Aviation Investigation Final Report

Location:	Mammoth Lakes, California	**Accident Number:**	SEA07FA277
Date & Time:	September 3, 2007, 09:30 Local	**Registration:**	N240R
Aircraft:	Bellanca 8KCAB-180	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot departed from a private airport at Flying M Ranch on a local personal flight, which ground personnel thought would last about 2.5 to 3 hours. When the airplane failed to return, it was reported missing and a search was started. No emergency locator transmitter (ELT) signal was received from the airplane. The Civil Air Patrol suspended its search activities after about 1 month. About 1 year later, a hiker found some of the pilot's personal effects, and an aerial search located the airplane wreckage about 0.5 mile from the personal effects. The accident occurred in remote mountainous terrain at an elevation of 10,000 feet. After the wreckage was discovered, a review of radar data from September 3, 2007, revealed a track that ended about 1 mile northwest of the accident site. This 20-minute track showed the airplane flying south along the crest of a mountain range with elevations greater than 13,000 feet.

During the search efforts, aircraft had flown over the accident location but did not see the wreckage. Additionally, the 20-minute track had been ruled out as the accident flight due to a witness report of seeing the airplane near Yerington at the time of the track. The witness reported the time of his sighting based on a telephone call with a friend. The search team initially used the time provided by the witness. Later, it was determined from the telephone company's time log that the witness-reported time was off by 1 hour.

Examination of the accident site revealed that the airplane was on a northerly heading at impact, indicating that the pilot had executed a 180-degree turn after radar contact was lost. Ground scars and distribution of the heavily fragmented wreckage indicated that the airplane was traveling at a high speed when it impacted in a right wing low, near level pitch attitude. A postimpact fire consumed the fuselage, with the exception of its steel frame. The wings were

fragmented into numerous pieces. The ELT was destroyed. Damage signatures on the propeller blades and the engine crankshaft indicated that the engine was operating at impact. Examination of the airframe and engine revealed no evidence of any malfunctions or failures that would have prevented normal operation.

Visual meteorological conditions existed in the accident area at the time of the accident. Mean winds at 10,000 feet were from 220 degrees at 15 to 20 knots; some gusts of 25 to 30 knots may have occurred. Moderate turbulence and downdrafts of at least 400 feet per minute probably occurred at the time and in the area of the accident. The magnitude of the downdrafts likely exceeded the climb capability of the airplane, which, at a density altitude of 13,000 feet, was about 300 feet per minute.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's inadvertent encounter with downdrafts that exceeded the climb capability of the airplane. Contributing to the accident were the downdrafts, high density altitude, and mountainous terrain.

Findings

Occurrence #1: IN FLIGHT ENCOUNTER WITH WEATHER
Phase of Operation: MANEUVERING

Findings
1. (F) WEATHER CONDITION - HIGH DENSITY ALTITUDE
2. (F) WEATHER CONDITION - DOWNDRAFT
3. (C) FLIGHT INTO ADVERSE WEATHER - INADVERTENT - PILOT IN COMMAND
4. (C) AIRCRAFT PERFORMANCE,CLIMB CAPABILITY - EXCEEDED

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: MANEUVERING

Findings
5. (F) TERRAIN CONDITION - MOUNTAINOUS/HILLY
6. (C) CLIMB - NOT POSSIBLE - PILOT IN COMMAND

Factual Information

HISTORY OF FLIGHT

On September 3, 2007, approximately 0930 Pacific daylight time, a Bellanca 8KCAB-180 (Super Decathlon), N240R, collided with terrain while maneuvering in remote mountainous terrain approximately 8 miles west-northwest of Mammoth Lakes, California. The airplane was destroyed, and the airline transport pilot was killed. The airplane was registered to and operated by the Flying M Hunting Club, Inc, (Flying M). Visual meteorological conditions prevailed for the local personal flight, which originated from a private airport at the Flying M Ranch near Yerington, Nevada, between 0820 and 0830. No flight plan was filed for the 14 Code of Federal Regulations (CFR) Part 91 flight.

The Flying M Ranch Airport was located at 38 degrees 36.700 minutes north latitude and 119 degrees 0.083 minutes west longitude at an elevation of 4,953 feet. The accident site was located approximately 65 miles south of the departure airport.

