Aviation Investigation Final Report

Location:	Islip, New York	**Accident Number:**	NYC01FA127
Date & Time:	May 18, 2001, 17:25 Local	**Registration:**	N270TC
Aircraft:	Beech C90	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	2 Serious
Flight Conducted Under:	Part 91: General aviation - Positioning		

Analysis

After about a 20 minute flight, while on final approach for landing, the airplane experienced a loss of engine power on both engines, and the pilot-in-command (PIC) performed a forced landing into trees about 1/2 mile from the airport. The left and right boost pumps and the left and right transfer pumps, were observed in the "OFF" position. According to the PIC, after he exited the airplane, he retuned to the cockpit and "shut off the fuel panel. The fuel quantity indicator toggle switch was observed in the "TOTAL" position. Examination of the fuel system revealed both engine nacelle tanks, both wing center section tanks, and the right wing fuel tanks were not compromised. About 1 quart of fuel was drained from the left and right engine nacelle tanks, respectively. Less than a quart of fuel was drained from the right wing tanks. The left wing tanks were compromised during the accident; however there was and no evidence of a fuel spill. Examination of the left and right wing center tanks revealed approximately 27 gallons (approximately 181 lbs) of fuel present in each tank. Battery power was connected to the airplane, and when the fuel transfer pump switches were turned to the "ON" position, fuel was observed being pumped from the left and right wing center tanks to their respective nacelle tanks. The accident flight was the third flight of the day for the flight crew and airplane. According to a flight log located in the cockpit, the flight crew indicated 750 lbs of fuel remained at the time of the takeoff. According to the airplane flight manual (AFM),"Fuel for each engine is supplied from a nacelle tank and four interconnected wing tanks...The outboard wing tanks supply the center section wing tank by gravity flow. The nacelle tank draws its fuel supply from the center section tank. Since the center section tank is lower than the other wing tanks and the nacelle tank, the fuel is transferred to the nacelle tank by the fuel transfer pump in the low spot of the center section tank...." Additionally, with the transfer pumps inoperative, all wing fuel except 28 gallons from each wing will transfer to the nacelle tank through gravity feed.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to activate the fuel transfer pumps in accordance with the check list, which resulted in fuel exhaustion.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - NONMECHANICAL
Phase of Operation: APPROACH

Findings
1. (C) FLUID,FUEL - EXHAUSTION
2. (C) FUEL SYSTEM,TRANSFER PUMP - NOT ACTIVATED
3. (C) PROCEDURES/DIRECTIVES - NOT FOLLOWED - PILOT IN COMMAND

Occurrence #2: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings
4. OBJECT - TREE(S)

Factual Information

HISTORY OF FLIGHT

On May 18, 2001, about 1725 eastern daylight time, a Beech C90, N270TC, operated by Executive Fliteways, Inc., was substantially damaged after it experienced a loss of engine power to both engines while on approach to Long Island Mac Arthur Airport (ISP), Islip, New York. The certificated commercial pilot and co-pilot were seriously injured. Visual meteorological conditions prevailed and no flight plan had been filed for the flight that originated at the East Hampton Airport (HTO), East Hampton, New York. The positioning flight was conducted under 14 CFR Part 91.

The accident flight was the third flight of the day for the flight crew and airplane. The flight crew originally departed ISP about 1330, and flew to the Philadelphia International Airport (PHL) to pick up a passenger. The passenger was then flown to, and deplaned at HTO. The flight crew then departed HTO, about 1700.

Both flight crewmembers described the earlier flights, and the en route portion of the flight to ISP as normal and uneventful. The airplane was on approach to Runway 24 at ISP, and was being flown by the co-pilot. According to the pilot-in-command (PIC), the airplane was approximately 800 feet MSL, at "Vref plus 10," and looked high on the visual approach slope indicator (VASI). The co-pilot then reduced engine power to get back on the glide slope. At that time, the left engine "red low fuel pressure annunciator" illuminated, followed by the right engine low fuel pressure annunciator, which was followed by the total loss of power to both engines. The PIC stated he looked at the fuel gauges, which indicated "above the yellow arc," and assumed control of the airplane. The flight crew declared an emergency, and the PIC performed a forced landing into trees about 1/2 mile from ISP.

The accident occurred during the hours of daylight approximately 40 degrees, 48 minutes north latitude, and 73 degrees, 5 minutes west longitude.

PERSONNEL INFORMATION

The PIC held a commercial pilot's certificate and a flight instructor certificate with ratings for single and multi-engine land airplanes. He was also instrument rated. According to company records, the pilot was hired on December 5, 2000, and began flying the Beech 90 as PIC on December 21, 2000. The company reported that the pilot had accumulated about 2,440 hours of total fight experience, which included about 900 hours in multi-engine airplanes and about 100 hours in the Beech 90. They further reported 63 and 40 hours of multi-engine flight experience, with 15 and 6 hours in the Beech 90; respectively, during the 90 and 30 days, prior to the accident.

The pilot's most recent Federal Aviation Administration (FAA) first class medical certificate was issued on April 3, 2001.

