Aviation Investigation Final Report

Location:	MERIDEN, Connecticut	**Accident Number:**	NYC96FA113
Date & Time:	May 24, 1996, 16:45 Local	**Registration:**	N59WW
Aircraft:	Beech A36	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	3 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot initiated a downwind takeoff on runway 18 with two passengers aboard. He said that after a 600 foot ground run, he rotated the airplane for takeoff, and it climbed about 40 feet above the runway, then it stopped climbing and stopped accellerating. According to witnesses, the airplane entered a steep nose high attitude during takeoff, then after climbing briefly, the wings rocked (or wobbled) to the left and right. The pilot lowered the nose briefly and said he increased engine power '2 ticks into the yellow (arc).' He aborted the climb and attempted to land. After ground contact, the airplane veered off the runway. After stopping, a fire erupted, which resulted in further damage. The airplane's reciprocating engine had been replaced with an Allison 250-B17C, turbine engine per Supplemental Type Certificate (STC) SA3523NM, by Tradewind Turbines, Amarillo, TX. The wind was estimated to be from 350 degrees at 15 knots. The Pilot's Operating Handbook showed that a ground roll of 1,800 feet would have been required for the takeoff conditions. The airplane was estimated to be 76 pounds over its maximum takeoff weight and about 2 inches beyond the forward center of gravity (CG) limit (as listed in the STC). Also, the pilot did not use maximum power for takeoff as described in the STC.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot's improper planning/decision, his failure to use takeoff power, and his premature lift-off of the airplane, which resulted in an inadvertent stall/mush and subsequent collision with terrain. Factors relating to the accident were: the pilot allowing the airplane's maximum takeoff weight to be exceeded, and the tailwind.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. (C) PLANNING/DECISION - IMPROPER - PILOT IN COMMAND
2. (F) AIRCRAFT WEIGHT AND BALANCE - EXCEEDED - PILOT IN COMMAND
3. (F) WEATHER CONDITION - TAILWIND
4. (C) THROTTLE/POWER CONTROL - IMPROPER USE OF - PILOT IN COMMAND
5. (C) LIFT-OFF - PREMATURE - PILOT IN COMMAND
6. (C) STALL/MUSH - INADVERTENT - PILOT IN COMMAND

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

Factual Information

HISTORY OF FLIGHT

On May 24, 1996, at 1645 eastern daylight time, a turboprop Beech A36, N59WW, was destroyed during a collision with terrain and post crash fire during takeoff at the Meriden-Markham Municipal Airport (MMK), Meriden, Connecticut. The private pilot and two passengers were not injured. Visual meteorological conditions prevailed for the personal flight that originated at MMK. No flight plan had been filed for the flight conducted under 14 CFR Part 91.

In the NTSB Form 6120.1/2, the pilot/owner stated that he and two passengers were departing for a flight to New Port, New Hampshire. He further stated:

"...After using 600' [feet] of active runway 18, airplane rotated and climbed to about 40', where aircraft would not fly. After two attempts at level flight, a decision was made to land aircraft in dirt area at departure end of runway. Four minutes later, fire started and burned aircraft."

During a May 29, 1996, telephone interview with the pilot, he stated that he received a weather briefing that morning, which called for winds from the north at 3 to 4 knots. The airplane had been fueled from his personal above ground fuel tank, where he filled the tip tanks, and added fuel to the tabs inside the wing tanks. He estimated that he departed with about 74 gallons of fuel, at a takeoff weight of 3,550 pounds.

The pilot taxied to runway 18. He stated that he always used runway 18, unless the tail wind exceeded 15 knots. The pilot observed that the wind sock was limp, and estimated the winds were only 3 to 5 knots from the north. He performed a rolling takeoff and set the takeoff torque at two ticks above the green arc on the torque gauge, just into the yellow area. He stated that this equated to 96 percent torque, which remained constant during the takeoff roll.

The pilot stated that he did not monitor the propeller RPM gauge, and could not recall the airspeed where he rotated the airplane for takeoff, but did recall 80 knots at some point during the initial climb. When the airplane reached about 40 feet above the ground, it stopped accelerating and climbing. The pilot briefly lowered the nose, then raised it again. He stated that the torque remained constant at 96 percent, until he increased the torque 2 percent to 98 percent. At that time he observed the turbine outlet temperature (TOT) needle was just above the green arc, in the yellow area of the TOT gauge. He also estimated the airplane's pitch attitude to be between 3 to 5 degrees nose up. When the pilot determined that he could not complete the takeoff, he reduced the power and attempted to land.

