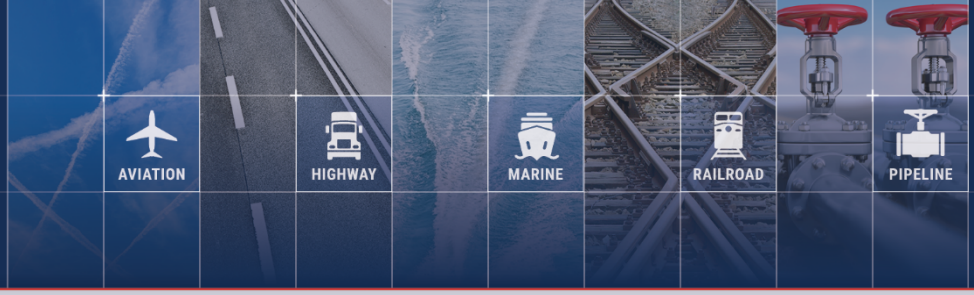

Aviation Investigation Final Report

Location:	Beauregard, Alabama	**Accident Number:**	ERA09FA289
Date & Time:	May 15, 2009, 11:42 Local	**Registration:**	N191MK
Aircraft:	Beech A36	**Aircraft Damage:**	Substantial
Defining Event:	Fuel starvation	**Injuries:**	2 Fatal, 2 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot was on the second leg of his cross-country flight, after picking up three passengers at the intermediate airport. The passengers stated that while cruising at 7,000 feet, the engine lost power. The pilot was able to restart the engine but it lost power again. The pilot rearranged the aft passengers into the aft facing seats, and then performed a forced landing to a pasture, during which the airplane collided with trees and a large rolled bale of hay. Postaccident examination of the airplane revealed the fuel selector valve was selected to the right fuel tank and the fuel drain on the selector valve was opened and there was no fuel present. The right tip tank was breached but contained about 4.5 gallons of fuel. The right main fuel tank was breached and no fuel was observed. The left main fuel tank bladder remained intact and was not leaking; approximately 1 quart of fuel was drained from the tank. The left wing tip tank was found separated from the wing; the tip tank was breached but contained approximately 1/2 gallon of fuel. No evidence of fuel leakage or browned grass was observed. Functional testing of the engine and fuel selector valve revealed no preimpact mechanical anomalies. During the functional test of the engine, the fuel supply was intentionally interrupted by turning off the test cell fuel valve and by the disconnection of the fuel pump hose supple quick-disconnect. In both cases, after engine function ceased, fuel was present in the fuel control inlet and outlet lines. Witnesses stated that prior to the accident flight; the daughter of the pilot was seen draining what was later measured to be 25.4 gallons of fuel from the main tanks. At the time when the cross-country flight started, the airplane had approximately 48.6 gallons of fuel in the main tanks and 10 gallons of fuel in each of the tip tanks. According to performance calculations made during the investigation, the engine would have burned at least 48.6 gallons of fuel at the time the engine lost power, confirming that the pilot never utilized the fuel remaining in the tip tanks.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's improper fuel management, which resulted in a total loss of engine power due to fuel starvation.

Findings

Aircraft	Fuel - Fluid management
Personnel issues	Fuel planning - Pilot

Factual Information

History of Flight

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

HISTORY OF FLIGHT

On May 15, 2009, at 1142 central daylight time, a Beech A36, N191MK, registered to a private individual, and operated by the certificated private pilot, crashed into trees and subsequently the ground in a field in Beauregard, Alabama. The personal flight was operated under the provisions of 14 Code of Federal Regulations (CFR) Part 91 with an instrument flight rules (IFR) flight plan filed. Visual meteorological conditions prevailed. The pilot and one passenger were killed, two passengers received minor injuries, and the airplane was substantially damaged. The flight departed Destin-Fort Walton Beach Airport (DTS), Destin, Florida, at 1041, destined for Newnan Coweta County Airport (CCO) Newnan, Georgia.

According to the surviving passengers, the airplane was flying about 7,000 feet when the pilot stated that he was having engine problems. Both passengers in the back seats stated that the pilot instructed them to move forward to the aft facing seats. The female passenger moved to the seat directly behind the pilot and the male passenger moved directly behind the co-pilot's seat and both secured their seatbelts "tightly." They stated that the pilot attempted to restart the engine with success but it stopped again after about 30 seconds. They overheard the pilot tell air traffic control that they were going to attempt to land in a field. The passengers stated that the airplane began hitting trees and the male passenger was knocked unconscious. The female passenger believed that the male passenger was unconscious for about a minute after the airplane came to a stop. Both passengers egressed the airplane via the open cockpit area and called 911 on their cell phone.

