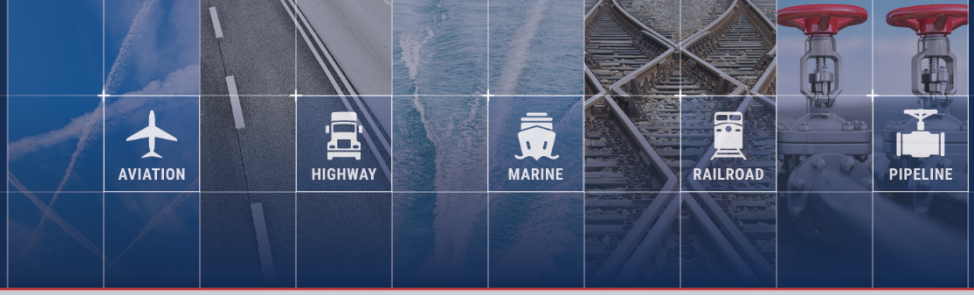

Aviation Investigation Final Report

Location:	San Bernardino, California	**Accident Number:**	WPR11FA125
Date & Time:	February 7, 2011, 11:47 Local	**Registration:**	N225DH
Aircraft:	Beech 95-B55 (T42A)	**Aircraft Damage:**	Substantial
Defining Event:	Fuel starvation	**Injuries:**	2 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

During the initial climb, the landing gear warning horn sounded. The pilot diagnosed the problem and determined that the landing gear had retracted successfully and that the indication system was in error. He continued the flight with the horn intermittently sounding. During the descent phase, the pilot was given an unexpected direct route to the airport, and, as a result, he rushed through the descent checklist items. The pilot decided to perform a low pass over the arrival runway to confirm that the landing gear had extended. The pilot said that during the low pass he started to have difficulty controlling the airplane. An onboard engine monitoring system recorded a total loss of engine power to the right engine at that time. The pilot did not recognize that his difficulty in maintaining altitude and airplane control was a result of a loss of engine power to one engine; he subsequently lost control of the airplane, which collided with a storage facility in a nose-down inverted attitude. Witness reports, photographic evidence, and a postaccident examination revealed that the pilot did not retract the landing gear and flaps after the loss of power, as instructed in the airplane's operating instructions for a go-around with one engine inoperative.

The airplane's operating instructions recommend that the main fuel tanks be selected during descent and while landing. The pilot stated that he customarily uses the auxiliary fuel tanks during cruise flight and the main tanks while climbing and descending; however, both fuel selector valves were found in the auxiliary tank position at the accident site. The airplane's fuel tanks were serviced to capacity about 2.5 flight hours before the accident. Calculations of fuel consumption for the flights since the last fueling would have resulted in the use of a quantity of fuel that would have either been equal to or slightly exceeded the capacity of the auxiliary fuel tanks. Damage to the fuel system precluded an accurate assessment of the quantity and distribution of the remaining fuel onboard at the time of the accident. The engine monitoring system recorded a small rise in exhaust gas temperatures just before the loss of power; this

rise is consistent with a lean fuel/air mixture, which would be present in a fuel starvation or exhaustion event. The postaccident examination did not reveal any anomalies with the airframe or engine that would have precluded normal operation.

The pilot's increased workload, due to the unexpected routing and possible problem with the landing gear, during the abbreviated final approach clearance and subsequent low pass could have resulted in a task overload, which resulted in his mismanagement of the fuel system during the landing phase.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot did not recognize the loss of power in the right engine and did not execute the proper procedures for a go-around with one engine inoperative, likely due to increased workload. Contributing to the accident was the pilot's improper in-flight fuel management, which resulted in fuel starvation of the right engine.