The co-pilot held a commercial pilot certificate with ratings for single and multi-engine land airplanes. He was also instrument rated and held flight instructor certificate with a single engine land rating. According to company records, the co-pilot was hired on November 14, 2000, and began flying the Beech 90 as second-in-command (SIC) on December 6, 2000. The company reported that the co-pilot had accumulated about 1,615 hours of total fight experience, which included about 465 hours in multi-engine airplanes and about 115 hours in the Beech 90. They further reported 67 and 27 hours of multi-engine flight experience, all in the Beech 90, during the 90 and 30 days; respectively, prior to the accident.

The co-pilot's most recent FAA first class medical certificate was issued on May 30, 2000.

AIRCRAFT INFORMATION

The airplane was maintained under a current manufacturer’s maintenance inspection program. The airplane had been operated for about 174 hours since it's most recent "Phase 1 Inspection," which was performed on December 6, 2000. At the time of the accident the airplane had been operated for about 6,581 hours, and the total engine time for both engines was about 6,555 hours.

METEOROLOGICAL INFORMATION

The weather reported at ISP, at 1727, was: wind from 180 degrees at 11 knots; visibility 10 miles; ceiling 2,200 feet broken, 3,600 feet overcast, temperature 14 degrees C; dew point 10 degrees C; altimeter 29.95 in/hg.

WRECKAGE AND IMPACT INFORMATION

The airplane came to rest upright, in a wooded area. Several freshly broken tree branches were observed on a path of about 240 degrees, and the fuselage was oriented about a 210-degree magnetic heading. All major portions of the airplane were accounted for at the accident site. Both wings sustained leading edge damage. The outboard 9 feet of the right wing, and the left wing outboard of the left engine, were found separated. The left horizontal stabilizer was separated at it's attach point, and folded downward. The right horizontal and vertical stabilizer remained attached to the airplane, and displayed leading edge damage. The flaps and landing gear were found extended; however, the nose gear and left main gear were collapsed.

Both engines and their respective propellers remained intact. The right propeller consisted of one blade that was not damaged, one blade with a twisted tip, and one blade which was bent aft. The left propeller consisted of one blade with an aft bent tip, one blade with trailing edge

gouges, and one blade which was bent aft. Overall, both propellers displayed minor chord wise scratches.

The fuel quantity indicator toggle switch was selected to the "TOTAL" position. The left and right fuel firewall valve switches were found in their respective "OPEN" positions and the crossfeed switch was found in the "CLOSED" position. Additionally, the left and right boost pumps and the left and right transfer pumps, were observed in the "OFF" position. According to the PIC, after he exited the airplane, he heard the engine boost pumps operating. He then retuned to the cockpit and "shut off the fuel panel."

The airplane was moved to a hanger for further examination. Examination of the fuel system revealed both engine nacelle tanks, both wing center section tanks, and the right wing fuel tanks were not compromised. About 1 quart of fuel was drained from the left and right engine nacelle tanks, respectively. Less than a quart of fuel was drained from the right wing tanks. The left wing tanks were compromised during the accident; however, according to a FAA inspector who arrived at the accident site within an hour after accident, there was "very little" smell of fuel present at the accident site, and no evidence of a fuel spill. Examination of the left and right wing center tanks revealed approximately 27 gallons of fuel present in each tank. Battery power was connected to the airplane, and when the fuel transfer pump switches were turned to the "ON" position, fuel was observed being pumped from the left and right wing center tanks to their respective nacelle tanks. Additionally, after all fuel was drained from both wing center section tanks, the fuel transfer pump switches were again placed in the "ON" position. After about 30 seconds, both transfer pumps ceased operating and the left and right "NO FUEL TRANSFER" lights illuminated. When the fuel transfer pump switches were placed in the "OFF" position, both lights extinguished, respectively.

ADDITIONAL INFORMATION

Beech 90 Fuel System

According to the airplane flight manual (AFM), the fuel system consisted of two separate systems connected by a cross feed system. Additionally, "Fuel for each engine is supplied from a nacelle tank and four interconnected wing tanks for a total of 192 gallons of usable fuel for each side with all tanks full. The outboard wing tanks supply the center section wing tank by gravity flow. The nacelle tank draws its fuel supply from the center section tank. Since the center section tank is lower than the other wing tanks and the nacelle tank, the fuel is transferred to the nacelle tank by the fuel transfer pump in the low spot of the center section tank...."

With regards to the fuel transfer pumps, the AFM stated, "Submerged, electrically driven, impeller pumps located at the low spots in the wing center section tanks provide the motive force for fuel transfer from the wing tanks to the nacelle tanks. Fuel transfer is accomplished when the TRANSFER PUMP switches are turned ON, unless the nacelle tanks are full.... The nacelle tanks will continue to fill until the fuel reaches the upper transfer limit and a float

switch turns the pump off. As the engines burn fuel from the nacelle tanks (60 gallon capacity each tank), fuel from the wing tanks transfers into the nacelle tanks each time their level drops approximately ten gallons. When 131 gallons of fuel (each side) are used from the wing tanks (132 gallons usable each side), a pressure-sensing switch reacts to a pressure drop in the fuel transfer line. After 30, seconds, the transfer pump shuts off and the annunciator panel illuminates showing a NO FUEL TRANSFER light. The NO FUEL TRANSFER light also functions as an operation indicator for the transfer pump. Extinguishing the NO FUEL TRANSFER light is accomplished by turning the transfer switch OFF."