PERSONNEL INFORMATION

The pilot, age 56, held a private pilot certificate with ratings for airplane single engine land and instrument airplane, issued on March 26, 1985. His latest Federal Aviation Administration (FAA) third class airman medical certificate was issued June 20, 2008, with a restriction that he must have available lenses that correct for near vision.

The pilot's logbook indicated 1,618 hours of total flight time, with about 600 hours in A36 airplanes, and 40 hours in the accident airplane since it was modified with a turbo normalizing system.

AIRCRAFT INFORMATION

The six-seat, low-wing, retractable gear airplane, serial number (S/N) E-3362, was manufactured in 2000. The HBC Model A36 was delivered in 2000 with a Teledyne Continental Motors IO-550-B, rated at 300 horsepower (normally aspirated). On January 12, 2004, a Tornado Alley Turbo, Inc "Whirlwind System II" turbo normalizing system was installed on the airplane (STC SA5223NM and SE5222NM). On the same date, General Aviation Modification, Inc (STC SE09289SC) "turbo GAMIjectors" were installed.

WEIGHT AND BALANCE INFORMATION

On the day of the accident the pilot's daughter drained about 25.4 gallons of fuel from the right and left main fuel tanks, for the trip from Newnan Coweta County Airport (CCO) Newnan, Georgia to Destin-Fort Walton Beach Airport (DTS), Destin, Florida. The airplane's maximum gross weight was 3,650. With zero fuel on board, 340 lbs for the pilot and passenger, 25 lbs for luggage, and 13 lbs for oxygen, the airplane's weight would have been 3,143.0 lbs. and well within the center of gravity (CG) envelope. By adding 48.5 gallons of fuel, and adding 20 gallons of fuel for the 10 gallons in each tip tank, brought the airplane's weight to 3,554.0 lbs., with the CG still within the envelope. Had the daughter not drained the fuel from the main tanks, the airplane's weight would have been 3,707.0 and the CG outside the CG envelope.

The same calculations were performed for the return flight from DTS to CCO. The pilot and front passenger weights were 340 lbs the two aft passengers were 340 lbs, 50 lbs of baggage was added and 13 lbs for oxygen. The fuel burn from CCO to DTS estimated at 24.1 gallons the remaining fuel for the trip home would have been 24.4 with 20 lbs still in the tip tanks. The airplane's weight at takeoff from DTS would have been 3,774.4 lbs. with the CG within the envelope. Had the pilot and daughter not drained the 25.4 gallons of fuel at CCO the airplane's weight would have been 3,927.4 lbs., and outside the CG Envelope.

METEOROLOGICAL INFORMATION

A review of recorded weather data from the Auburn-Opelika Robert G. Pitts Airport, Auburn, Alabama (AUO) automated weather observation station, revealed at 1135 conditions were winds 120 degrees at 5 knots, visibility 10 statute miles, cloud condition scattered at 3,900 feet above ground level, and altimeter 30.19 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The main wreckage accident site was located at N032° 32 59, W085° 24 12, in a hay field located approximately 4.3 miles from AUO. The airplane's initial collision with a tree was approximately 150 feet before impacting the ground. The airplane then traveled approximately 60 feet before coming to rest with the left wing, flap and fuselage on top of a round hay bale. The direction of travel was approximately 040 degrees to 045degrees magnetic. Crushing of the lower cabin and right wing was consistent with the airplane having impacted the ground in 30-degree nose low, right wing down attitude, and came to a stop on a 120 degrees heading. All flight control surfaces were located and control continuity was established.

The engine, engine cowling and nose landing gear were found separated from the firewall forward of the fuselage. The pilot compartment entrance door, door frame, windscreen, and side windows were found separated from the fuselage, exposing the pilot and co-pilot seats. The safety restraints were attached to the seats but had been cut by emergency medical personnel to remove the pilot and passenger. The instrument panel was inverted and folded over to the left of the crew compartment exposing the navigation and radio equipment. The pilot and co-pilot control yokes were found separated from the control column. The instrument sub-panel, engine control pedestal, control column, and rudder pedals were damaged. The fuel selector valve was selected to the right fuel tank. The fuel drain on the selector valve was opened and there was no fuel present. The fuel selector valve was removed and tested with no anomalies noted.

