

**No: 4/91**

**Ref: EW/G91/01/06**

**Category: 1c**

**Aircraft Type and Registration:** Beech B24R, G-BBXU

**No & Type of Engines:** 1 Lycoming IO-360-A1B6 piston engine

**Year of Manufacture:** 1974

**Date and Time (UTC):** 17 January 1991 at 1921 hrs

**Location:** Coventry (Baginton) Airport

**Type of Flight:** Private

**Persons on Board:** Crew - 2                      Passengers - None

**Injuries:** Crew - None                      Passengers - N/A

**Nature of Damage:** Damage to nose landing gear, cowling panels and propeller

**Commander's Licence:** Private Pilot's Licence with IMC rating

**Commander's Age:** 38 years

**Commander's Total Flying Experience:** 330 hours (of which 165 were on type)

**Information Source:** Aircraft Accident Report Form submitted by the pilot and subsequent AAIB inspection and investigation

The aircraft was engaged on an ILS approach to runway 23. The pilot stated that when the landing gear was selected to 'down', the nose gear failed to indicate 'down-and-locked'. The system was recycled twice without success. ATC were advised of the problem and a low pass was authorised to aid inspection of the aircraft by the fire crew. This external inspection was inconclusive. During the go-around, the landing gear was selected to 'up' but the main gears remained down with the transit light illuminated. The landing gear was therefore selected to 'down' and the selector switch was left in that position for the remainder of the flight.

The aircraft cleared to the south east and climbed to 3000 ft, outside of controlled airspace, before carrying out several manoeuvres intended to free the nose landing gear. This was unsuccessful. The pilot then opened the emergency dump valve and returned to the airport with only the two green indicator lights for the main landing gears illuminated. A further fly-past of the tower was carried out and ATC advised the pilot that the nose landing gear was not extended. The pilot again elected to clear to the south east in order to review the situation, after which he advised ATC of his decision to return and land using only the main landing gear.

The aircraft touched-down and came to rest within the first half of the runway. An attempt was made to keep the nose off the runway for as long as possible, and the fuel and electrics were turned off shortly after touchdown. The aircraft was vacated rapidly. The visible damage to the aircraft was confined to the nose area and propeller.

The aircraft was recovered to a hangar where it was placed on jacks and an inspection carried out. The nose landing gear was found jammed in its bay and there was local distortion of the structure due to landing damage. When freed, the nose landing gear extended and locked. Subsequently the landing gear was operated normally, through several cycles. Following this, the landing gear was raised and then lowered, by opening the emergency dump valve. All three landing gears lowered normally, however a significant amount of hydraulic fluid was released from the hydraulic unit during this operation.

The AAIB technical investigation focussed on the hydraulic unit, its associated shuttle valve and the nose landing gear hydraulic actuator. Examination of the hydraulic system schematic-diagram showed that it was not possible to prevent the nose landing gear from lowering when the emergency dump valve was open, except in the case of a hydraulic blockage or a mechanical jam of the landing gear mechanism. The former had been discounted by examination of the system. Damage to the nose area precluded a thorough assessment of the mechanical condition prior to the landing. The nose landing gear had been disassembled prior to the AAIB inspection. Close inspection of the ram of the hydraulic actuator for the nose gear did show some wear marks which were indicative of side-loading of the actuator.

Examination of the shuttle valve showed that one of its "O" ring seals was missing. This would have had only a marginal effect on the functioning of the shuttle valve. Examination of the hydraulic unit showed that fluid had been able to escape through the filler vent hole due to the incorrect fitment of a star washer instead of the specified seal under the screw head. No other internal damage, mis-assembly or malfunction of the unit was identified. The hydraulic line, from the hydraulic unit to the emergency dump valve, is relatively long on this aircraft and is a possible location for airlocks. The maintenance organisation confirmed that air was 'heard' in the system during the tests of the emergency dump valve. The release of trapped air when the dump valve was opened would result in excessive amounts of fluid being returned to the hydraulic unit and leaking out through the unsealed filler vent hole.

Finally, the maintenance organisation confirmed that the inability to retract the main landing gears during the go-around would have resulted from operation of the pump motor thermal cut-out, which would have re-set once the motor had cooled down.