



National Transportation Safety Board

Aviation Accident Final Report

Location:	Ellabell, Georgia	Accident Number:	CEN17FA331
Date & Time:	August 28, 2017, 08:39 Local	Registration:	N87RY
Aircraft:	Beech A36	Aircraft Damage:	Destroyed
Defining Event:	Loss of engine power (total)	Injuries:	3 Fatal
Flight Conducted Under:	Part 91: General aviation		

Analysis

The commercial pilot was conducting a business flight; while climbing out after departure, the pilot declared an emergency and reported a loss of engine power to air traffic control. The controller provided vectors to a private airport about 6.5 nautical miles (nm) behind the airplane and stayed in communication with the pilot until communications and radar were lost. The airplane then began a wide turn to head back to the private airport, traveling about 6.3 nm during the turn. The airplane impacted trees and terrain about 6 miles from the private airport.

The airplane's maintenance records showed that all six engine cylinders were replaced about 15 months and 227 engine hours before the accident. Postaccident examination of the engine revealed that four of the eight nuts that retained the No. 1 cylinder and one nut that retained the No. 2 cylinder were loose during disassembly, and no breakout torque reading could be measured. Two of the loose nuts on the No. 1 cylinder were on the through-studs that provided clamping force on the No.1 main crankshaft bearing. Disassembly of the crankcase revealed that the No. 1 main bearing had shifted to the rear of the crankcase, which obstructed the oil flow to the No. 1 main bearing and the No. 1 connecting rod bearing.

Given the available evidence, it is likely that, during replacement of the engine cylinders, improper torque of the cylinder hold-down bolts and through-studs resulted in an insufficient clamping torque, which allowed the No. 1 main bearing to shift. This shift precluded oil from reaching the No. 1 main bearing and the No. 1 connecting rod bearing, which led to the failure of the connecting rod during the accident flight.

The [emergency obstruction video map \(EOVM\) display map data](#) used by the controller handling the flight did not depict another private airport, which was closer (3.4 nm) and was in more of a direct path from the airplane's heading and position at the time of the emergency. The Federal Aviation Administration order governing [EOVM displays stated that they must contain satellite airports and other airports that could serve in an emergency. The order also noted that the information depicted on the EOVM should be restricted to only the information that is "absolutely essential."](#) [display map data stated that they should contain airports and heliports among other items, but noted that facility managers could](#)

delete items not required. The only exception was that facility managers could not delete airports immediately outside their area of jurisdiction that were within airspace used to receive radar handoffs and that were depicted by the facility having jurisdiction over that airspace. In response to questions from the NTSB, the closer airport was not depicted on the controller's video display because the air traffic facility was not aware the airport existed. Since the accident, the airport has been added to the display map data. On the basis of the distance that the airplane was able to glide after the pilot declared the emergency (6.3 nm), the airplane should have been able to reach the closer airport that was ahead of it. Thus, the omission of this airport on the controller's EOVM-display map data resulted in the pilot attempting, at the direction of the controller, to reach an airport that was beyond the airplane's gliding distance.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The total loss of engine power due to oil starvation to the No. 1 connecting rod, which resulted from the improper torque of the No. 1 cylinder hold-down bolts and through-studs at the time of the cylinder's installation, which resulted in the failure of the connecting rod due to oil starvation. Contributing to the accident was the omission, from the air traffic control emergency obstruction video display map data, of a closer alternate airport for the emergency landing.

Findings

Personnel issues	Installation - Maintenance personnel
Aircraft	Recip eng cyl section - Incorrect service/maintenance
Environmental issues	(general) - Contributed to outcome
Organizational issues	Adequacy of policy/proc - FAA/Regulator
Environmental issues	Tree(s) - Contributed to outcome

Factual Information

On August 28, 2017, at 0839 eastern daylight time, a Beech A36 airplane, N87RY, was destroyed when it collided with trees and terrain near Ellabell, Georgia, during a forced landing following a complete loss of engine power. The pilot and two passengers were fatally injured. The airplane was registered to the pilot who was operating it under the provisions of Title 14 *Code of Federal Regulations (CFR)* Part 91 as a business flight. Visual meteorological conditions prevailed at the time of the accident, and an instrument flight rules flight plan was filed. The flight originated from Savannah/Hilton Head International Airport (SAV), Savannah, Georgia, at 0829 and was destined for Cobb County International Airport – McCollum Field (RYY), Kennesaw, Georgia.