A witness at mid-field stated that he observed the airplane taxi out for takeoff on runway 18.

He stated that the wind sock was straight out, indicating a north wind. He observed the airplane turn onto the runway and perform a rolling takeoff. He stated that when the airplane passed his position during the down wind takeoff roll, the "engine sounded fine." The witness further stated:

"...Very near the end of the runway...the aircraft rotated at a very steep angle. It appeared to climb 125' - 150'. Aircraft looked as if it were on a wall, I could almost see the windshield the angle was so steep. Aircraft stalled, wings wobbled violently, and aircraft rolled to left and nosed downward striking ground, nose and left wing first...then made a sharp turn to right and traveled a short distance as if being pushed or pulled along..."

A second witness at mid-field stated:

"...The plane took a long time to liftoff. Toward the end of the runway it started to go up steeply so you could see the top of the plane and wings. As it headed up it rocked violently left and right as it seemed to be pushed towards the trees. In no time it headed down and...left, and hit the ground in a nose heavy crash and spun around...."

Another witness in the operations building at the north end of the airport observed the airplane perform the rolling takeoff on runway 18. The airport wind machine was out of calibration, and he estimated that the winds were from the northeast at 10 knots. He also observed that the wind sock was extended about 3/4 of the way straight out, indicating a north wind. The witness stated the engine sounded "strong," and he did not detect any variation in the propeller RPM. The airplane rotated about 2/3 to 3/4 of the way down the runway, and it did not climb above 40 feet. He estimated the airplane's pitch up angle to be at least 20 degrees above the horizon, and he observed the wings wobble back and forth.

The witness then observed the left wing drop and airplane's nose and the wings leveled. This was followed by the nose of the airplane pitching up again to a climb angle greater than the original 20 degree nose-up rotation.

A police officer interviewed the pilot immediately after the accident. In the police officer's report he stated, "[The pilot] stated that he had attempted to takeoff to the south and that while traveling down the runway he realized that the plane was not developing enough lift and he decided to put it down." The report further stated, "[The pilot] was questioned as to why he had taken off to the south with the wind blowing straight down the runway in the same direction and he looked at the undersigned and refused to answer."

The airplane came to rest about 150 feet beyond the departure end of runway 18, and was consumed by a post crash fire. The accident occurred during the hours of daylight about 41 degrees, 31 minutes north latitude, and 72 degrees, 50 minutes west longitude.

PERSONNEL INFORMATION

The pilot, Mr. Norman W. Gavin, held a Private Pilot Certificate with ratings for airplane single engine land, rotorcraft helicopter, and instrument airplane.

His most recent Federal Aviation Administration (FAA) Third Class Medical Certificate was issued on March 30, 1996.

Mr. Gavin estimated his total flying experience to be about 2,500 hours, of which 500 hours were in make and model. Maintenance facility documents revealed that the airplane had accumulated approximately 283 hours after it was purchased by Mr. Gavin, in December, 1994. This was Mr. Gavin's only turboprop experience, and he had not received any formal training in turbine powered airplanes.

AIRCRAFT INFORMATION

The pilot/owner stated that all the maintenance records were stored in the airplane, and were consumed by the post crash fire.

The airplane was purchased by the pilot, through a broker in Texas, during December, 1994. The pilot had maintenance performed on the airplane by Tradewind Turbines LTD, Amarillo, Texas, before returning it to Connecticut. Tradewind records indicated that during the maintenance, a Hobbs meter reading of 44.7 hours was recorded.

During 1995, Aero Mechanical LTD., Wappingers Falls, New York, performed maintenance on the airplane. Maintenance dates and Hobbs meter readings were as follows:

March 14, 1995, Hobbs--- 77.8 hours. April 14, 1995, Hobbs----- 99.2 hours. May 1995, Hobbs----------133.9 hours. July 20, 1995, Hobbs-----176.3 hours.