Findings

Aircraft	Gear position and warning - Malfunction
Personnel issues	Use of equip/system - Pilot
Personnel issues	Identification/recognition - Pilot
Personnel issues	Incorrect action performance - Pilot
Aircraft	Fuel - Fluid management
Personnel issues	Task overload - Pilot

Factual Information

History of Flight

Approach-VFR go-around	Fuel starvation (Defining event)
Approach-VFR go-around	Loss of engine power (total)
Approach-VFR go-around	Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On February 7, 2011, at 1147 Pacific standard time, a Beech 95-B55 (T42A), N225DH, impacted the grounds of a recreational vehicle (RV) storage facility after performing a precautionary low pass at San Bernardino International Airport, San Bernardino, California. The pilot operated the airplane under the provisions of Title 14 Code of Federal Regulations Part 91. The private pilot and private pilot licensed passenger sustained serious injuries. The airplane sustained substantial damage. The personal cross-country flight departed San Luis Obispo, California, at 1033, with a planned destination of San Bernardino. Visual meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan had been filed.

The pilot and passenger were interviewed by the NTSB investigator-in-charge (IIC) on numerous occasions subsequent to the accident. They both reported that due to their injuries, recollection of the accident, in particular the final stages, was somewhat unclear.

Both the pilot and pilot rated passenger reported that prior to departure from San Luis Obispo, they performed an uneventful preflight inspection. The passenger reported that the main fuel tanks were full, and that the auxiliary tanks were filled to about 1/2 of their capacity. The pilot filed an IFR flight plan, and shortly thereafter, they departed. While on the upwind leg, he heard the landing gear warning horn sound. He asked the control tower personnel to confirm that the landing gear was retracted. The controller confirmed that it was, and the pilot sent a text message to his mechanic describing the circumstances. He subsequently deduced that there was a fault with the landing gear indication system, rather than the landing gear. He therefore elected to continue the flight, with the horn intermittently sounding, with the intention of performing a precautionary low-approach at the destination airport.

The pilot continued with the climb, and began his departure checklist, which included switching from the main wing fuel tanks to the auxiliary tanks. The pilot stated that he customarily utilized the auxiliary fuel tanks during cruise, and the main tanks during climb and descent. The flight continued uneventfully; however, prior to reaching his final planned waypoint, air traffic control gave a clearance direct to San Bernardino. The clearance caught him by surprise, and he reported that as such, he performed his descent checklist in a rushed manner. He recalled switching to the main fuel tanks, but rather than waiting a customary 10 seconds between

tanks, he switched both at the same time.

Upon arrival, the pilot extended the landing gear, confirming its deployment visually with the gear mirror, and by observing the illumination of the green landing gear light. He reported his intention to the tower, and continued with the low pass. The tower personnel confirmed that the landing gear appeared extended.

The pilot stated that as soon as he received the tower's confirmation, he felt that something was not right with the airplane. His recollection from this point onward was somewhat unclear, but he reported that the airplane was not climbing as expected, and both engines seemed to be "cycling." The flight progressed with no change in altitude, and he recounted that he was struggling to maintain control of the airplane. He could not recall if any one engine had lost power, but felt that he was losing power in both engines. He could not specifically recall the steps he took to troubleshoot the problem, however, he did ask the passenger to look for any erroneous indications on the engine and flight instruments.

The pilot stated that he began to turn the airplane around, as he looked for a landing area. At an altitude of about 20-30 feet above ground level (agl), he observed what appeared to be an RV park. He was concerned that if he attempted to land there, he could cause injuries to anyone on the ground, so he made the decision to stall the airplane, minimizing the accident footprint. He reported that he then switched the fuel selector valves to the off position, and pulled the mixture lever for both engines to idle cut-off. He could not recall if he turned off the magnetos during this time. He then pulled back on the elevators in an attempt to stall the airplane.

A Federal Aviation Administration (FAA) and Boeing flight test crew was situated on the flight deck of a Boeing 747-8, located along the north taxiway, adjacent to the departure end of runway 24 at San Bernardino International Airport. The crew recounted similar observations of the airplane flying level about 150 feet agl over the runway, with its landing gear and flaps extended. It then began a turn to the left while simultaneously descending. A few seconds later, the nose of the airplane appeared to pitch up, followed by a subsequent roll to the right and an inverted nose down descent. They reported that throughout the sequence, the landing gear and flaps remained extended, and the airplane did not appear to be emitting smoke or vapors.