The AFM further stated, "If the transfer pump fails to operate during flight, gravity feed will perform the transfer. When the nacelle tank level drops to approximately 150 lbs, the gravity feed port in the nacelle tank opens and gravity flow from each wing starts. All wing fuel except 28 gallons from each wing will transfer during gravity feed."

The first item in the AFM, AFTER STARTING AND TAXI checklist, was "Transfer Pumps - ON."

With regards to the fuel gauging system, the AFM stated, the airplane is equipped with a capacitance fuel gauging system. The fuel panel utilizes a fuel quantity indicator for each side. A toggle switch, located between the two fuel quantity indicators, can be placed in the TOTAL position to provide an indication of all fuel in the system, or in the NACELLE position to indicate the quantity of the fuel in the nacelle tanks only..."

Re-fueling History

The day before the accident, the airplane was flown by the co-pilot and a different PIC, on a round trip flight from ISP to North Carolina. Upon returning to ISP, the PIC requested 150 gallons of Jet A fuel to be added to the airplane. The PIC said he determined this amount because the airplane was routinely refueled to a standard fuel load of 1,800 pounds.

According to the co-pilot, when the lineman asked him how much fuel to add to the airplane, he "forgot the conversions," and therefore he instructed the lineman to refuel the airplane, while he monitored the fuel gages in the cockpit. A refueling receipt indicated the airplane was refueled with 130 gallons of Jet A fuel. The PIC stated he logged the 130 gallons of fuel received onto a trip expense report; "but it did not register in my mind that it wasn't the 150 [gallons] that I had requested.

According to company records, the airplane departed ISP with about 1,700 lbs of fuel on board and was not re-fueled at PHL or HTO. On a flight log located in the cockpit, the flight crew indicated 1,100 lbs of fuel remaining prior to takeoff at PHL, and 750 lbs of fuel remaining prior to takeoff at HTO. According to the flight crew, the flight from HTO to ISP was "direct" and flown at an altitude of 2,000 feet MSL.

Wreckage Release

The airplane wreckage was released on May 20, 2001, to the President of Executive Fliteways Inc.

Pilot Information

Certificate:	Commercial	**Age:**	29,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	April 3, 2001
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	December 21, 2000
Flight Time:	2439 hours (Total, all aircraft), 98 hours (Total, this make and model), 2129 hours (Pilot In Command, all aircraft), 63 hours (Last 90 days, all aircraft), 40 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Commercial	**Age:**	26,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	May 30, 2000
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	December 5, 2000
Flight Time:	1613 hours (Total, all aircraft), 114 hours (Total, this make and model), 1410 hours (Pilot In Command, all aircraft), 67 hours (Last 90 days, all aircraft), 27 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N270TC
Model/Series:	C90	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	LJ-858
Landing Gear Type:	Retractable - Tricycle	**Seats:**	8
Date/Type of Last Inspection:	December 6, 2000 Continuous airworthiness	**Certified Max Gross Wt.:**	9650 lbs
Time Since Last Inspection:	175 Hrs	**Engines:**	2 Turbo prop
Airframe Total Time:	6581 Hrs at time of accident	**Engine Manufacturer:**	Pratt & Whitney
ELT:	Installed, activated, aided in locating accident	**Engine Model/Series:**	PT6-21
Registered Owner:	Delux Jets	**Rated Power:**	550 Horsepower
Operator:	Executive Fliteways	**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	AOQA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	ISP,99 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	17:27 Local	**Direction from Accident Site:**	240°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Broken / 2200 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	11 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	180°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.95 inches Hg	**Temperature/Dew Point:**	14°C / 10°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	EAST HAMPTON, NY (HTO)	**Type of Flight Plan Filed:**	None
Destination:	Islip, NY (ISP)	**Type of Clearance:**	None
Departure Time:	17:00 Local	**Type of Airspace:**	Class C

Airport Information

Airport:	LONG ISLAND MAC ARTHUR ISP	**Runway Surface Type:**	Asphalt
Airport Elevation:	99 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	24	**IFR Approach:**	None
Runway Length/Width:	7002 ft / 150 ft	**VFR Approach/Landing:**	Forced landing;Straight-in

Wreckage and Impact Information

Crew Injuries:	2 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Serious	**Latitude, Longitude:**	40.809444,-73.086387

Administrative Information

Investigator In Charge (IIC):	Schiada, Luke
Additional Participating Persons:	Joseph Rachiele; Farmingdale, NY Stuart E Bothwell; Wichita, KS
Original Publish Date:	July 25, 2002
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=52295