The Flying M's chief pilot had breakfast with the pilot on the day of the accident. During breakfast, the chief pilot asked the pilot what he wanted to do that day, and the pilot said he wanted to fly the Super Decathlon. The chief pilot prepared the airplane for flight by removing it from its T-hangar and confirming that it was full of fuel. The pilot arrived about 0815 and conducted a preflight of the airplane in the presence of the chief pilot. The chief pilot reviewed the fuel-injected engine's starting procedures with the pilot and asked him where he was going. The pilot responded that he was heading south to Highway 395, which runs roughly on a north/south line along the eastern side of the Sierra Nevada mountain range.

According to the pilot's wife, the purpose of the flight was pleasure; she characterized it as "a Sunday drive." The pilot gave no indication that he planned to perform aerobatic maneuvers, and he was not wearing a parachute, which is required for aerobatics. He was seated in the front seat of the tandem two place airplane.

Another employee of the Flying M observed the airplane about 0825 or 0835 approximately 9 miles south of the departure airstrip. The employee knew the airplane well, as it was commonly used for spotting cattle, which he was responsible for rounding up. He saw the airplane flying south at about 150 to 200 feet above the ground.

The chief pilot said that he expected the airplane to return by 1030 or 1100. The pilot's personal pilot was standing by to assist in parking the airplane at 1100. When the airplane had not returned by 1130, the chief pilot became concerned, and an aerial search was commenced within 30 minutes. No emergency radio transmissions were received from the airplane, nor were any Emergency Locator Transmitter (ELT) transmissions received.

The Civil Air Patrol (CAP), State and County authorities, and friends of the pilot initiated an extensive search for the missing airplane. The terrain searched was located in two states and involved several counties. The CAP suspended its search activities on October 2, 2007.

On October 1, 2008, the Madera County Sheriff's Department was notified that personal effects, including a pilot certificate and another identification card, believed to belong to the pilot had been found by a hiker near Minaret Summit in the Sierra Nevada Mountains. A new search was initiated, and the wreckage of the airplane was discovered about 1/2 mile from the location where the personal effects had been found. The wreckage was located at an elevation of approximately 10,000 feet. The elevation of peaks in the area exceeded 13,000 feet.

PERSONNEL INFORMATION

The pilot, age 63, held an airline transport pilot certificate with an airplane multiengine land rating; commercial privileges in single engine land airplanes, single engine sea airplanes and helicopters; private privileges in gliders and balloons; a helicopter instrument rating; and type ratings in the CE-500, CE-525, CE-750, and DA-10. The pilot received recurrency training in a Cessna Citation X (CE-750) in April 2007. The pilot's most recent second-class Federal Aviation Administration (FAA) medical certificate was issued on February 14, 2007, with the limitation: must have available glasses for near vision. On his application for this medical certificate, the pilot indicated that he had 6,731 hours of flight experience, with 350 hours in the previous 6 months. The Flying M's chief pilot estimated the pilot had 40 hours flight time in the accident airplane.

AIRCRAFT INFORMATION

The airplane, a Super Decathlon, was a single engine, high wing, tail-wheel fixed landing gear airplane, which was manufactured by Bellanca Aircraft Corporation in 1980. Its maximum takeoff gross weight was 1,800 pounds. It was powered by a Lycoming AEIO-360-H1A, reciprocating, 180-horsepower, normally aspirated, fuel-injected engine. The airplane could be operated as a normal or acrobatic category airplane.

Entries in the airplane's maintenance records indicated that its most recent annual inspection was performed on April 8, 2007. The airframe and engine each had 1,072.68 hours of flight time at the time of the annual inspection. In 1996 the airplane received a factory modification of new wings, which incorporated aluminum spars and ribs. The airplane was not equipped with a GPS receiver.

The airplane was involved in a landing incident on May 27, 2007. During this event, the airplane departed the runway during landing roll and impacted a barbed wire fence. A propeller strike inspection was performed on the engine and a new Hartzell constant speed propeller was installed on the airplane. The airplane was returned to service on June 29, 2007, at a total time of 1,094.7 hours. The Flying M's chief pilot reported the airplane had been flown 10 to 12 hours

since its return to service.

Two days prior to the accident, the Flying M's chief pilot and another pilot flew the airplane and performed extensive aerobatic maneuvers. They reported no discrepancies with the airplane.

The airplane had two seats and each seat was equipped with two sets of seat belts. One set of seatbelts was a Pacific Scientific 5-point harness, used for aerobatics, and generally not worn on non-aerobatic flights. The other set of seatbelts was a conventional lap belt with one shoulder harness strap.

The airplane was equipped with a single cabin door on the right side of the fuselage that could be jettisoned if necessary. The emergency door release handle was on the forward edge of the door. In order to jettison the door, a red locking pin had to be pulled and then the red release handle pulled aft and up, which would remove the door hinge pins.