The airplane was equipped with a Garmin GPSMap 496 global positioning systems receiver. Historical flight data from the unit was extracted, revealing the entire flight sequence. The airplane departed San Luis Obispo on a heading of 100 degrees true, while climbing to a maximum altitude of about 9,400 feet mean sea level (msl). Twenty-six minutes later, the airplane turned 15 degrees left over Santa Barbara towards the Los Angeles area. After an additional 15 minutes, the airplane began a gradual descent to 5,000 feet msl over Corona. At 1138, the airplane turned 90 degrees left towards San Bernardino airport. At 1143, the airplane joined the left downwind for runway 24, while at an altitude of about 2,400 feet msl (1,241 ft agl). The airplane continued to descend during the downwind phase, while its GPS

groundspeed decreased to 135 mph. The airplane began a sweeping left turn through the base leg, turning onto final at an elevation of about 1,287 msl (128 feet agl). For the next 40 seconds the airplane maintained runway heading, reducing speed to 108 mph while descending to about 20 feet agl. The airplane then began a right turn, climbing to 163 feet agl as its speed decreased to 88 mph. For the remaining 66 seconds, the airplane began a descending 180 degrees left turn, while maintaining an average speed of 84 miles per hour.

Recorded radio transmissions made over the airport's common traffic advisory frequency revealed that while on the left downwind for runway 24, the pilot reported problems with the airplane's landing gear. He made a request for a low approach, and to overfly the runway so that tower personnel could check the gear. Tower personnel cleared the request, the pilot overflew the runway, and the tower personnel reported that the gear appeared to be down. The pilot was subsequently approved for a left turn, and given a clearance to land on runway 24. A few seconds later the pilot reported, "I've got another problem now, just standby, I'm going to head straight for a while." Tower personnel then canceled the landing clearance, and advised the pilot that runway 6 was available for landing. The pilot then made his final radio transmission, reporting that he was going to attempt to circle back to runway 6. The tower subsequently cleared him to land on that runway. Tower personnel reported light and variable winds with the clearance.

The airplane came to rest in the parking lot of the RV storage facility, about 4,700 feet southwest of the departure end of runway 24. The airplane was located upright, on a heading of about 310 degrees magnetic, adjacent to a collapsed steel awning. Fragments of roofing material and awning cross members were comingled with the airplane wreckage. The airplane remained largely intact, with crush damage noted to the entire cabin and nose cone area. Both wings remained partially attached to the fuselage. The tail section remained in place, and the associated control surfaces were intact. All sections of the airplane were located within the immediate confines of the crash site. Fuel staining was noted to the tarmac surface surrounding the airplane, and first response personnel reported a strong odor of fuel was present at the accident site upon their arrival.

PERSONNEL INFORMATION

A review of FAA airman records revealed that the 39-year-old pilot held a private pilot certificate with ratings for airplane single-engine land, multiengine land, and instrument airplane. An examination of the pilot's flight logbook indicated an estimated total flight time of about 660 hours since his first training flight in January 2001. Logbook records indicated that the pilot began multiengine training in April 2010. He subsequently was issued a multiengine rating on August 8, after receiving a total 21 hours of dual flight instruction. His total flight experience in multiengine aircraft at the time of the last entry, dated November 28, 2010, was 101.2 hours.

The pilot held a third-class medical certificate issued in May 2007. It had no limitations or waivers.

AIRCRAFT INFORMATION

The, low-wing, retractable-gear airplane, was manufactured in 1969. It was powered by two fuel injected, normally aspirated, Continental IO-470-L engines, and equipped with McCauley two-blade, constant-speed propellers.

The airplane was equipped with a 39-gallon main, and 32-gallon auxiliary fuel tank in each wing.

At the time of the accident, the airplane's flight-hour meter indicated a total time 3,981.2 hours. The last annual airframe and engine inspection occurred on June 23, 2010, 51.4 flight hours prior to the accident.

