HISTORY OF FLIGHT

On August 3, 2013, about 1254 eastern daylight time, a Beechcraft D55, N7641N, was destroyed by impact and fire following collision with a telephone pole and terrain near Conway, South Carolina. The private pilot and two passengers were fatally injured. The flight departed from Conway-Horry County Airport (HYW), Conway, South Carolina, about 1128. Visual meteorological conditions prevailed, and no flight plan was filed for the local personal flight which was conducted under the provisions of 14 Code of Federal Regulations Part 91.

According to air traffic control (ATC) communication transcripts and radar data provided by the Federal Aviation Administration (FAA), the pilot was issued an instrument clearance and performed a practice Instrument Landing System (ILS) approach to runway 18 at Myrtle Beach International Airport (MYR), Myrtle Beach, South Carolina, then proceeded back to HYW under visual flight rules (VFR).

After performing a low approach to runway 18 at MYR he climbed the airplane to 3,500 feet on a northerly track. The pilot reported the destination airport in sight, and ATC issued the airplane a frequency change. The airplane continued several miles north of HYW, and approximately 1246, initiated a 180-degree descending turn back towards HYW. About 1252:50, while descending at a calculated rate of 800 feet per minute, the airplane turned and aligned with the final approach course to runway 22 at HYW.

While tracking inbound, aligned for runway 22 at HYW, about 2 miles from the runway threshold, the airplane leveled about 600 feet where it entered a 270-degree turn to the right. The last radar target was plotted at an altitude 700 feet, approximately over the accident site. The Beechcraft Aerodynamics Engineering Department performed calculations and plotted a graph, attached elsewhere to this report, which showed the altitude and airspeed changes along the radar track of the airplane. The calculations correlated to a right bank of approximately 30 degrees and airspeeds below 80 knots.

Witnesses heard the airplane approaching from the southwest and noticed it was "extremely" low. The airplane then executed a steep right turn, leveled its wings, and rocked side to side. The airplane departed controlled flight, struck a telephone pole, rotated approximately 180 degrees, impacted terrain, and caught fire.

According to one witness, "… I could hear the engine sputtering and stalling and at the same time I witnessed the plane banking toward the Southeast really hard, almost to the point I thought the plane was going to turn completely upside down.

Then all of a sudden it sounded like the plane went to full power and it was like he was trying to get altitude but the plane was still rocking side to side like it was not in control. All I can remember after that point is the plane losing altitude and clipping the power lines with the left wing and hitting the ground then exploding."

Another witness stated, "At no time did I witness any attempt to pull up and out of the rapid decent I do remember hearing lots of sputtering/choking…I did not see any landing gear exposed."

PILOT INFORMATION

According to FAA records, the pilot held a private pilot certificate with ratings for airplane single-engine land, multi-engine land, and instrument airplane. His most recent FAA third-class medical certificate was issued on February 15, 2012. According to the pilot's most recent logbook entry, dated July 26, 2013, he had a total of 354 total hours of flight experience; of which193 hours were in the accident airplane make and model.

AIRCRAFT INFORMATION

The six-seat, twin-engine, low-wing, retractable landing gear airplane was manufactured in 1968 and was equipped with two Continental Motors IO-520, 285-horsepower engines. The airplane's maintenance and fuel servicing records were not recovered; however a copy of a maintenance log entry revealed that its most recent annual inspection was completed on September 10, 2012, at 4,352 total airframe hours. The right and left engines had accrued 1,313 and 135 total hours of operation since overhaul, respectively.

The main fuel tanks had a capacity of 40 gallons each, of which 37 gallons was usable. The auxiliary tanks had a capacity of 31 gallons each. The separate, identical fuel supplies for each engine were interconnected by crossfeed lines. During normal operation, each engine operated on its respective fuel tanks. During an emergency, fuel could be drawn from any or all tanks by either engine. Emergency crossfeed operations were limited to level flight only.

A one-eighth tank indication was approximately 5 gallons.