Radar data for the flight showed that the airplane departed SAV at 0829. After takeoff, the airplane made a left turn to a heading of about 300° and reached an altitude of 3,900 ft mean sea level (msl) about 6 minutes later; at that time, the airplane was about 16 miles northwest of SAV. At 0835:46, the pilot declared an emergency and reported that the airplane's engine had failed. At 0837:35, a tower controller at SAV provided the pilot with directional guidance to Cypress Lakes Airport (GA35), Bloomingdale, Georgia, but the controller then expressed concern about whether the airplane would make it to GA35. The final communication that the controller received from the pilot was at 0838:57; the pilot stated that the airplane "would probably make it."

After reaching its peak altitude of 3,900 ft msl about 0835, the airplane began descending and made a left 180° turn. The final radar data point, at 0839:39, showed the airplane at an altitude of 400 ft msl and a heading of about 120°. At that time, the airplane was about 0.1 mile from the accident site, which was about 6 miles from GA35.

PERSONNEL INFORMATION

The 39-year-old pilot held a commercial pilot certificate with single-engine land, multiengine land, and instrument airplane ratings. His most recent Federal Aviation Administration (FAA) first-class medical certificate was issued on March 20, 2017, without waivers or limitations.

The pilot's logbook was found within the wreckage. The logbook indicated that the pilot had accumulated 1,420 hours of total flight experience, including 786 hours in single-engine land airplanes and 633 hours in multiengine land airplanes.

AIRCRAFT INFORMATION

The Beech A36, serial number E-2917, was manufactured in 1994 as a single-engine airplane with retractable tricycle landing gear and seating for six occupants, including two flight crewmembers. The airplane was constructed primarily of aluminum and was powered by a 300-horsepower Continental Motors IO-550-B29B engine, serial number 675936.

The airplane's maintenance records indicated that the airplane was maintained in accordance with 14 *CFR* 91.409, Inspections, using a program recommended by the airplane manufacturer. The most recent

engine overhaul was performed on December 5, 2007, at which time the engine had accumulated a total of 1,815 hours. A maintenance entry dated May 23, 2016, indicated that all six engine cylinders were replaced on that date; the Hobbs meter reading at the time was 516.6 hours. The most recent maintenance was performed on June 29, 2017, at which time the airframe had accumulated a total of 3,215.2 hours. The recording hour meter reading at the time was 680.6 hours.

The recording hour meter reading during the postaccident examination was 743.2 hours, indicating that the airplane had accumulated 62.6 hours since the most recent maintenance and that the engine had accumulated 226.6 hours since the engine cylinders were replaced.

METEOROLOGICAL INFORMATION

At 0853, the weather reporting station at SAV recorded wind from 030° at 12 knots, 10 miles visibility, few clouds at 4,000 ft above ground level (agl), broken clouds at 7,000 ft agl, broken clouds at 25,000 ft agl, a temperature of 23°C, a dew point of 18°C, and an altimeter setting of 30.12 inches of mercury.

AIRPORT INFORMATION

Radar data and voice communications revealed the airplane was traveling on a heading of about 300° when the pilot reported the engine power loss. At that time, GA35 was about 6.5 nautical miles (nm) away on a heading of 174°, which required a 126° left turn to divert to GA35. Radar plots showed that the airplane was able to glide about 6.3 nm after the pilot declared the emergency and made the left turn.

FAA published charts for the area showed that Briggs Field Airport (GA43), Guyton, Georgia, was about 3.4 miles away on a heading of 345° when the pilot reported the engine power loss, which would have required a 45° right turn toward GA43. GA43 was a private airstrip with a 2,300-ft long turf runway. Although GA35 was depicted on the air traffic controller's [emergency obstruction video map \(EOVM\)](#)[display map data](#) that was used in handling the accident flight, GA43 was not depicted. The figure shows the positions of the airports relative to the airplane's track.

