

AAIB Bulletin No: 11/93

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Aircraft Type and Registration: Cessna 340A, G-XGBE

No & Type of Engines: 2 Continental TSIO-520-NB piston engines

Year of Manufacture: 1979

Date & Time (UTC): 7 September 1993 at 1318 hrs

Location: One mile northwest of Sheepy Magna, Leicestershire

Type of Flight: Private (Corporate)

Persons on Board: Crew - 1 Passengers - 3

Injuries: Crew - None Passengers - None

Nature of Damage: Landing gear, wing attachments and fuselage underside extensively damaged

Commander's Licence: Private Pilot's Licence

Commander's Age: 61 years

Commander's Flying Experience: 7,650 hours (of which 933 were on type)
Last 90 days - 150 hours
Last 28 days - 50 hours

Information Source: AAIB Field Investigation

History of the flight

The accident occurred when both engines stopped simultaneously during the return flight from Fradley Airfield, near Lichfield, to Bournemouth International Airport.

The purpose of the flight from Bournemouth to Fradley was to pick up three passengers and fly them back to Bournemouth, where the aircraft was based. Immediately prior to take off from Bournemouth the aircraft was re-fuelled with 133 litres divided between the two main (tip) tanks, which raised the level in each tank to a few inches below full (300 lb / 50 US Gallons each). This was confirmed by the pilot dipping his fingers through the filler. It was the pilot's intention to use only the main tanks for the journey.

The flight took off from Bournemouth at 1207 hrs and flew to Fradley, landing at about 1245 hrs. Having collected the passengers, it took off for Bournemouth at about 1300 hrs and was instructed by Birmingham Radar to fly a heading of 140° and to climb to "not above 2,500 feet". The pilot states that, on departure from Lichfield, he noticed a slight right-wing-

down asymmetry and compensated for it with aileron trim. At 1316 hrs, shortly after they had reached 2,000 feet and settled into the cruise, both engines lost power in unison. The pilot attempted to identify and rectify the problem by checking the magneto and the fuel pump switches and changing fuel tanks but, being unsuccessful, transmitted a "Mayday" message to Birmingham ATC. The pilot selected the landing gear 'DOWN' and then, despite some difficulty in finding a suitable field in which to make a forced landing and clearing some trees on the final approach, landed in a field of mature wheat. The aircraft came to rest with all three landing gear legs collapsed and the occupants left the aircraft through the normal passenger door. When the danger of fire had passed, the pilot returned to the aircraft, disabled all electrical circuits except the radio and, at 1325 hrs, transmitted to Birmingham ATC, via a passing KLM aircraft, their survival state and the Latitude/Longitude position provided by the Global Positioning System satellite navigation system carried on board.

Emergency Services co-ordination

The controller of the Rescue Co-ordination Centre (RCC) at Pitreavie Castle was informed of the emergency at 1318 hrs and he was given an approximate crash position as 12 nm north of Birmingham, at Twycross. He scrambled the Sea King SAR helicopter from Leconfield and the Mountain Rescue Team from Stafford at 1320 hrs. At 1327 hrs the RCC were given the Lat/Long position passed by the aircraft and were able to convert this to an Ordnance Survey map grid reference which was then passed to the Leicestershire Police. The SAR helicopter was airborne at 1331 hrs but, at 1336 hrs, when the RCC had established that there were definitely no injuries, the helicopter and the Mountain Rescue Team were stood down.

The Police were notified of the accident at 1322 hrs and, as they were initially uncertain of the exact location of the accident, both the Leicestershire and the Warwickshire Forces were alerted before the site was identified as being in Leicestershire. The Leicestershire Police then took over and at 1334 hrs advised their other Emergency Services of the accident. The Police and Fire Services arrived on site at 1353 hrs and Fire Service personnel attempted to plug a fuel leak from the right tip tank, which had separated from the wing, and laid foam around it.

Accident site

Ground marks showed that the aircraft had touched down on a track of 075°M at a point 280 feet amsl. The ground comprised soft, heavy soil with a maximum slope of 3° downwards to the left, approximately across track. The right main landing gear collapsed on touchdown, a right yaw developed as the aircraft slid through the crop and the left and the nose landing gear legs collapsed sideways before the aircraft came to rest 63 metres from the touchdown point heading 204°M.

