Aviation Investigation Final Report

Location:	Newton, Georgia	**Accident Number:**	MIA08FA003
Date & Time:	October 5, 2007, 16:45 Local	**Registration:**	N62970
Aircraft:	Bellanca 7GCBC	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

On the day of the accident, the newly certificated private pilot went on a short cross-country flight to build additional time for a commercial pilot certificate. While in cruise flight, the airplane's right outboard wing, at the wing strut attachment point, separated at the front and rear wing spars as a result of preexisting compressive damage. The airplane subsequently descended out of control and impacted the ground in a near-vertical nose-down attitude. Review of the airplane’s maintenance logbook records showed that an annual inspection was completed about 10 days, and 4.2 flight hours prior to the accident. The inspection write-up found in the logbook stated in part that on the day of the annual inspection, the airframe and powerplant mechanic with an inspection authorization (IA) complied with airworthiness directive (AD) 2000-25-02 R1, by inspecting the wood wing spars in accordance with (I/A/W) American Champion Aircraft Corporation (ACAC) Service Letter 406, and stated that no cracks were detected. Further inspection of the right wing found several inspection holes, one of which was located at the wing strut attachment point on the underside of the wing, and several inspection holes on the upper surface of the wing. However, the location and number of inspection holes were inadequate to allow total compliance with AD 2000-25-02, or ACAC Service Letter 406 and ACAC Service Letter 417. Given the size of the area of preexisting damage, had the IA inspected the wing spars at the wing strut attach point, where there was an inspection hole, in an attempt to comply with AD 2000-25-02, ACAC Service Letter 406, and ACAC Service Letter 417, he would have seen the preexisting damage.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of the right wing wooden spar due while the airplane was in cruise flight, due to the mechanic's inadequate annual inspection and his failure to comply with an airworthiness

directive.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: CRUISE - NORMAL

Findings
1. WING,SPAR - PREVIOUS DAMAGE
2. (C) MAINTENANCE,ANNUAL INSPECTION - INADEQUATE - COMPANY MAINTENANCE PERSONNEL
3. (C) MAINTENANCE,COMPLIANCE WITH AD - NOT PERFORMED - COMPANY MAINTENANCE PERSONNEL
4. WING,SPAR - FAILURE,TOTAL

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: CRUISE - NORMAL

Findings
5. AIRCRAFT CONTROL - NOT POSSIBLE - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
6. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On October 5, 2007, at 1645 eastern daylight time, a Bellanca 7GCBC, N62970, collided with the ground near Newton, Georgia. The certificated private pilot was killed, and the airplane sustained substantial damage. The flight was operated as a personal flight under the provisions of Title 14 Code of Federal Regulations (CFR) Part 91, and no flight plan was filed. Visual meteorological conditions (VMC) prevailed at the time of the accident. The airplane was registered to a private individual and operated by Ag-Flight, Inc. The flight originated from Decatur County Industrial Airpark, (BGE) Bainbridge, Georgia, on October 5, 2007, at 1630; destined for Weedon Field (EUF), Eufaula, Alabama.

According to the pilot's certified flight instructor (CFI), the pilot briefed with him for the 1.0-hour flight. A weather brief from flight service was obtained, and the airplane left BGE at 1630. At 1700 the CFI attempted to make radio contact with the pilot to warn of impending weather approaching from the east, but no contact was established. The airplane was declared overdue at about 1800. The CFI notified authorities and a search was started.

A witness, who was in the local area of the accident, heard an airplane engine making a "funny" sound. He looked up and saw a red and white airplane making what appeared to be a dive. The right wing of the airplane looked like there was something wrong with it on the outer wing. The airplane continued to dive towards the ground until he lost sight of it, and did not hear it crash. He drove his truck down a road searching for a "wreck," but saw no smoke or fire at the time. He stated that there are some rather large agricultural fields, so he thought that the airplane might have leveled out on one of the fields and flew off. On Monday, October 8th, he read in the local newspaper that a red and white airplane had crashed and they were still looking for it. He called the number listed in the newspaper and told the people what he had seen. The airplane was located by local authorities at about 1330 the same day.

PERSONNEL INFORMATION

The pilot, age 22, held a private pilot certificate with a rating for airplane single-engine land. His certificate was issued September 24, 2007. He held a second-class medical certificate issued on August 22, 2007, with no limitations. Review of the pilot's logbook revealed that he had accumulated 133.0 total flight hours, of which 33.3 hours were in the Bellanca 7GCBC. On the day of the accident, the personal flight consisted of a cross-country for the purpose of building additional time towards a commercial pilot certificate.

AIRCRAFT INFORMATION

The three-seat, high wing, fixed-gear tailwheel airplane was manufactured in 1972. The airplane's wing spars were constructed of wood. It was powered by a Lycoming O-320-A2B 150-hp engine and equipped with a Sensenich fixed-pitch propeller. Review of the maintenance logbook records showed that an annual inspection was completed on September 25, 2007, 4.2 hours prior to the accident. The airframe total time was recorded at 8,021.2 hours.