The right wing was folded back and to the right of the fuselage. The leading edge was separated from the companion walk way out to the wing tip exposing the forward spar. The leading edge was crinkled and damaged from impact forces. The right aileron separated from the wing and was located forward and to the right of the wing. The flap was attached to the wing and damaged by impact forces. The wing tip fuel tank was separated from the wing and was located approximately 9 feet outboard of the wing. The fuel line was attached to the tip tank. The tip tank was breached but contained about 4.5 gallons of fuel. The right main fuel tank was breach and no fuel was observed. The right main landing gear was folded and located forward of the main wing spar.

The left wing leading edge sustained collision damage consistent with an impact with a tree approximately 1 foot outboard of the fuselage to the wing tip. The leading edge skin was crumpled and torn in several locations exposing the fuel tank bladder and the front wing spar. The main fuel tank bladder remained intact and was not leaking; approximately 1 quart of fuel was drained from the tank. The left wing tip tank was found separated from the wing and was located approximately 37 feet forward and to the right of the main wreckage, the tip tank was breached but contained approximately .5 gallons of fuel. No evidence of fuel leakage or browned grass was observed. The flap remained attached to the wing and was bent upward from contacting a hay bale. The aileron remained attached to the wing and was damaged from midpoint of the trim tab. The outer third of the aileron was warped and crinkled. The left

landing gear was extended. The gear door leading edge sustained collision damage and was distorted.

The left horizontal stabilizer remained attached to the empennage and appeared undamaged. The elevator and trim tab were distorted and crinkled but remained attached to the horizontal stabilizer.

The right horizontal stabilizer was bent forward and was twisted at midpoint. The outer half of the elevator separated at midpoint from the horizontal stabilizer. The inner half remained attached to the rear spar with the trim tab.

The vertical stabilizer sustained leading edge damage from the fairing up to the rotating beacon. The rudder remained attached to the vertical stabilizer. The fixed trim tab was damaged and bent to the right.

Both the left and right tip tank fuel transfer pumps were tested with 28 volts of external power, and both functioned with no anomalies noted.

The engine and engine cowling assembly were found separated from the firewall and remained attached to the cockpit via the propeller governor cable. The entire engine cowling assembly exhibited impact-related damage. The engine was separated from each of its four engine mounts and came to rest approximately 10 feet in front of the cockpit.

The propeller remained attached to the crankshaft propeller mating flange. All three blades were found tight in their respective hub sockets. One blade was found in low pitch with minor leading edge damage. The second blade was found at low pitch with the blade bent in a forward orientation starting at mid-span and continuing out to the tip. The third blade was found in a bent aft orientation starting just outboard of the hub and continuing out to the tip. The third blade also exhibited chordwise damage to the backside of the blade.

All of the accessories remained intact and attached to the engine. The numbers 1, 2, and 3 exhaust risers exhibited impact damage and visually appeared to have been pushed inward. The induction tubes, intercooler and alternate air door separated free of the engine. The turbo-charger rotated freely by hand with a small amount of debris noted in the compressor inlet. The throttle body mixture control unit exhibited impact damage to the control arms and shafts. The engine baffling was intact and exhibited impact-related damage. Two fittings were found separated from the fuel pump housing. The propeller governor cable remained attached to the throttle quadrant and had to be cut to separate the engine from the cockpit. Both the primary and secondary alternators exhibited impact-related damage. During the recovery process when the engine was lifted, a 1.5-inch breech in the left side aft portion of the oil sump leaked approximately 8 quarts of oil. The oil was captured in a white bucket and no fine shiny metal particles or other foreign debris were found.

On May 17, 2009, the engine was transferred to Teledyne Continental Motors in Mobile,

Alabama. On May 18, 2009, the engine was prepared for an engine run. Several damaged engine components were repaired or replaced to facilitate engine operation. The engine experienced a normal start on the first attempt without hesitation or stumbling in observed revolutions per minute (rpm). The engine rpm was advanced in steps for warm-up in preparation for full power operation. Throughout the test phase, the engine accelerated normally without any hesitation, stumbling or interruption in power and demonstrated the ability to produce rated horsepower. After the engine operation test was completed, the fuel supply was interrupted by turning-off the test cell fuel valve and by the disconnection of the fuel pump hose supple quick-disconnect. In both cases, after engine function ceased, fuel was present in the fuel control inlet and outlet lines.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was not performed on the pilot as ordered by the NTSB IIC, and the FAA inspector. The coroner in Alabama did not feel it was necessary because he was able to interview survivors of the accident. He did obtain blood specimens and submitted them to the FAA Bioaeronautical Lab in Oklahoma City.