On December 24, 1995, Aero Mechanical completed the annual inspection of the airplane, at a Hobbs meter reading of 238.1 hours, and a total airframe time of 1262.2 hours. The pilot stated during a telephone interview that he had flown about 90 hours on the airplane since the December annual inspection.

METEOROLOGICAL INFORMATION

At 1645, winds at the Hartford-Brainard Airport, Hartford, Connecticut, 18 miles northeast of MMK, were reported to be from 350 degrees, at 15 knots.

The police report revealed that during the on scene investigation, they estimated the winds at MMK to be from 340 degrees at 11 knots. The police report also stated that the runway was dry and clean, and the temperature was 72 degrees Fahrenheit.

AERODROME INFORMATION

The Meriden Markham Municipal Airport runway direction was 18/36. The asphalt runway was 3,100 feet long and 75 feet wide. Power lines crossed several hundred feet north of the departure path of runway 36, and an open level field existed for about 2,000 feet beyond the departure end of runway 18.

WRECKAGE AND IMPACT INFORMATION

The airplane wreckage was examined at the accident site on May 25, 1996, by Federal Aviation Administration Inspectors, and on June 18, 1996, by the NTSB investigator-in-charge (IIC). The examination revealed that all major components of the airplane were accounted for at the scene, and the airplane came to rest on an approximate magnetic heading of 270 degrees, about 150 feet beyond the end of the departure end of runway 18.

Initial tire skid marks were observed departing the west side of the runway 18, about 550 feet before the departure end. The skid marks continued onto the grass, parallel to the runway, and departed the grass, across a perpendicular taxiway, to the wreckage.

Control continuity was confirmed from the pilot's controls to the ailerons, rudder, and elevator. The landing gear had been extended and the flaps were retracted. A post crash fire consumed the center wing section and cabin area. The engine and propeller remained attached to the fuselage, and were removed for further examination.

TESTS AND RESEARCH

On June 12, 1996, the propeller was removed and disassembled at MMK, under the supervision of an FAA Inspector, representatives of New England Propeller Service Inc., and the owner's insurance company. Also present during the examination were the MMK Fixed Based Manager, and an airframe and power plant mechanic. The examination revealed that the propeller blades were in the feathered position. The notes provided by the New England Propeller Service representative to the FAA Inspector stated the following: "...adjustment of the feedback rod seemed to coincide with the Hartzell assembly print D3660; throttle and power lever seemed to be in full aft position; governor seemed to be in feather position; propeller was not bench checked for freedom of movement."

On June 18, 1996, the engine was examined at MMK, by the NTSB IIC. Present during the examination was the MMK Fixed Base Manager. The starter/generator mounts were observed to be broken, and the starter was separated from the engine. The beta pin that extended from the back of the engine case, about 4 inches from the starter, was bent at a 10 to 15 degree angle. The side of the beta pin, opposite from the direction of the bend, contained a long scratch along the length of the pin. The power input lever on the coordinator, which had been connected to the pilot's power lever control, could not be moved from the minimum position with the beta pin bent. When the beta pin was straightened, the input lever could be rotated on the coordinator to the 95 degree takeoff position.

The beta control rod that extended from the beta control valve contained an adjustable barrel bolt, with lock nuts at each end. The safety wire for each lock nut was found to be cut and not securing the nuts.

The remainder of the engine was undamaged and the first stage compressor rotated freely by hand. When the power turbine wheel was rotated by hand, the wheel turned freely and the propeller output shaft rotated.

ADDITIONAL INFORMATION

The airplane's reciprocating engine was replaced with an Allison 250-B17C, turbine engine, in accordance with Supplemental Type Certificate (STC) SA3523NM, by Tradewind Turbines, Amarillo, Texas. The airplane, then registered as N72236, was placed in service on December 31, 1990. The airplane's total airframe hours were 783.8. The STC also included a full feathering and reversing propeller, wing tip tanks, and a increased gross takeoff weight of 3,833 pounds.

During July 1995, the owner delivered the airplane to Airwork, Millville, New Jersey, for maintenance on the Allison Engine due to "low power." The engine was repaired and reinstalled at Millville. On August 8, 1995, Airwork sent a service engineer to Meriden to repair a fluctuating torque meter. The service engineer's inspection report stated:

"...Found throttle hard to move from idle position. Disconnected aircraft throttle cable from coordinator. Found aircraft throttle system OK. Disconnected coordinator from engine controls. Found coordinator hard to move off idle position. Reconnected all controls..."