WRECKAGE AND IMPACT INFORMATION

Examination of the airplane on-site found that it had impacted into an agricultural field in a near vertical attitude. The debris field was limited to a 25-foot circle around the center of impact. The airplane did not exhibit signs of rotation; ground scarring from the wing impact was evident and was measured at 30 feet 3 inches. Further examination found the right wing, outboard of the wing strut attach point, folded over and resting on the remaining right wing. The remainder of the right wing had accordion-type crushing from the leading edge aft to the trailing edge. The left wing remained intact with accordion-type crushing from the leading edge aft to the trailing edge. The aileron was present, but the attach fittings were distorted in an "S" shape and ground scarring was present the entire length of the left wing.

The right wing aft spar was compressed forward towards the front spar, and the leading edge was crushed into the front spar. A portion of the right wing, approximately 59 inches outboard of the wing strut attach fitting to include the wing tip, was folded back over and on top of the remaining inboard right wing. Witness marks from the red painted wing tip were present on the inboard section of the right wing; about 57 inches from the strut attach point. In addition, there was no ground scarring present from this section of the wing or tip. The right hand aileron was detached from two of the three attaching points and bent chordwise in a "U" shape, and the attach fittings were distorted in an "S" shape. The fuselage collapsed into itself, but the horizontal stabilizers and elevators remained attached. The vertical stabilizer was damaged on the top and leading edge, and the rudder remained attached.

Flight control continuity was established to all flight controls leading to the cockpit area. However, due to impact damage, control cable continuity could not be established to the control column in the cockpit.

The propeller remained attached to the engine, and both propeller blades exhibited "S" bending and chordwise scratching. The engine was found buried in the main impact crater, completely up to the rear case and firewall, which was compressed against the rear engine case. The airframe fuselage was separated from the engine by first responders in order to extract the pilot.

The engine examination included partial disassembly. The lubrication system, induction system, carburetor, ignition system including magnetos, harness leads, and spark plugs were examined. The crankshaft could not be rotated due to impact damage. A lighted borescope was used to examine the internal top end components. No preimpact anomalies were revealed. At the conclusion of the engine examination, no evidence of any engine mechanical

failure or malfunction was found.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot on October 10, 2007, by the Division of Forensic Sciences, Georgia Bureau of Investigation (GBI), Atlanta, Georgia. The autopsy findings reported the cause of death as multiple generalized blunt-force trauma.

Forensic toxicology was performed on specimens from the pilot by the Federal Aviation Administration (FAA) Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. The toxicology report stated that 105 (mg/dl, mg/hg) Ethanol detected in Kidney, 144 (mg/dl, mg/hg) Ethanol detected in Kidney, 1 (mg/dl, mg/hg) N-Butanol detected in Kidney, 22 (mg/dl, mg/hg) N-Butanol detected in Muscle, 5 (mg/dl, mg/hg) N-Propanol detected in Kidney, 6 (mg/dl, mg/hg) N-Propanol detected in Muscle, 1 (mg/dl, mg/hg) Isopropanol detected in Kidney, 2 (mg/dl, mg/hg) Acetone detected in Kidney samples. Also noted was that all of the samples tested had putrefaction.

TESTS AND RESEARCH

The right wing was sent to the National Transportation Safety Board's Materials Laboratory in Washington, DC, for further examination.

Examination of the wing spar pieces near the area where they connected to the main support strut found that both spars were fractured in this area. The bottom edges of both spars were square to the forward and aft faces, but the top edges of both spars were beveled, consistent with the shape of the airfoil. The front spar was 0.75 inch thick, 5.65 inches tall on the forward side and 5.75 inches tall on the aft side. The front spar dimensions were consistent with a drawing provided by ACAC, which holds the type certificate. The rear spar was 0.75 inch thick, 4.10 inches tall on the forward side and 4.00 inches thick on the aft side. The forward and aft sides of both spars were reinforced with plywood, measuring approximately 0.16 inch thick in the area of the connections to the main support struts.

A closer view of the mating pieces at the separation of the front spar, just outboard of the connection to the main support strut, found that the fracture surface on the lower 2.8 inches of the spar was flat with a dull white appearance. Optical micrographs of the mating surfaces showed that the cell walls of the wood were crumpled and folded, indicating preexisting compressive damage. In contrast, the optical micrographs of typical flat overstress fractures from other areas of the spar, showed wood with sharply defined cell walls of a reddish color. Preexisting compressive damage was found on the entire lower 2.8 inches of the spar, occurring generally on two planes perpendicular to the spar.

The outboard damage plane coincided with the center of the first rib outboard of the main support strut, approximately 0.8 inch outboard of the edge of the plywood reinforcement for the connection to the main support strut. This outboard plane of damage intersected the aft

surface of the spar and was bounded at top and bottom by the two lower nail holes where the rib was attached (ribs were typically attached with three nails). The outboard damage plane measured approximately 2 inches tall, and 0.6 to 0.7 inches deep, occupying approximately 1.3 square inches. The other damage plane on the lower 2.8 inches of the front spar was approximately 0.4 inch further inboard (approximately 0.4 inch outboard of the edge of the plywood reinforcement for the main support strut), and extended to the lower surface of the spar. The inboard damage plane intersected the forward surface of the spar and occupied approximately 0.8 square inches.