Forensic toxicology was performed on specimens from the pilot by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. Carbon Monoxide and Cyanide tests were not performed and there was no ethanol or other drugs detected in blood.

ADDITIONAL INFORMATION

According to fueling records, before the flight from Newnan, Georgia (CCO) to Destin, Florida (DTS) on the day of the accident, there were 74 gallons of usable fuel in the main tanks, and 10 gallons of fuel in each tip tank. The daughter of the pilot was seen draining what was later measured to be 25.4 gallons of fuel from the main tanks. Two cans containing the drained fuel were left in the hangar. The locations of the cans in the hangar suggested that 15 gallons of fuel was drained out of the left tank and 10 gallons of fuel was drained from the right fuel tank. The usable fuel in the Hawker Beechcraft Corporation A36 was 37 gallons per main fuel tank, with a total of 74 gallon usable.

At the time the flight left for Destin, it had approximately 48.6 gallons of fuel in the main tanks and 10 gallons of fuel in each of the “Osborne” tip tanks.

The Tornado Alley Turbo, Airplane Flight Manual Supplement -550, dated August 27, 2004 which was recovered from the aircraft after the accident, only contains performance data for a Lean of Peak operation that can be used for pre-flight planning. According to Teledyne Continental Motors Service Information Directive 97-3E (Procedures and Specifications for Adjustment of Teledyne Continental Motors Continuous Flow Fuel Injection Systems) an IO-550-B engine at full RPM should flow no more than 26.6 gallons of fuel per hour. But according to the TAT AFM-550 POH supplement (p.20, heading 8) “the engines mixture control must be manually adjusted if the fuel flow exceeds 35 gallons per hour or more.” In addition to

the fuel system flowing more fuel than a TCM Type Certified (E3SO) normally aspirated engine, the TAT AFM-550 POH supplement does not supply the pilot with fuel consumption data if the aircraft is operated rich of peak.

According to performance calculations made during the investigation, the engine would have burned more than 48.6 gallons at the data point indicated as the initial loss of power on the engine performance non-volatile memory graphic depiction. The airplane was equipped with a JPI for engine monitoring, however it did not record fuel flow.

Pilot Information

Certificate:	Private	**Age:**	56,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	June 20, 2008
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	June 26, 2008
Flight Time:	(Estimated) 1618 hours (Total, all aircraft), 600 hours (Total, this make and model), 1531 hours (Pilot In Command, all aircraft), 11 hours (Last 90 days, all aircraft), 8 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N191MK
Model/Series:	A36 UNDESIGNAT	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	3362
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	April 2, 2009 Annual	**Certified Max Gross Wt.:**	3650 lbs
Time Since Last Inspection:	10 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	752 Hrs as of last inspection	**Engine Manufacturer:**	Teledyne Continental Motors
ELT:	C91A installed, not activated	**Engine Model/Series:**	IO-550-B
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:	AUO,777 ft msl	**Distance from Accident Site:**	4 Nautical Miles
Observation Time:	11:35 Local	**Direction from Accident Site:**	162°
Lowest Cloud Condition:	Scattered / 3900 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	120°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.19 inches Hg	**Temperature/Dew Point:**	27°C / 17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Destin, FL (DTS)	**Type of Flight Plan Filed:**	VFR/IFR
Destination:	Newnan, GA (CCO)	**Type of Clearance:**	IFR
Departure Time:	10:41 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal, 2 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal, 2 Minor	**Latitude, Longitude:**	32.54972,-85.401947

Administrative Information

Investigator In Charge (IIC):	Wilson, Ralph
Additional Participating Persons:	Yancey Rushton; FAA/FSDO; Birmingham, AL Jason Lukasik; Teledyne Continenal Motors; Mobile, AL Eric A Thomas; Hawker Beechcraft Corporation; Wichita, KS Charlie Varano; FAA/FSDO; Birmingham, AL George W Braly; Tornado Alley; Oklahoma City, OK Randall R Knuteson; Kelly Aerospace; Montgomery, AL
Original Publish Date:	June 20, 2011
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=73839