAA second-class medical certificate application, dated April 27, 2010. According to excerpts from his pilot logbook, he completed a flight review on April 24, 2009, in a Cessna 172.

### AIRCRAFT INFORMATION

The airplane was a North American/Schwamm AT-6F, serial number 44-81687-A. It was powered by a Pratt and Whitney R-1340 AN-1 radial engine, rated at 600 horsepower at 2,250 rpm.

According to the maintenance logbooks, an annual inspection was performed on January 7, 2010, at an airframe total time of 5,766 hours. Examination of the recovered aircraft records did not reveal documentation of any recent removal or disassembly of a carburetor.

## METEOROLOGICAL INFORMATION

Weather, recorded at FIT at 1252, included winds from 350 at 6 knots, visibility 10 statute miles, sky clear, temperature 8 degrees C, dew point 0 degrees C, and altimeter setting 30.11 inches of mercury.

## FLIGHT RECORDERS

The airplane was equipped with a Panasonic HDC-SD1PP high definition digital video recorder.

Two video files were recorded on a memory card found in the camera. The first file was 1 minute and 26 seconds in length, and contained video, taken by the pilot, prior to the accident flight. The file included video of the passenger, who was seated in the aft seat. The passenger was wearing shoulder harnesses and another set of belts similar in appearance to a parachute.

The second file captured the accident flight and was 51 minutes and 55 seconds in length. The video was taken from a fixed mounting, behind the forward windscreen. The video image recorded forward, through the propeller arc.

The remainder of this section is a summary of the second video contents. Depicted times are elapsed time in minutes and seconds (mm:ss) from the beginning of the recording.

The video began after the engine was started and the airplane was stationary on the ramp at FIT. The weather consisted of little to no cloud cover and excellent visibility. Following a rolling takeoff, the airplane was airborne at 4:21. From 6:00 through 16:00, turns were demonstrated by the pilot, followed by practice by the passenger. At 16:32, the pilot made the following comment, "...now if you look at the horizon...you can see what the attitude is for level cruise-we haven't filled up here what's the matter...oh I know the problem."

After some scenic flying and non-pertinent discussion, at 24:00, the pilot began a series of aerobatic maneuvers, all narrated by the pilot in detail. At 35:31, the pilot discussed fuel consumption of the airplane. He noted that the power setting was 1,850 rpm and 26 inches of manifold pressure, which resulted in a fuel burn of 30 gallons per hour. The pilot noted that the airplane held a maximum capacity of 140 gallons of fuel, saying that they started with 70 gallons of fuel in the right tank and about 30 gallons of fuel in the left tank. The pilot further stated that they were currently using the right tank, and he used the left tank on the previous flight.

At 37:00, additional aerobatics were performed until the passenger stated that he was feeling "it," and the pilot advised that he would discontinue the aerobatics and conduct a scenic flight for the remainder of the flight.

At 39:00, while descending towards FIT, the pilot noted that they had been airborne for 39

minutes. The conversation continued, and the pilot explained how the global positioning system (GPS) indicated they were flying 196 miles per hour and were 12.3 miles from FIT and how the camera showed that they had been flying for 44 minutes.

At 48:16, the airplane entered a downwind leg for runway 32. At 49:18, the last radio transmission was made by the pilot, as "ah Fitchburg traffic T six midfield left downwind runway three two." At 50:18, the aircraft started a turn to base leg, and the pilot explained he was slowing the aircraft and putting down the flaps.

At 50:49, the airplane started a turn to final and rolled out with the right wing slightly low, consistent with a sideslip correction for a crosswind landing. The right wing low condition continued until 51:33. The pilot remarked that he was flying with the left wing low (inconsistent with the video recording showing the right wing low) to compensate for the winds out of the north.

At 51:33.15, the pilot said, "whoops my." This statement was accompanied by the nose moving slightly to the right, no change in the right wing low bank angle, and a noticeable decrease in engine noise, consistent with a loss of engine power. At 51:47.15, the pilot stated, "we're in trouble the engine has stopped for some reason." From 51:53.26 through 51:55.03, the nose of the airplane moved rapidly left and down. The last frame was recorded at 51:55.03, showing the airplane at a low altitude and sinking rapidly, in a nose low attitude, heading toward a river.

#### WRECKAGE AND IMPACT INFORMATION

The wreckage was recovered to FIT where the FAA inspector performed a preliminary examination of the wreckage. The propeller was rotated by hand and no internal binding or unusual noises were observed. Several spark plugs were removed and the electrodes exhibited normal color and wear. The wreckage was subsequently moved to a storage facility in Clayton, Delaware where a more detailed examination of the wreckage was performed.

On June 3, 2011, the wreckage was examined by NTSB and FAA investigators. The wings and elevator were removed during recovery of the wreckage. Flight control continuity was established from the cockpit to the wing roots and the elevator bell crank. Throttle, mixture, and propeller control continuity was established from the cockpit to the engine.

The right side of the cockpit was cut open, reportedly by rescue personnel to extract the pilot. The remainder of the cockpit, empennage, and tail section were intact. The leading edge of the left wing displayed significant impact damage; the right wing was largely intact, and displayed only minor dents.