According to the performance charts in the pilot's operating manual for the airplane, the airplane's maximum rate of climb capability at a pressure altitude of 12,000 feet was 370 feet per minute, and at 13,000 feet, it was 300 feet per minute. These rates of climb were determined at standard temperature, with the airplane at its maximum gross weight, and the engine at full throttle and leaned as required for smooth operation.

The engine manufacturer provided a table in the engine operator's manual that gave the full throttle horsepower at a given altitude as a percentage of sea level horsepower. At an altitude of 13,000 feet, the engine produced 63.4% of its sea level 180-horsepower or 114 horsepower.

METEOROLOGICAL INFORMATION

Mammoth Yosemite Airport (MMH), located about 102 degrees at 14.7 nautical miles (nm) from the accident site at an elevation of 7,129 feet, recorded the following weather observations:

September 3, 2007 at 0848 (AUTO): Wind 120 degrees at 7 knots, visibility 10 miles, clear at or below 12,000 feet, temperature 21 degrees Celsius (C), dew point 7 degrees C, altimeter setting 30.33 inches of Hg., density altitude 8,900 feet.

September 3, 2007 at 1049 (AUTO): Wind 090 degrees at 9 knots, visibility 10 miles, clear at or below 12,000 feet, temperature 27 degrees C, dew point 4 degrees C, altimeter setting 30.32 inches of Hg., density altitude 9,700 feet.

Mt. Warren, located about 19.4 nm north of the accident site at an elevation of 12,327 feet, recorded the following weather observations during the morning hours of September 3, 2007:

Time Wind Speed Wind Direct Wind Speed Mean Temp Relative Humidity

	Avg MPH	Degrees	Max MPH	Degrees	F	Mean %
0700	21.9	192	31.8	47.3		42
0800	22.4	199	31.8	48.7		38
0900	20.0	196	36.7	50.7		38
1000	22.9	192	41.7	52.6		40
1100	21.4	205	36.7	54.5		38
1200	19.7	209	36.7	56.2		39

Using data from Mt. Warren for 1000 with the mean temperature value adjusted from 12,327 feet to 10,000 feet results in a temperature of 18 degrees C and a density altitude of about 12,700 feet for the accident site. The temperature deviation from the standard atmosphere was about +23.2 degrees C.

A meteorologist from Salinas, California, provided a numerical simulation of the conditions in the accident area using the WRF-ARW (Advanced Research Weather Research and Forecasting) numerical model. At 0930 the model displayed downdrafts in the accident area of approximately 300 feet per minute. The model was run for a horizontal resolution of 800 meters and according to the meteorologist, these values probably underestimate the downdraft magnitudes due to the inability of the model grid to fully resolve the steep terrain slopes in the region or to treat small-scale transient eddies. He also ran the model at a 600 meters resolution. The results indicated slightly stronger downdrafts near 400 feet per minute.

Several individuals who were flying or camping in the vicinity of the accident site on the day of the accident provided their personal observations of the weather conditions during phone interviews conducted by the NTSB Investigator in Charge (IIC).

One pilot reported that he has a home in Bishop and often flies across the Sierras. On the morning of the accident, he flew a Cessna 206 from Rio Vista Airport (O88) to the Mammoth Yosemite Airport. About 1130, he crossed from west to east near Mt. Ritter (one of the Minarets) about 2 miles north of the accident site at 13,500 feet. The winds aloft were from the south about 10 knots. There were no clouds and 60 miles visibility. There were no ripples visible on lake surfaces. He did not encounter any "big turbulence," was not tossed around, and did not have to slow down due to rough air. He stated that it was a "wonderful day to go flying."

Another pilot reported that on the day of the accident, he flew a King Air from Santa Barbara to Reno and back to Santa Barbara. He departed about 0730 and reported encountering clear blue skies and no clouds on the flight to Reno. He hit "random clear air turbulence (CAT)" during descent into Reno. The surface wind at Reno was calm. Above 2,500 feet agl, the winds were 30 to 35 knots out of the west (heading 240 to 290). The winds aloft were strong enough that he questioned the tower about the ground winds to confirm they were calm. He departed Reno about 0930. The wind conditions during the departure were the same as he had on approach - calm on the surface, strong at 2,000 to 3,000 feet agl. He stated this was a very unusual wind condition. At the request of his passengers, he flew over Yosemite National Park; this route took him to no more than 20 miles from the accident site. He was near the site about

1000 to 1015. It was a "very nice day," and he cautioned his passengers to wear their seatbelts because of the CAT he had encountered earlier. It was "unusually smooth when it was not turbulent." About 95% of the time it was smooth. The smooth ride was interrupted by "random rough chop." He recalls the day because it was unusual - "a weird day." He is familiar with the area and flies into Mammoth Lakes about 50 times a year.