The smaller outboard piece of the spar located above the larger outboard piece also had an area of preexisting compressive damage, which occupied approximately 0.3 square inches. The area of preexisting compressive damage was approximately 0.4 inch inboard of the third nail hole where the first rib outboard of the main strut was attached, at a position similar to the inboard damage plane on the lower part of the spar.

In total, the preexisting compressive damage areas outboard of the connection to the main support strut occupied a minimum of approximately 55 percent of the cross section of the front spar. This value is a minimum because missing areas of the front spar could have retained additional areas of preexisting compressive damage.

The fracture of the rear spar outboard of the main support strut also had an area of preexisting compressive damage near the top of the spar. This area of preexisting compressive damage was approximately in plane with the edge of the plywood reinforcement for the connection to the main support strut, and measured approximately 0.3 inch tall by 0.75 inch wide. The majority of the rear spar in this area was missing.

ADDITIONAL INFORMATION

Review of the maintenance logbook records showed that an annual inspection was completed on September 25, 2007, by an airplane and powerplant mechanic with an inspection authorization (IA). An inspection write-up found in the logbook stated in part that on the day of the annual inspection, the IA complied with airworthiness directive (AD) 2000-25-02 R1, by inspecting wood wing spars in accordance with (I/A/W) American Champion Aircraft Corporation (ACAC) Service Letter 406, and stated that no cracks were detected. Furthermore, the IA stated that a annual inspection was completed that same date and that he certified that the aircraft was inspected I/A/W a annual inspection and was determined to be in airworthy condition.

FAA AD 2000-25-02 (revision 1) requires periodic inspection of the wing spars of 7GCBC aircraft at intervals not to exceed 500 hours time-in-service or 12 calendar months, whichever comes first. The effective date of AD 2000-25-02 (revision 1) was July 13, 2001, and the initial inspection required by the AD would have had to occur no later than 13 calendar months after January 19, 2001. Inspections were to be accomplished I/A/W ACAC Service Letter 406, Revision A, dated May 6, 1998. If necessary, additional inspection holes were to be installed

I/A/W ACAC Service Letter 417, Revision C, dated May 6, 1998. ACAC Service Letter 406 noted that "Compression cracks have been found emanating from the upper and lower surfaces of the front and rear wing spars at both ends of the reinforcement plate for the lift strut attachment." Service Letter 406 further stated, "The only area where it is possible to positively identify a compression crack is on the top and bottom surfaces of the spar. Both front and rear spars need to be inspected." Key areas of concern were shown to be generally in the vicinity of the connection to the main strut. Service Letter 406 also required inspection for loose or missing rib nails per Bellanca Service Letter C-1 39, dated January 28, 1980; a figure in Service Letter 406 included an annotation "Warning: Loose rib nails may indicate compression failure behind rib flange." Service Letter 406 also included a note that "It may be helpful during compression failure inspection to apply upward or downward force at the wing tip."

Further inspection of the right wing found several inspection holes, one of which was located at the wing strut attachment point on the underside of the wing and several inspection holes on the upper surface of the wing. However, the location and number of inspection holes were inadequate to allow compliance with AD 2000-25-02, ACAC Service Letter 406 and ACAC Service Letter 417.

Pilot Information

Certificate:	Private	**Age:**	22,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	August 22, 2007
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	September 24, 2007
Flight Time:	133 hours (Total, all aircraft), 33 hours (Total, this make and model), 89 hours (Pilot In Command, all aircraft), 33 hours (Last 90 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bellanca	**Registration:**	N62970
Model/Series:	7GCBC	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Aerobatic	**Serial Number:**	367-72
Landing Gear Type:	Tailwheel	**Seats:**	3
Date/Type of Last Inspection:	September 25, 2007 Annual	**Certified Max Gross Wt.:**	2950 lbs
Time Since Last Inspection:	4.2 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	8021.2 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	C91 installed, not activated	**Engine Model/Series:**	O-320-A2B
Registered Owner:	William F. Howell	**Rated Power:**	150 Horsepower
Operator:	Ag-Flight, Inc	**Operating Certificate(s) Held:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	ABY	**Distance from Accident Site:**	
Observation Time:	16:53 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	60°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.04 inches Hg	**Temperature/Dew Point:**	31°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Bainbridge, GA (BGE)	**Type of Flight Plan Filed:**	None
Destination:	Eufaula, AL (EUF)	**Type of Clearance:**	None
Departure Time:	16:30 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	31.194723,-84.485275

Administrative Information

Investigator In Charge (IIC):	Wilson, Ralph
Additional Participating Persons:	JD Nichols; FAA/FSDO; College Park, GA Edward Rogalski; Lycoming; Bellview, FL
Original Publish Date:	December 28, 2008
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=66848