

# Beech E55 Baron, G-BFEE, 8 July 1996

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<b>Aircraft Type and Registration:</b>	Beech E55 Baron, G-BFEE
<b>No &amp; Type of Engines:</b>	2 Continental IO-520-C piston engines
<b>Year of Manufacture:</b>	1973
<b>Date &amp; Time (UTC):</b>	8 July 1996 at 1605 hrs
<b>Location:</b>	Trow Down, Berwick St. John, Wiltshire
<b>Type of Flight:</b>	Private
<b>Persons on Board:</b>	Crew - 1 - Passengers - 1
<b>Injuries:</b>	Crew - Minor - Passengers - None
<b>Nature of Damage:</b>	Extensive
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence with Flying Instructor Rating
<b>Commander's Age:</b>	41 years
<b>Commander's Flying Experience:</b>	2,275 hours (of which 27 were on type) Last 90 days - 60 hours Last 28 days - 40 hours
<b>Information Source:</b>	AAIB Field Investigation

## History of the flight

At about 0815 hrs on the morning of 8 July, the operations department of a Bournemouth based airline was informed that one of their jet aircraft was unserviceable in Dublin. It was ascertained that a spare part was required to be taken from Bournemouth to Dublin, along with an engineer to carry out the rectification task.

The operations department telephoned an airport handling agency in order to ascertain whether there was any locally based charter aircraft available to undertake the task. Telephone contact was then made with the operator of G-BFEE and a confirmation quote for the flight was faxed by GBFEE's

operator to the airline operations department. The airline's operations log indicated that the Baron aircraft was to be used, with an estimated departure time of 1100 hrs and estimating to arrive in Dublin at 1230 hrs. The estimated time to accomplish the repair was one hour, and the company's engineer required to return to Bournemouth in the afternoon of the same day.

Meanwhile, the pilot involved in the accident had heard from the handling agent's staff that there was a requirement for a flight to Dublin. The pilot then apparently telephoned G-BFEE's operator and arranged to take the aircraft and operate the Dublin trip on a private basis. There was no direct contact between the pilot and the airline operations department. The airline operations staff considered that the flight was to be undertaken by an operator holding, and in compliance with, a CAA Air Operator's Certificate.

While the pilot obtained the appropriate navigation charts, checked the weather and filed the VFR flight plan for a direct routing to Dublin, G-BFEE's operator arranged for the aircraft to be refuelled to full tanks. The operator then taxied the aircraft around the airfield to pick up the engineer, the spare part and the engineer's toolbox (which was stowed in the rear passenger area of the aircraft). The aircraft was then taxied back to its original parking location to meet the pilot. After a wait of about 20 minutes, the pilot arrived at the aircraft. The engineer waited outside the aircraft while the operator and the pilot carried out a briefing session in the aircraft. The engineer considered that this briefing lasted about ten minutes, but the pilot thought it was about one hour duration. Various systems were discussed including the GPS, flap system, landing gear, cowl flaps and the unconventional layout of the throttle quadrant (described in AAIB Bulletin 2/96, G-BAHN).

The fuel system on G-BFEE consisted of four fuel tanks, one main (37 USG capacity) and one auxiliary tank (31 USG capacity) in each wing. Fuel quantity was measured by float type transmitter units which conveyed signals to two indicators on the instrument panel (above the throttle quadrant). These indicated 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 sub-panel, to the left of the control console, determined the tanks, main or auxiliary, to which the indicators were connected. The pilot recalled being shown this switch during the pre-flight briefing, but subsequent events indicated that the system operation was not correctly understood. The fuel selectors were located on the floor between the two front seats, in a position not readily observable from the pilot's normal seating position. Four positions were provided, OFF, AUX, MAIN and CROSS FEED for each side.