A third pilot reported that on the day of the accident, he flew his glider from the Bishop Airport. He departed about 1200 and stayed airborne for about 3 hours. During the time he was airborne, he heard the California CAP call on the radio looking for anyone who had seen the accident airplane. He recalled that it was unusually windy on the ground at Bishop for his takeoff. He recalled the winds were out of the south. Once he got above 10,000 feet, the wind dropped off and the air was smooth. He went soaring over the White Mountains and did not go over the accident area.

One person reported that on the day of the accident, he was camping at East Lake, about 30 miles north of the accident site. His camp was at an elevation of about 9,400 feet, and there are 12,000-foot peaks in the area. A little before 1000, he saw an airplane that he believes was the accident airplane. The airplane was flying from north to south, heading towards Yosemite. When he saw the airplane it was about 1/2 mile north of the camp at an altitude of about 11,500 feet. He pointed the airplane out to the people he was camping with and they saw it also. It had been very windy during the night and in the morning. The wind was out of the southwest. The airplane was heading into the wind, and it looked like it was standing still due to the wind. When the camping trip was over, he saw pictures of the accident airplane on television and identified it as the airplane he observed. He reported his observation to local authorities.

For further weather information, see the Meteorological Factual Report in the public docket for this accident.

WRECKAGE AND IMPACT INFORMATION

The accident site was located about 300 feet below the crest of a ridge that was oriented northwest/southeast. The steep terrain was sparsely forested with Ponderosa pines averaging 40 to 60 feet tall. Numerous boulders and rock outcrops surrounded by grassy areas covered the ground.

The airplane was severely fragmented and a severe post crash fire burned most of the structure and surrounding vegetation. The first evidence of ground contact was a boulder with paint transfers on it consistent with the left main wheel and the belly of the airplane. Wreckage was distributed upslope from this point in a debris field oriented about 010 degrees magnetic and measuring approximately 350 feet long and 150 feet wide. About 100 feet upslope from the initial impact point, the first evidence of fire began with scorched earth and charred plants. The main wreckage consisting of the fuselage and part of the empennage was located about 200 feet upslope from the initial impact point. The engine was located about 100 feet further

upslope from the main wreckage.

All of the aircraft structure was accounted for at the accident site. Remains of all the control surfaces were found. Control continuity could not be established due to the severe fragmentation of the airplane.

The main wreckage was located near a group of pine trees, which were burned to the extent that their needles had turned brown. The fuselage, except for its steel tubing frame, was consumed by fire. The fuselage tubing was dented and bent throughout its length, with the damage decreasing in severity towards the tail. Numerous pieces of tubing were separated from the fuselage and found scattered throughout the debris field.

All of the fabric covering was burned off the empennage. The vertical stabilizer remained partially attached to the fuselage, and the rudder remained partially attached to the vertical stabilizer. Both rudder cables were attached to the rudder horn. The left horizontal stabilizer was partially attached to the fuselage; the left elevator remained attached to the stabilizer; and the elevator trim tab remained attached to the left elevator. The right horizontal stabilizer was separated from the fuselage, and the right elevator was separated from the stabilizer; both were found in the debris field. Both elevator cables were connected to the elevator horn.

The majority of the fabric covering was burned off the wings. The wings were fragmented into numerous pieces. All wing lift strut attach points were found secure. Pieces of the left and right wingtip navigation lights were identified in the debris field.

The forward cabin door hinges were found still attached to a piece of the doorframe by the door hinge pins. The emergency release handle for the door was present with its locking pin in place.

The steel frames for both seats were found in the wreckage of the fuselage in their approximate pre-impact locations. The front seat frame was bent, deformed and crushed to a size about one third of its original dimension. The rear seat frame was bent and distorted, but retained its original size.

Buckles from both sets of seatbelts for the rear seat were found in the wreckage of the fuselage. All of the belt webbing was consumed by fire. The conventional lap belt was buckled and the shoulder harness was hooked to the buckle. The 5-point buckle had one of the belts buckled; this belt fell out when the buckle was moved. The conventional lap belt for the front seat was unbuckled, and its two halves were found in the vicinity of the fuselage. A 3-inch section of webbing remained attached to one of the buckle halves. All other belt webbing was consumed by fire. The 5-point buckle for the front seat was found near the fuselage with none of the belts buckled to it.