The engine and its associated cowlings displayed significant impact damage. The engine remained in its mounts, with the upper mount tubes fractured, and was bent downward about 65 degrees. One propeller blade was bent aft slightly and displayed leading edge gouging and chord wise scratching at the tip. The opposite blade showed minor leading edge damage and

chord wise scratching at the tip.

The propeller was rotated by hand, and continuity was established through the power train to the accessory section. Compression was confirmed on all cylinders using the thumb method. The magnetos were removed, rotated by hand, and each produced spark at all terminal leads.

The fuel selector was found in the right tank position. The fuel caps were removed, and examination revealed that both the left and right inboard tanks had approximately 1/8 of an inch of fuel across the bottom of each tank. There was no evidence of water or contaminants in either tank. The outboard fuel bladders in each wing were intact and empty of all liquid. The left and right fuel quantity indicators were removed and tested. The units operated as designed, with no anomalies noted. Compressed air flowed from the carburetor supply line through the fuel selector to each respective fuel tank when selected. The carburetor was removed, and an external examination revealed a puncture to the float bowl. Disassembly of the carburetor revealed a dented and cracked float. The cracked float was on the opposite side of the float chamber that was punctured. The examination was suspended and the carburetor was retained for further examination.

The engine oil screen was removed, and the screen had captured carbon particles but was free of obstructions. The oil filter sustained significant impact damage and was not examined.

#### MEDICAL AND PATHOLOGICAL INFORMATION

A postmortem examination of the pilot was performed at the Office of the Chief Medical Examiner for the Commonwealth of Massachusetts. The autopsy report noted the cause of death as blunt head trauma.

Forensic toxicology was performed on specimens of the pilot by the FAA Bioaeronautical Sciences Research Laboratory (CAMI), Oklahoma City, Oklahoma. The CAMI toxicology report indicated negative for ethanol, cyanide, and carbon monoxide. There was 27.97 ug/ml acetaminophen in urine, diphenhydramine in urine, and 0.152 ug/ml diphenhydramine in blood.

#### TESTS AND RESEARCH

The engine carburetor was sent to the NTSB Materials Laboratory in Washington, DC for examination. The carburetor was a Bendix Stromberg model NA-Y9E1. The wall of the carburetor body was perforated, consistent with impact forces, by an object penetrating the wall from the exterior into the interior. The metal float in the perforated chamber was undamaged. The float on the opposite side of the carburetor body exhibited a visible fracture in the circumferential solder joint adjacent to a dent in the float surface. The crack was about 0.8 inches in length. The chamber housing this float was uncompromised by impact forces.

Examination of the solder joint fracture surface revealed white salt corrosion product on the solder-wetted areas of the fracture surface. Analysis of the white salts revealed significant

concentrations of carbon, oxygen, and lead. There were minor concentrations of iron, sodium, and potassium. Corrosion product was also scraped from the soldered surface inside the float; similar concentrations of the previously-mentioned elements were found.

An exemplar area of lab-fractured solder joint was examined for comparison purposes. The exemplar solder joint fracture revealed significant concentration of tin, copper, and lead. There were minor concentrations of oxygen, carbon, and iron.

The chemical composition of the float base metal was consistent with type 304 austenitic stainless steel. For additional information regarding the examination of the carburetor, refer to the NTSB Materials Laboratory Factual Report number 11-133, located in the public docket for the accident investigation.

### Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	73, Male
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Front
<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 2 With waivers/limitations	<b>Last FAA Medical Exam:</b>	April 27, 2010
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	April 24, 2009
<b>Flight Time:</b>	2621 hours (Total, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	NORTH AMERICAN/SCHWAMM	<b>Registration:</b>	N164US
<b>Model/Series:</b>	AT-6F	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	44-81687-A
<b>Landing Gear Type:</b>	Retractable - Tailwheel	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	January 7, 2010 Annual	<b>Certified Max Gross Wt.:</b>	4700 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	5766 Hrs as of last inspection	<b>Engine Manufacturer:</b>	P&W
<b>ELT:</b>		<b>Engine Model/Series:</b>	R1340 SERIES
<b>Registered Owner:</b>	On file	<b>Rated Power:</b>	600 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	FIT,348 ft msl	<b>Distance from Accident Site:</b>	1 Nautical Miles
<b>Observation Time:</b>	12:52 Local	<b>Direction from Accident Site:</b>	140°
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	6 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	350°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	30.11 inches Hg	<b>Temperature/Dew Point:</b>	8°C / 0°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Fitchburg, MA (FIT )	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Fitchburg, MA (FIT )	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	12:23 Local	<b>Type of Airspace:</b>	



## Airport Information

<b>Airport:</b>	Fitchburg Municipal Airport FIT	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	348 ft msl	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>	32	<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	4510 ft / 100 ft	<b>VFR Approach/Landing:</b>	Forced landing

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	1 Serious	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Fatal, 1 Serious	<b>Latitude, Longitude:</b>	42.548332,-71.750274(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Hicks, Ralph
<b>Additional Participating Persons:</b>	Fulton Shaw; FAA/FSDO; Windsor Locks, CT
<b>Original Publish Date:</b>	January 17, 2012
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class</a>
<b>Note:</b>	
<b>Investigation Docket:</b>	<a href="https://data.ntsb.gov/Docket?ProjectID=77739">https://data.ntsb.gov/Docket?ProjectID=77739</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).