The pilot commented that the operator seemed anxious to get the aircraft underway quickly and had completed the pre-flight inspection earlier. The engineer reboarded, occupying the front right seat. He closed the door and was given a briefing on the emergency exits by the pilot. The aircraft taxied out for a departure from Runway 26. During the take-off roll, approaching lift-off speed, the door came open. The pilot abandoned the take off and brought the aircraft to a halt within the remaining runway distance. The aircraft was then taxied round the airfield for a second take off attempt, while the engineer re-closed the door and ensured that it was indeed correctly closed. The aircraft took off at 1138 hrs, landing at Dublin after an uneventful flight at 1302 hrs, a flight time of one hour and 24 minutes. The pilot commented that the outbound flight had been conducted with the fuel gauge selector switch in the MAIN position.

The engineer and pilot were transported across the Dublin Airport ramp to the unserviceable aircraft. The engineer effected the repair, and the aircraft was recorded as being serviceable again at 1340 hrs. The engineer and pilot then had lunch at the airport. The pilot filed the return VFR flight

plan to Bournemouth and the weather was confirmed to be good for the route. G-BFEE took off again at 1452 hrs, still using the Main fuel tanks.

The aircraft climbed to the selected cruise altitude of 5,000 feet. The pilot then moved the fuel quantity indicator selector switch to the AUX position, under the misapprehension that this would transfer the fuel from the auxiliary tanks to the main tanks. The flight proceeded normally.

As the aircraft crossed Wiltshire, the pilot descended to 3,000 feet and began to reduce speed to 140 kt in anticipation of the arrival into Bournemouth. As the aircraft levelled off, the left engine began to run erratically, cutting out and then giving surges of power. While attempting to control the aircraft directionally and analyse the problem, the right engine also failed. The aircraft had been turned towards Compton Abbas airfield as a possible landing site. Yeovilton Radar had been informed of the situation and the 7700 transponder code was activated. The pilot realised that it would not be possible to reach Compton Abbas and selected a flat field for a forced landing. However, on selecting the landing gear down, the glide angle steepened such that it would not reach the chosen field. The aircraft was approaching rising ground cultivated with an arable crop. The pilot selected full flap and stalled the aircraft onto the ground at about 1605 hrs on a southerly track. The impact was hard and the aircraft stopped in about 20 metres.

The pilot was wearing only a lap harness and sustained a minor head injury on impact with the instrument panel. The engineer had secured his full harness and sustained only minor bruising where the harness had been positioned. The engineer pulled the pilot out of the aircraft. There was no fire, so he returned to the aircraft to pick up his mobile telephone and other items before calling for assistance. The emergency services had already been alerted by other witnesses to the accident.

On inspection of the aircraft by the operator and his engineering contractor, it was discovered that the Main fuel tanks were completely empty, but the Auxiliary tanks were still full. The engineer stated that he did not recall the pilot operating the fuel tank selector switches on the floor of the aircraft at all during the two flights.

### **Fuel Calculations**

The technical log sheets for the aircraft, in conjunction with refuelling and movement information over a period of a few days before the accident, were examined in order to assess the average fuel consumption. Figures between 107 litres/hr and 166 litres/hr were obtained. The flight time from Dublin to the accident had been one hour 13 minutes. This gave a total of two hours 37 minutes from the original take off from Bournemouth with full tanks, which was broadly in accordance with the onboard flight timer which registered two hours 34 minutes. Assuming no fuel was supplied from the Auxiliary tanks, and with full Main tanks containing a total of 282 litres, the fuel consumption on the last two flights was 107 litres/hr, in accordance with correctly leaned mixture controls and a cruise power setting of 65%.

### **Pilot's experience**

The pilot had previously flown about 20 hours in G-BFEE during 1989 and 1990, initially as a "pilot's assistant" on charter flights with a qualified Commercial Pilot, in order to gain experience. About 7 hours of dual instrument flying training was then carried out locally from Bournemouth.

The pilot was type rated on Cessna single engined, Piper PA-22/28/38, Partenavia P68 series and Piper PA-23/34/44 aircraft. Until June 1996, the pilot had been flying the P68 aircraft on charter

operations. During the week before the accident, some 10 hours of flying was undertaken on a Piper PA-34 Seneca II. That aircraft was equipped with auxiliary fuel tanks that required the fuel to be transferred into the main tanks by means of electrical pumps before it could be used.

The pilot had not flown G-BFEE, or any other Baron aircraft, between 1990 and the day of the accident.