All of the cockpit instruments and avionics were destroyed. Pieces of instruments were found scattered throughout the debris field. The airplane's ELT was destroyed; numerous pieces of

its orange plastic case and internal circuit board components were found scattered in the debris field.

The engine sustained severe impact damage. The crankshaft was broken off about 3.5 inches inside the nose case, a piece of the nose case was broken out, and the front thrust bearing was partially extruded, bent and deformed. All accessories and the oil sump were stripped from the engine. The cylinder heads of the right side cylinders (#1 and #3) were destroyed; the impact crush angle measured at the lower #1 cylinder barrel was 39 degrees. Two 3/8-inch holes were bored into the top of the case to allow access for borescope inspection. No internal defects were noted.

The propeller was separated from the engine, and both blades were separated from the propeller hub. The hub was broken into pieces; the separated forward portion of the engine crankshaft remained bolted to one of the pieces. The propeller blades were marked A and B for identification. The tip of Blade A was curled back and displayed chordwise scratches and gouging. A short section of the blade's tip was broken off; this section was not recovered. Blade B displayed "S" bending and deep gouging to its entire leading edge. A 3-inch section of the blade's tip was broken off; this section was recovered.

MEDICAL AND PATHOLOGICAL INFORMATION

Small bone fragments were recovered at the accident site; however, none of the fragments could be definitively identified as human. On October 29, 2008, law enforcement personnel returned to the area where the pilot's personal effects were found to search for human remains and evidence as to the identity of any remains. They found skeletal fragments, a pair of tennis shoes, clothing, credit cards and the pilot's driver's license. DNA testing performed by a California Department of Justice laboratory on two of the recovered skeletal fragments determined that they were from the pilot. A postmortem examination of the skeletal fragments was performed under the auspices of the Madera County Sheriff's Department. The cause of death was determined to be multiple traumatic injuries.

ADDITIONAL INFORMATION

After the wreckage was discovered, radar tracks identified during the original search were reviewed. A radar track beginning at 0907 and terminating at 0927 showed a target flying southbound following the crest of the Sierra Nevada Mountains. The track started about 35 miles south-southwest of the departure airport, roughly paralleled Highway 395, offset about 10 miles to the west of the highway, and ended about 1 mile northwest of the accident site. The first few minutes of the track consisted of beacon code 1200 returns with Mode C altitudes of 14,500 to 14,900 feet. The remainder of the track consisted of primary returns with no altitude information.

Early in the original search, this track was eliminated as a possibility, as its time did not agree with the time of a witness sighting that was believed to be accurate. The witness sighting was

that of the Flying M employee who observed the airplane approximately 9 miles south of the departure airstrip. Initially, the time of this sighting was believed to be 0925 to 0935; however, it was later determined that the time of the witness sighting was actually 0825 to 0835.

The California Wing of the CAP reported that the area where the wreckage was located had been searched once by air during the original search.

Pilot Information

Certificate:	Airline transport; Commercial; Private	**Age:**	63,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	Balloon; Glider; Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	February 14, 2007
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	6731 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bellanca	**Registration:**	N240R
Model/Series:	8KCAB-180	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Aerobatic; Normal	**Serial Number:**	635-80
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	April 8, 2007 Annual	**Certified Max Gross Wt.:**	1800 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	1073 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	C91A installed, not activated	**Engine Model/Series:**	AEIO-360-H1A
Registered Owner:	Flying M Hunting Club, Inc.	**Rated Power:**	180 Horsepower
Operator:	Flying M Hunting Club, Inc.	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	MMH,7128 ft msl	**Distance from Accident Site:**	15 Nautical Miles
Observation Time:	08:48 Local	**Direction from Accident Site:**	110°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	120°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.32 inches Hg	**Temperature/Dew Point:**	21°C / 7°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Yerington, NV	**Type of Flight Plan Filed:**	None
Destination:	Yerington, NV	**Type of Clearance:**	None
Departure Time:	08:20 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	N/A	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	37.667778,-119.133613

Administrative Information

Investigator In Charge (IIC):	Struhsaker, Georgia
Additional Participating Persons:	Robert Drake; FAA AAI-100; Washington, DC Jerry Mehlhaff, Jr.; American Champion Aircraft; Rochester, WI John Butler; Lycoming Engines; Williamsport, PA
Original Publish Date:	July 9, 2009
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=69235