Review of the engine maintenance logbooks revealed that the right engine was overhauled in August 1993, about 1,020 flight hours prior to the accident. The left engine was overhauled in September 1988, about 1,280 flight hours prior to the accident.

WRECKAGE AND IMPACT INFORMATION

Examination of the airplane at the accident site revealed that the main landing gear was in the extended position. The nose landing gear position could not be determined due to damage sustained to the forward cabin area.

Examination of the flap actuators, located within the wing trailing edges, revealed an extension length of greater than 6 inches. According to Beech representatives, this dimension corresponded with a full-down flap position.

The fuel system lines within the cabin area had sustained multiple ruptures, and were fragmented through to the wing roots. The right engine fuel selector valve handle had become separated from the selector shaft. The selector indicator plate was subsequently removed, and both valves appeared set to the auxiliary fuel tank positions. Both selectors valve handles could be rotated by hand, and locked firmly within their detents. The fuel quantity indicator switch was noted in the auxiliary tank position.

The airplane came to rest tilted about 15 degrees onto the left wing. All fuel tanks had become either ruptured, or exhibited damage to their fuel interconnect and supply lines at the wing root intersection. About 20 gallons of fuel was recovered from the right main fuel tank, with residual quantities of fuel observed in the right auxiliary tank. About 5 gallons of fuel was recovered from the left main fuel tank, with 2 gallons recovered from the right auxiliary tank. All fuel caps were secure within their respective filler necks. The covers for both engine fuel manifolds were removed, and residual quantities of fuel were noted within the cavity. The fuel was tested for the presence of water utilizing SAR-GEL detecting paste, and no water was observed. The right engine auxiliary fuel pump was connected to a 24-volt power source, and

produced an audible sound consistent with operation. Both wing-mounted fuel filters were clear of debris and contaminants, and both engine air intake filters were free of debris and obstructions.

The magneto switches were noted in the right position. The engine controls were examined, and appeared continuous from the throttle quadrant through to each engine firewall. Beyond the firewall, the controls were continuous through to their respective engine controls with the exception of the right engine fuel metering arm, which had become separated from both the metering unit, and the control cable. The fracture surfaces exhibited bending damage and granular features consistent with impact damage.

About 25 pounds of baggage was recovered from the airplane.

TESTS AND RESEARCH

EDM-760

The airplane was equipped with a JPI EDM-760 Engine Monitor. The unit was removed from the instrument panel, and sent to the NTSB Office of Research and Engineering for data extraction. The EDM-760 recorded the engine performance parameters for the time between engine start and the accident, for both engines. The following parameters were recorded; exhaust gas temperature, cylinder head temperature, oil temperature, and battery voltage. The data revealed consistent operation for both engines throughout the takeoff, climb, cruise, and descent phases. For the last 90 seconds, the exhaust gas temperatures for the right engine decreased from about 1,275 degrees F to 250 degrees. The corresponding cylinder head temperatures during that period decreased from about 280 to 220 degrees. About 10 seconds prior to the temperature reduction, the exhaust gas temperatures momentarily increased by about 35 degrees. During the last 90 seconds, the exhaust gas and cylinder head temperatures for the left engine remained relatively constant at 1,300 and 270 degrees, respectively. The battery voltage and oil temperatures for both engines remained constant for the last 90 seconds.

Engines

Examination of the recovered engines was conducted at the facility of Continental Motors in Mobile, Alabama, under the supervision of the NTSB investigator-in-charge. No evidence of preimpact mechanical malfunction or failure was noted during the examination. Refer to the engine report included in the public docket for further details.

ADDITIONAL INFORMATION

Pilot Operating Handbook

The Pilots Operating Handbook (POH), applicable to the model and series of airplane stated

the following under Emergency Procedures:

ONE ENGINE INOPERATIVE GO-AROUND

WARNING

Level Flight might not be possible for certain combinations of weight, temperature, and altitude. In any event, DO NOT attempt a one engine inoperative go-around after the flaps have been fully extended.