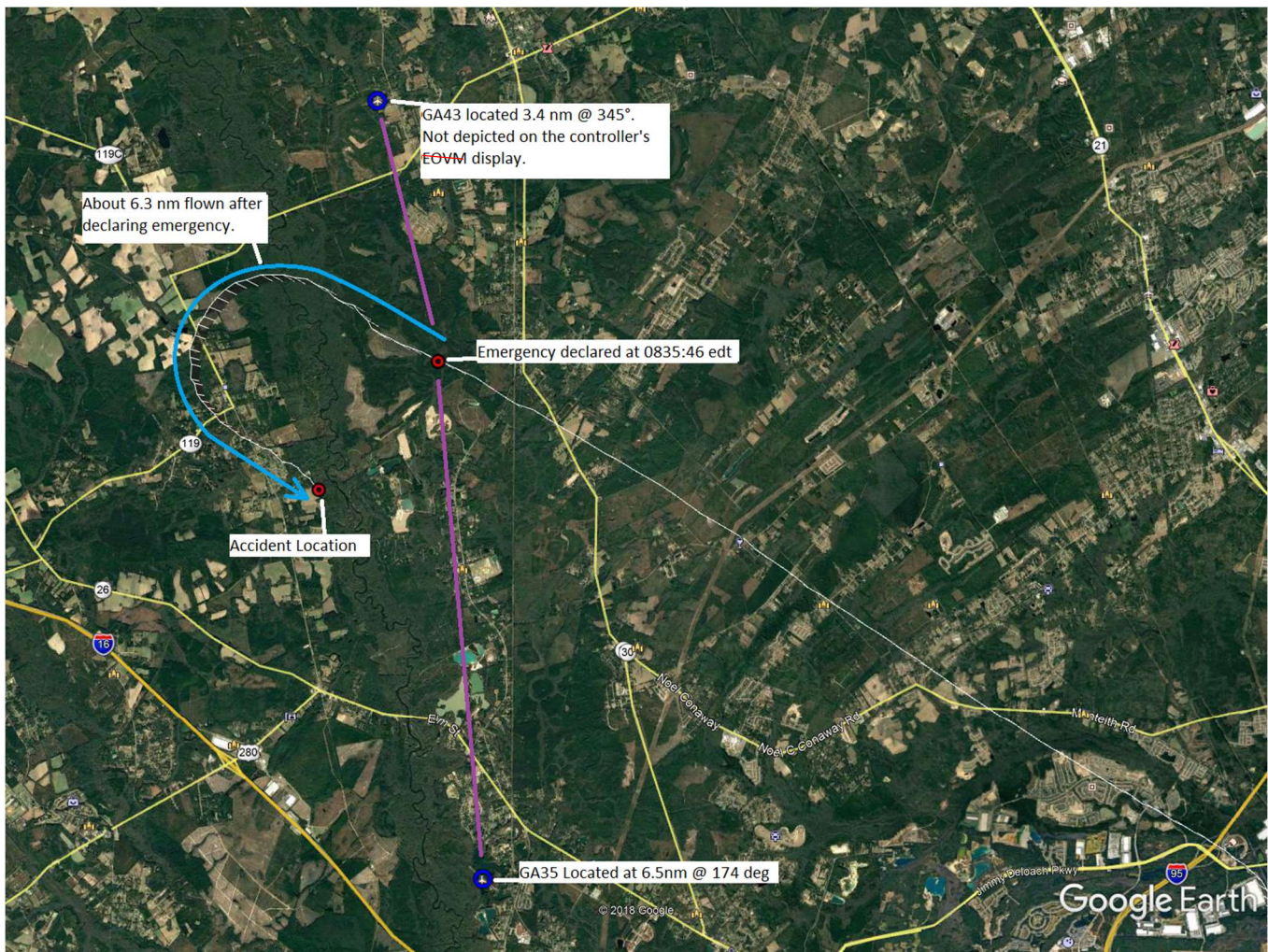


Figure - Google Earth plot of the airplane's flight path (in white) along with the nearest alternate airports.

FAA Order JO 7210.3Z, Facility Operations and Administration, which was in effect at the time of the accident, provided guidance regarding items depicted on the EOVM display map data. Paragraph 3-7-3, Display Map Data, stated that they should contain airports and heliports among other items, but noted that facility managers could delete items not required. The only exception was that facility managers could not delete airports immediately outside their area of jurisdiction that were within airspace used to receive radar handoffs and that were depicted by the facility having jurisdiction over that airspace. 3-8-4d, EOVM Design, stated that the basic design of the EOVM must incorporate, among other items, satellite airports and other airports that could serve in an emergency. This paragraph of the order contained a note stating "to avoid clutter and facilitate maintenance, information depicted on the EOVM should be restricted to only that which is absolutely essential." No guidance was found regarding the determination of airports essential for depiction on the EOVM.

In response to questions from the NTSB, the airport GA43 was not depicted on the controller's video display because the air traffic facility was not aware the airport existed. After the accident, GA43, along

with several other small airports in the Savannah area, were added to the [EOVM display map data](#) at the SAV ATCT.

WRECKAGE AND IMPACT INFORMATION

The airplane impacted trees and terrain near Ellabell, GA. The airplane was found in a wooded swamp area at a GPS elevation of 59 ft. The airplane was upright and facing 323°. An impact crater was centered about 10 ft directly in front of the nose of the airplane. Beyond the impact crater were trees with broken limbs and trunks that indicated a descent angle of about 45°.