Refueling

The pilot refueled his airplane from a personally owned, above ground jet fuel tank, at MMK. In the police report, the pilot stated to the police officer that the airplane had 62 gallons of fuel onboard at takeoff. The pilot reported to the FAA Inspector at the accident scene that he had fueled the airplane and added 72 gallons of fuel. In the NTSB Form 6120.1/2, the pilot stated that the airplane contained 72 gallons of fuel at takeoff. During a telephone interview with the pilot, he stated that he had departed with about 74 gallons of fuel. The pilot also stated that the tip tanks were filled, and the wing tanks were fueled to the tabs.

The STC supplement listed the total useable fuel in the tip tanks to be 40 gallons. A review of the A36 Pilot's Operating Handbook revealed that the wing tanks maximum capacity was 74 gallons of useable fuel; however, 2 intermediate level were also listed. If each wing tank was filled to the bottom of the tab in the tank filler neck, the wing tanks would have contained a total of 54 useable gallons. If each wing tanks was filled to the slot in the tab, the wing tanks would have contained a total of 64 useable gallons of fuel. Therefore, full tip tanks and filled to the tabs could have equaled between 94 and 104 gallons of fuel.

The pilot provided an estimated break down of the airplane's takeoff weight, and listed the takeoff fuel at 603 pounds, or 90 gallons. During a telephone interview with a certified flight instructor (CFI) who had flown the airplane several times with the pilot/owner, he stated that the pilot had always kept the fuel tanks full.

Weight and Balance

At the request of the NTSB IIC, the pilot/owner computed the airplane's estimated takeoff weight to be 3,719 pounds.

The NTSB IIC computed two takeoff weight and balance conditions based upon; pilot interviews, pilot statements, the pilot's weight calculations; police reported weights of the occupants; and a weight and balance data sheet provided by Tradewind Turbines. The two estimated conditions were as follows:

Condition 1:

Fueled to the bottom tabs, 94 gallons. The takeoff weight was estimated to be 3,774 pounds, at a center of gravity of 81.598 inches. At a gross weight of 3,774 pounds, the center of gravity range was depicted to be 82.6 to 87.5 inches, in the Tradewind Turbines STC Supplement.

Condition 2:

Full fuel, 114 gallons. The takeoff weight was estimated to be 3,908 pounds, at a center of gravity of 81.372 inches. The Tradewind Turbines STC Supplement specified the maximum takeoff weight to be 3,833 pounds, and listed the center of gravity range for that weight to be 83.3 to 87.3 inches.

Additional weight and balance computations were performed for different takeoff conditions of the basic airplane. These calculations revealed that a single pilot, with full wing tanks only, was within the center of gravity range. However, a single pilot with full wing and tip tanks was computed to be beyond the forward C.G limit. Additionally, with a pilot and passenger in the front seats, the airplane was computed to be out of the forward C.G limits with the wing tanks only filled, and with the wing and tip tanks filled.

General Performance

During an interview with the pilot, he stated that during previous departures he could "get the airplane off the runway in 600 to 800 feet," and with the "440 horsepower engine," the airplane would climb in a nose high attitude to over 4,000 feet before it stopped climbing.

One of the witnesses had observed the airplane takeoff downwind on several previous occasions, and had observed the wobbling of the wings back and forth, with the airplane "hanging on the prop." He stated that during those previous departures, "the pilot was able to

fly out of it."

In a telephone interview with the CFI who had flown the airplane, he stated that the operator's manual indicated that the airplane should be rotated at 60 to 65 knots; however, he did not like that early of a rotation, and taught the pilot to apply back pressure and to let the airplane fly off the runway at 75 to 80 knots. Lift off from the runway usually occurred after a 1,000 to 1,300 foot ground roll using that method. He stated that the pilot preferred to rotate the airplane at 70 to 75 knots. During a July, 1995, flight with the pilot, when the pilot rotated the airplane at 75 knots, it "just hung there about 4 feet off the ground." Then after several hundred feet the airplane accelerated and continued to climb.