The manufacturer's published minimum controllable airspeed (Vmca) for single engine operation was 80 knots.

METEOROLOGICAL INFORMATION

The 1255 recorded weather at HYW, included wind from 190 degrees at 4 knots, 7 statute miles visibility, and scattered cloud layers at 4,600 and 5,000 feet. The temperature was 31 degrees C, the dew point was 23 degrees C, and the altimeter setting was 30.02 inches of mercury.

AIRPORT INFORMATION

HYW was a non-towered airport that operated under class G airspace. The field elevation for the airport was 35 feet msl and the traffic pattern altitude was 1,035 feet msl. The airport was equipped with one asphalt runway. Runway 4/22 was 4,401 feet in length and 75-feet wide.

WRECKAGE INFORMATION

The accident site was located at the entrance of a residential neighborhood, about 2 miles to the north of the approach end of runway 22 at HYW. All major components of the airplane were accounted for at the scene. The airplane impacted terrain in an approximately 25-30 degrees nose down, level attitude, and came to rest on about a 305 degree magnetic heading.

The airplane front cockpit area came to rest on the housing development entrance marque brick pillar. The forward carry thru structure was separated, and the outboard half of the left wing was separated. The airplane was otherwise intact. The left wingtip assembly was located to the left (outboard) of the left engine nacelle. The wingtip assembly had been exposed to post-impact fire. A section of the left outboard wing with the aileron attached was found about 25 feet to the left of the airplane. The separated outboard left wing was further separated into three pieces; two pieces of leading edge connected to each other by a piece of front spar hinge wire, and a wing panel piece with an aileron attached by the outboard hinge. The section of the left outboard wing with the aileron attached was only slightly exposed to the post-impact fire.

The inboard end of the right and left wing were partially consumed by post-impact fire. The remainder of the airplane, including the cockpit area, cabin, rear fuselage, and empennage, displayed varying degrees of exposure to post-impact fire. The engine nacelle assemblies were not exposed to post impact fire.

The airplane was equipped with a dual arm control column. The right aileron and empennage flight control surfaces remained attached to the airplane. The left aileron remained partially attached to the separated portion of the outboard end of the left wing. The left aileron pushrod was separated. The airplane flight control cable systems from the front carry thru to their respective control surface remained intact. Manipulation of the empennage flight control cables from a position aft of the front carry thru moved the elevators and rudder. The aileron flight control cables could not be manipulated to move the right aileron. The left aileron flight control cables could be manipulated to move the left aileron bellcrank. Forward of the front carry thru one rudder flight control cable remained intact. The other five flight control cables were separated at the bottom side of the front carry-thru structure. The cable separations were consistent with the cables being sheared in overstress. The flight control cable attachments to the cockpit flight control assemblies could not be confirmed due to crush damage behind the instrument panel. The rudder bellcrank mounted on the left side of the cockpit was not located. The rudder bellcrank mounted on the right side of the cockpit that was located. The push/pull tube that interconnects the two cockpit rudder bellcranks and the two output push/pull tubes to the copilot rudder pedals were separated.

The airplane trim tabs located on the left aileron, the rudder, and on each elevator remained attached. The aileron and rudder trim system knobs in the cockpit could not be manipulated, and the airplane pitch trim system, which could be activated either manually or by an electric trim servo, could not be manipulated from the cockpit. The trim actuator extensions were measured, and the actuators could be

manipulated at the trim cable inputs to each actuator. The rudder trim actuator extension was measured and determined to be extended 3.5 inches, which corresponded to a rudder tab trailing edge 12 degrees right position. Both elevator trim actuator extensions were measured and each actuator was determined to be extended 0.875 inches, which corresponded to an elevator tab trailing edge 3 degrees up position. The aileron trim actuator extension was measured and determined to be extended 1.625 inches, which corresponded to an aileron tab trailing edge 3 degrees down position.