1. Power – MAXIMUM ALLOWABLE
2. Landing Gear – UP
3. Flaps – UP (0 degrees)
4. Airspeed – MAINTAIN 100 KTS (115 mph)

The pilot reported that he had received training in single engine procedures in the past, and that during those events the airplane was capable of initiating a climb with a single engine inoperative.

The normal procedures checklist further require that the fuel selector valves be set to the main tanks during the descent and landing phases.

The POH states that the fuel/air mixture during cruise flight can be adjusted utilizing exhaust gas temperature (EGT) readings as follows:

CRUISE (LEAN) MIXTURE – Increase the mixture until the EGT shows a drop of 25 degrees F below peak on the rich side of peak.

BEST POWER MIXTURE – Increase the mixture until the EGT shows a drop of 100 degrees F below peak on the rich side of peak.

Photographic Images and Video Footage

The flight test crew, who witnessed the accident, presented a photograph of the airplane taken just prior to its ground impact. The image revealed the airplane in a 90-degree right bank, level with the top of power transmission towers, just west of the accident location. The landing gear and flaps appeared to be deployed, and the airplane did not appear to be trailing smoke or vapors.

Security camera video footage was recovered from the RV storage facility. The video documented the last second of the airplane's flight path, and included the ground collision. Just prior to the collision, the airplane appeared to be in a wings–level, nose-down attitude.

Fueling

Examination of the GPS data revealed that the last flight prior to the accident occurred on February 3, 2011. The flight departed Mc Clellan-Palomar Airport, Carlsbad, California, direct to San Luis Obispo, with a duration of 1 hour 35 minutes. Fueling records provided by the fixed base operator, Jet Source, Inc., located at Carlsbad Airport, indicated that the airplane was filled to capacity with the addition of 69.9 gallons of 100 low lead aviation gasoline prior to flight.

The fuel burn from the time of the last refueling in Carlsbad through to the accident was calculated based on the recovered GPS data, and fuel burn values derived from the POH. Assuming maximum cruise power, and a standard temperature day, the airplane would have consumed about 38 gallons of fuel for the flight from Carlsbad to San Luis Obispo, and 33 gallons for the accident flight.

Pilot Information

Certificate:	Private	**Age:**	39,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):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	May 1, 2007
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	August 8, 2010
Flight Time:	(Estimated) 660 hours (Total, all aircraft), 101 hours (Total, this make and model), 541 hours (Pilot In Command, all aircraft), 11 hours (Last 90 days, all aircraft), 3 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N225DH
Model/Series:	95-B55 (T42A)	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	TC-1271
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	June 23, 2010 Annual	**Certified Max Gross Wt.:**	5100 lbs
Time Since Last Inspection:	51 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	3981 Hrs at time of accident	**Engine Manufacturer:**	CONT MOTOR
ELT:	C91A installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-470
Registered Owner:	On file	**Rated Power:**	260 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:	SBD,1159 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	11:58 Local	**Direction from Accident Site:**	45°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	240°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.12 inches Hg	**Temperature/Dew Point:**	23°C / 2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	San Luis Obispo, CA (SBP)	**Type of Flight Plan Filed:**	IFR
Destination:	San Bernardino, CA (SBD)	**Type of Clearance:**	IFR
Departure Time:	10:33 Local	**Type of Airspace:**	

Airport Information

Airport:	San Bernardino International SBD	**Runway Surface Type:**	Concrete
Airport Elevation:	1159 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	24	**IFR Approach:**	None
Runway Length/Width:	10001 ft / 200 ft	**VFR Approach/Landing:**	Go around;Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Serious	**Latitude, Longitude:**	34.080833,-117.258888

Administrative Information

Investigator In Charge (IIC):	Simpson, Eliott
Additional Participating Persons:	Michael R Baudoux; Federal Aviation Administration FSDO; Riverside, CA Andrew Swick; Teledyne Continental Motors; Mobile, AL
Original Publish Date:	February 23, 2012
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=78296