The CFI also explained that he had received his orientation to turbine operation by the pilot/owner, and that takeoff power was set by advancing the power lever until the TOT was just into the yellow arc on the gauge. Torque was not a primary gauge that was monitored. The pilot had explained to the CFI that the yellow area of the torque and TOT gauges was considered a caution area to avoid.

Performance Charts

The performance section of the Tradewind Turbines STC supplement stated:

"Performance of the Allison 250-B17 equipped Beech A36 meets the required certification performance criteria and is not published. For guideline information, use the Takeoff and Landing Distances shown in the Beech Pilot's Operating Handbook and FAA Approved Airplane Flight Manual...Precise performance information will be added to this section when it is available."

The Tradewind Turbines STC listed the airplane's maximum takeoff gross weight with the optional wing tip tanks, at 3,833 pounds. The Charts in the A36 Beech Pilot's Operating Handbook (POH) were based on a takeoff weight of 3,600 pounds.

The POH listed a takeoff ground roll distance of about 1,800 feet, for a 3,600 pound airplane, with a 15 knot tailwind, sea level, and 72 degrees F.

In the NTSB Form 6120.1/2, the pilot stated, "...After using 600 feet of active runway 18, airplane rotated..."

Takeoff Power

An Allison Engine chart depicted the direct relationship between torque and engine shaft horsepower. Another chart depicted the direct relation between horsepower, propeller thrust, propeller blade angle, power and gas turbine speeds, and turbine outlet temperature.

The Tradewind Turbines STC Supplement did not contain engine power available charts.

The torque limits described in the STC Supplement were, 0 to 90 PSI continuous (green arc normal), and 90 to 107 PSI (yellow arc caution), with a 5 minute limit. The TOT limits described in the STC were, 400 to 738 degrees C. continuous (green arc normal), and 738 to 810 degrees C. (yellow arc caution), with a 5 minute limit.

The takeoff procedure described in the STC supplement stated, "Power Control - FLIGHT IDLE, then TAKEOFF POWER (107 PSI torque or 810 degrees C TOT limits)."

The pilot stated that he set the indicated takeoff torque to 96 "percent." According to Tradewind Turbines personnel and the STC supplement, the torque gauge was calibrated in pounds per square inch (PSI); therefore, 96 PSI would have represented about 90 percent of the recommended 107 PSI takeoff torque.

The airplane wreckage was released on June 19, 1996, to Charles Bowman, a representative of the owners insurance company.

Pilot Information

Certificate:	Private	**Age:**	53,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	March 30, 1996
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	2500 hours (Total, all aircraft), 283 hours (Total, this make and model), 2500 hours (Pilot In Command, all aircraft), 80 hours (Last 90 days, all aircraft), 25 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N59WW
Model/Series:	A36 A36	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal; Utility	**Serial Number:**	E-2224
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	December 24, 1995 Annual	**Certified Max Gross Wt.:**	3833 lbs
Time Since Last Inspection:	90 Hrs	**Engines:**	1 Turbo prop
Airframe Total Time:	1352 Hrs	**Engine Manufacturer:**	Allison
ELT:	Installed, not activated	**Engine Model/Series:**	250-B17C
Registered Owner:	NORMAN W. GAVIN	**Rated Power:**	420 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:	UNITED CONCRETE PRODUCTS INC	**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	HFD ,19 ft msl	**Distance from Accident Site:**	18 Nautical Miles
Observation Time:	16:45 Local	**Direction from Accident Site:**	40°
Lowest Cloud Condition:	Clear	**Visibility**	20 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	15 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	350°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	23°C / 4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(MMK)	**Type of Flight Plan Filed:**	None
Destination:	NEWPORT , NH (2B3)	**Type of Clearance:**	None
Departure Time:	16:39 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	MERIDEN MARKHAM MUNICIPAL MMK	**Runway Surface Type:**	Asphalt
Airport Elevation:	103 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	18	**IFR Approach:**	
Runway Length/Width:	3100 ft / 75 ft	**VFR Approach/Landing:**	

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Destroyed
Passenger Injuries:	2 None	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 None	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	Pearce, Robert
Additional Participating Persons:	ELIO BUENO; WINDSOR LOCKS , CT
Original Publish Date:	August 21, 1997
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=39088