The flap handle was in the APPROACH position in the cockpit. The flaps remained attached to their respective wing trailing edge. The right flap had been partially consumed by the post impact fire. With the airplane sitting flat on the ground at the site, the flaps were observed to be in a near retracted position, and as such the actuator extensions could not be measured. The flap actuators were observed to have remained attached to their respective flap. Each flap drive cable/housing was separated from the flap drive motor drive/mount. The flap drive retainer coupling was observed to be attached to the right flap cable/housing.

The landing gear actuator with attached main landing gear extension rods were separated from the front carry thru, and was located on top of the left inboard wing. The landing gear was found collapsed with the landing gear strut assemblies positioned on the outside of the closed inboard landing gear doors. The landing gear selector handle was in the DOWN position.

The four fuel tanks were partially consumed by the post-impact fire. The four fuel caps remained seated and locked in their fuel cap receivers.

The left fuel valve was damaged. The selector handle and fuel output housing were separated from the left valve body. Low pressure air was applied to the left main tank input port mounted on the valve body and was felt exiting the fuel supply rotor port located on the bottom of the valve body. The fuel supply rotor port was observed to be aligned with an in-the-valve body port. Free passage of air through these two ports was consistent with the left fuel selector valve being selected to the left MAIN fuel tank.

The right fuel selector valve was damaged. The selector handle, the fuel supply rotor, and the fuel output housing were separated. Low pressure shop air was applied at the fuel return from the engine valve port located on the side of the valve body and was felt exiting the right MAIN RETURN port located on the side of the valve body. Free passage of air through these two ports was consistent with the right fuel selector valve being selected to the right MAIN fuel tank.

The left engine's propeller hub remained attached to the engine. The hub was shattered and the spinner was splayed open. All three blades were separated from the hub. One blade was located about 200 feet north of the airplane. The other two blades were found in close proximity to the left engine. The separated blades displayed varying degrees of tip erosion and tip curl, twist toward a lower pitch, and aft bending.

The right engine's propeller was separated from the engine crankshaft propeller mounting flange. All

three blades remained attached to the propeller hub. The blades were slightly bent rearward, and one blade was buckled lengthwise. There was no visible blade tip damage, and light chordwise scratching on the blade leading edges along the majority of the blade's length visible. The blade leading edges displayed red brick dust along the full span of the blades. One blade rotated in the hub. The spinner was dented and displayed no visible rotational signatures.

Complete disassembly of each engine revealed normal wear and lubrication signatures. Crankshaft to camshaft timing was confirmed on each engine. The magnetos were tested on a test stand and each produced spark through the full range of test bench rpm.

The right engine-driven fuel pump was flow-tested and functioned properly through its full range of operation. The left engine-driven fuel pump displayed impact and thermal damage that precluded its testing.

There were no preimpact mechanical anamolies that would have precluded normal operation of either engine.

MEDICAL AND PATHOLOGICAL INFORMATION

The Horry County Coroner's Office, Conway, South Carolina, performed the autopsy on the pilot.

Toxicological testing was performed on the pilot by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. The report stated that no ethanol was detected in vitreous fluid and specimens were unsuited for carbon monoxide analysis.

Review of the toxicological report revealed:

Desmethylsertraline detected in Liver
0.531 (ug/mL, ug/g) Desmethylsertraline detected in Blood

Sertraline detected in Liver
0.137 (ug/mL, ug/g) Sertraline detected in Blood"

Sertraline was a prescription selective serotonin reuptake inhibitor (SSRI) medication used for the treatment of depression and was marketed as Zoloft. Although the medication has not been shown to impair the ability of normal subjects to perform tasks requiring complex motor and mental skills in laboratory experiments, drugs that act upon the central nervous system may affect some individuals adversely.

Desmethylsertraline is a byproduct produced by the body during normal elimination of sertraline from the body; it is less biologically active than the parent compound.

A review of the pilot's personal medical records revealed that he was prescribed medications for the treatment of depression and anxiety from February 2009 through April 18, 2013. ~~According to an NTSB medical officer, "In this case, the pilot's depression and anxiety were apparently well controlled four months prior to the accident. It is unlikely that the pilot's sertraline was impairing at the time of the accident."~~

On his application for FAA medical certification dated February 15, 2012, the pilot marked "no" in block 18m~~.~~ (mental disorders of any sort, depression, anxiety, etc.).