Aircraft examination

The aircraft remained intact with the exception of the landing gear and the right wingtip fuel tank, which had been structurally separated from the wing. Other damage consisted of distortion of the fuselage undersurface and the wing root areas, failure of some of the wing attachment structure and bending of propeller blades. Examination showed that the collapse of all three landing gears was consistent with the effects of overload. Propeller blade damage was consistent with both propellers having been rotating at touchdown, but not producing appreciable thrust. The aileron trim position was found to be set at around 40% of the left wing-down trim range and the yaw trim at about 15% of the nose-left range. There is no reason for these settings to have altered during the landing.

On this aircraft type, fuel can be carried in three tanks per side: The Main Tank attached to the wingtip; an Auxiliary Tank in the wing and; a Locker Tank in the rear part of the engine nacelle. A fuel selector valve in each wing allows fuel to be fed to an engine fuel control unit from either the main or auxiliary tank on the same side, or to be crossfed from the main tank on the opposite side of the aircraft. The fuel selector valves are cable operated from two rotary selector levers set into the cockpit floor between the pilots seats (Figure 1). The selector has a spring loaded detent at each of the four selection positions. Main or auxiliary tank contents can be shown on a twin (left-right) fuel quantity gauge at the right side of the cockpit main instrument panel. A microswitch operated by each fuel selector valve causes the respective side of the gauge to display the contents of the selected tank, except in the case of crossfeed, when the contents of the main tank on the same side as the crossfeeding engine is displayed on the respective side of the gauge. Thus, for example, if the right fuel selector is positioned to the left main tank the right needle of the gauge will display the right main tank contents. Each main tank is also fitted with a float operated switch that is intended to illuminate a 'LOW FUEL' caution light on an annunciator panel at the left side of the main instrument panel when the fuel level is below approximately 160 lb (27 US Gallons).

Examination showed that the only part of G-XGBE's fuel system to have been ruptured was at the interface between the wing and the right main tank, where connecting pipelines had fractured when the tank detached. The right main tank was subsequently found to contain only a few gallons of fuel, consistent with drainage through the ruptured pipes with the tank in the orientation that it came to rest, but evidence from Fire Service personnel in attendance shortly after the accident showed that the tank had been much fuller at this time. The left main tank was found to contain only 0.6 lb (0.1 US Gallons) of fuel and the associated part of the fuel system remained intact. Left and right auxiliary tanks contained 72 and 114 lb (12 and 19 US Gallons) respectively and the locker tanks were both empty. On both engines, the inlet hoses to the engine driven fuel pump and the injector nozzle manifold supply pipeline were found to contain little fuel.

After disassembly, the aircraft was taken to a maintenance base for further examination. Functional checks showed that the fuel system electric pumps and selector valves operated normally. Calibration of the fuel quantity indicating system, using kerosene rather than AVGAS for safety reasons, showed that the error in the left main tank contents indication was generally around 1% and that the right tank indication overread by approximately 80 lb (13 US Gallons) throughout its range. Measurements indicated that a main tank filled to the point where the fuel surface could just be reached with the fingers (through the filler) contained in the order of 180 to 230 lb (30 to 40 US Gallons).

It was also found that the right main tank 'LOW FUEL' caption operated normally, but the caption for the left main tank initially failed to illuminate whatever the level of fuel in the tank. This was found to be partially the result of a persistent poor contact in the annunciator panel. However, even with this fault rectified, the caption operated only intermittently at low fuel levels because the switch float occasionally stuck on its guide rod.

Subsequent calculations show that the total fuel consumed during the engines running time of the two flights since refuelling would have been about 190 to 200 lb (32 to 34 US Gallons). This, together with the evidence provided by the state of the fuel system and the likely quantity of fuel in the tanks, is entirely consistent with the right fuel selector having been positioned at 'LEFT MAIN' rather than at 'RIGHT MAIN' throughout both sectors of the flight, causing both engines simultaneously to lose their fuel supply as the left main tank ran dry.

The flight was the first since a 50 hour maintenance check, during which the engines had been run by ground engineers. It was noted that with either main tank selected, the cockpit selector lever is positioned athwartships and, whilst in this position, it is not instinctively recognisable whether the thick or the thin end of the lever is pointing at the selected tank.

FUEL SELECTORS



Forward



Fuel Selector Valve Levers set horizontally in Cockpit Floor between Pilot's Seats

Fig 1