The engine was partially separated from the fuselage. The fuselage was buckled in the cabin section with the aft section bent upward. The tail surfaces remained attached to the aft fuselage. The elevator was attached to the horizontal stabilizer, and the rudder was attached to the vertical stabilizer. The windshield and window posts had been cut by first responders to facilitate extrication of the occupants. The forward fuselage was crushed rearward. Both wings exhibited rearward crushing with the right wing crushing more pronounced than that on the left wing. The crush angles indicated a ground impact that was about 25° from vertical. Both wings remained attached to the fuselage, and the flaps and ailerons remained attached to the wings.

The location of the airplane and the terrain precluded a comprehensive on-scene examination. The airplane was recovered from the accident site and transported to a facility for a more comprehensive examination. Subsequent examination of the airframe revealed:

- The aft fuselage had been cut off to facilitate removal from the scene
- The left horizontal stabilizer and elevator had been cut to facilitate removal from the scene
- The right wing tip had been cut to facilitate removal from the scene.
- The engine had been removed to facilitate removal from the scene.

Flight control system continuity was verified. The flaps were found in the up position (0°). The landing gear was retracted. No preimpact defects were noted on the airframe.

Examination of the engine revealed a hole that was about 2 inches in diameter in the top right rear of the engine case. The crankshaft was visible through the hole, and no connecting rod was attached to the rod journal. A subsequent teardown examination of the engine revealed that the No. 1 connecting rod was separated from the crankshaft and the piston. Fragments of the No. 1 connecting rod were found within the crankcase. Further examination revealed that four of the eight nuts that retained the No. 1 cylinder and one nut that retained the No. 2 cylinder were loose during disassembly, and no breakout torque reading could be measured. Two of the loose nuts on the No. 1 cylinder were on the studs that provided clamping force on the No. 1 main crankshaft bearing (through-studs). Disassembly of the crankcase revealed that the No. 1 main bearing had shifted to the rear of the crankcase, which obstructed the oil flow to the No. 1 main bearing and the No. 1 connecting rod bearing. All other connecting rods exhibited normal operating signatures with some mechanical damage from the internal components of the engine. No other preimpact anomalies were detected.

MEDICAL AND PATHOLOGICAL INFORMATION

The Division of Forensic Sciences, Georgia Bureau of Investigation, Savannah, Georgia, performed an autopsy on the pilot. The cause of death was multiple injuries.

Toxicology testing performed at the FAA Forensic Sciences Laboratory was negative for all substances in the screening profile. |

History of Flight

Enroute-climb to cruise	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing
Landing	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Commercial; Private	Age:	39, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	3-point
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 1 Without waivers/limitations	Last FAA Medical Exam:	March 20, 2017
Occupational Pilot:	No	Last Flight Review or Equivalent:	July 1, 2016
Flight Time:	1420 hours (Total, all aircraft), 873 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	Registration:	N87RY
Model/Series:	A36 UNDESIGNAT	Aircraft Category:	Airplane
Year of Manufacture:	1994	Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	E-2917
Landing Gear Type:	Retractable - Tricycle	Seats:	6
Date/Type of Last Inspection:	June 29, 2017 AAIP	Certified Max Gross Wt.:	3651 lbs
Time Since Last Inspection:	63 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	3278 Hrs at time of accident	Engine Manufacturer:	Continental Motors
ELT:	C91A installed	Engine Model/Series:	IO-550-B29B
Registered Owner:	On file	Rated Power:	300 Horsepower
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	SAV, 50 ft msl	Distance from Accident Site:	13 Nautical Miles
Observation Time:	12:53 Local	Direction from Accident Site:	120°
Lowest Cloud Condition:	Few / 4000 ft AGL	Visibility	10 miles
Lowest Ceiling:	Broken / 7000 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	12 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	30°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.88 inches Hg	Temperature/Dew Point:	23°C / 18°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	SAVANNAH, GA (SAV)	Type of Flight Plan Filed:	IFR
Destination:	ATLANTA, GA (RYY)	Type of Clearance:	IFR
Departure Time:	08:29 Local	Type of Airspace:	Class G

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	2 Fatal	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	3 Fatal	Latitude, Longitude:	32.239444, -81.439163

Administrative Information

Investigator In Charge (IIC):	Brannen, John	Report Date:	
Additional Participating Persons:	Mike Pupic; FAA - Atlanta FSDO; Atlanta, GA Kurt Gibson; Continental Motors; Mobile, AL Ricardo Ascensio; Textron Aviation; Wichita, KS		
Publish Date:			
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=95900		

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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](#).