TESTS AND RESEARCH

A Samsung Galaxy SIII touch screen smart-phone, Apple iPad, Garmin Aero 560, BF Goodrich Stormscope, and a Garmin GTN 750 were recovered in the wreckage and examined in the NTSB Recorders Laboratory, Washington, DC. Exterior examinations of these items, except for the smart-phone, revealed extensive structural and/or fire damage. Recovery was attempted, but due to the damage, data could not be recovered.

Videos depicting portions of the accident flight were recovered from the Samsung Galaxy SIII. There were five separate videos of various lengths. The first was time-stamped at 1121:15, and the final video was time-stamped at 1244:41.

The videos began after the airplane's engines were started and the airplane then taxied, performed a run-up, and departed. All videos were recorded from the back/rear seat of the airplane. The camera direction changed frequently, such that the field of view varied between left and right views outside the airplane and internal cabin and cockpit views.

A review of the videos revealed the engines were running at 1121, and at 1127 during run-up, the left tank fuel quantity indicator was about one needle-width below the half-tank indication and the right tank fuel quantity indicator was about 3 needle-widths below half-tank indication. Takeoff was at 1128.

At 1231, about 300 feet altitude on approach to Myrtle Beach Airport, the left tank was one needle-width above one-quarter tank, and the right tank was showing one-eighth of a tank which was in the yellow range marking on the gauge.

The radar data showed the flight continued for 23 more minutes, which included a climb to 3,500 feet.

ADDITIONAL INFORMATION

Interpolation of performance charts when plotting temperature, engine start, run-up, taxi, takeoff, climb and cruise profiles revealed that each engine would have consumed between 27 and 32 gallons during the estimated 90 minute flight, which was an approximate fuel consumption rate of 20 gallons per hour.

Pilot Operating Handbook (POH)

"Fuel quantity is measured by float type transmitter units which convey signals to two indicators on the instrument panel. They indicate the amount of fuel in either the main tanks or the auxiliary tanks for their respective wings. A two-position selector switch on the pilot's subpanel, to the left of the control console, determines the tanks, main or auxiliary, to which the indicators are connected." No images of the selector switch were captured in the on-board videos.

According to the pilot's operating handbook, Fuel Management, engine start, takeoffs, and landings should be performed "on main tanks only." It further states, "Do not take off if Fuel Quantity Gages indicate in Yellow Arc or with less than 13 gallons in each main tank."

According to the POH, the emergency procedure for ENGINE FAILURE AFTER LIFT-OFF AND IN FLIGHT, "Continued flight requires immediate pilot response to the following procedures.

1. Landing Gear and Flaps – UP
2. Throttle (inoperative engine) – CLOSED
3. Propeller (inoperative engine) – FEATHER
4. Power (operative engine) – AS REQUIRED
5. Airspeed – MAINTAIN SPEED AT ENGINE FAULURE (99 KNOTS (114 MPH) UNTIL OBSTACLES ARE CLEARED

After positive control of the airplane is established:

6. Secure inoperative engine:
a. Mixture Control – IDLE CUT-OFF
b. Fuel Selector – OFF
c. Auxiliary Fuel Pump – OFF
d. Magneto/Start Switch –OFF
e. Alternator Switch – OFF
f. Cowl Flap – CLOSED
7. Electrical Load – MONITOR (Maximum load of 1.0 on remaining engine)

NOTE:

The most important aspect of engine failure is the necessity to maintain lateral and directional control. If airspeed is below 80 kts (92 mph), reduce power on the operative engine as required to maintain control.

The FAA Airplane Flying Handbook defined VMC as: "Minimum control speed. The minimum flight speed at which the airplane is controllable with a bank of not more than 5 [degrees] into the operating engine

when one engine suddenly becomes inoperative and the remaining engine is operating at takeoff power."