

**Aircraft Type and Registration:** Rockwell Commander 112B, G-BENJ

**No & Type of Engines:** 1 Lycoming IO-360-C1D6 piston engine

**Year of Manufacture:** 1976

**Date & Time (UTC):** 31 December 1994 at 1514 hrs

**Location:** Blackbushe Airport, Surrey

**Type of Flight:** Private

**Persons on Board:** Crew - 1                      Passengers - 2

**Injuries:** Crew - None                      Passengers - None

**Nature of Damage:** Minor damage to left main gear door; light scuffing of left wing underside

**Commander's Licence:** Private Pilot's Licence with IMC and Night Ratings

**Commander's Age:** 54 years

**Commander's Flying Experience:** 492 hours (of which 40 were on type)  
Last 90 days - 19 hours  
Last 28 days - 9 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot;  
AAIB examination of gear door and DRA metallurgical examination

Whilst preparing to land at Blackbushe the pilot failed to obtain a 'down and locked' indication for the left landing gear. The controller confirmed that the left gear did not appear to be fully extended. Subsequently another aircraft formed on G-BENJ. Passengers aboard the former aircraft were able to confirm that the left main gear door had apparently become jammed in the wheel well, thereby preventing gear extension. The pilot decided to land with the gear in this condition, and touched down initially on the right-hand wheel, keeping the aircraft straight by the use of rudder. Although the left main gear partially collapsed, residual hydraulic pressure in the system was sufficient to prevent the gear from retracting into the wheel well, with the result that the left wingtip remained largely clear of the ground.

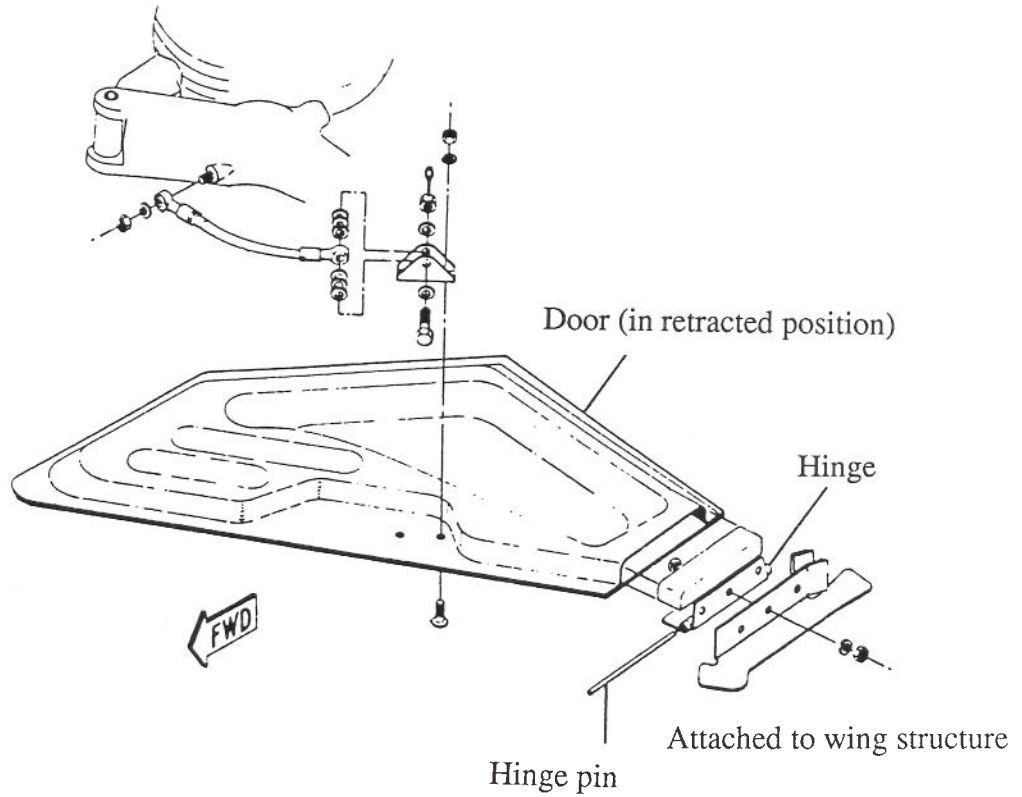
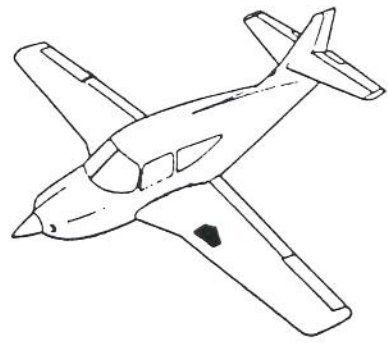
Subsequent examination of the aircraft revealed that the left main landing gear door hinge had broken such that the top of the door was no longer attached to the aircraft structure. It was thus free to become lodged in the wheel well, although the various associated witness marks suggested that the top of the door had become jammed against the wing underside immediately outboard of the well. The door had been retained on the aircraft by a strut attaching it to the landing gear leg.

The two hinge halves, which were of light aluminium alloy, were removed from the aircraft and examined at the Structural Materials Centre, DRA Farnborough. It was apparent that all five hinge lugs had failed, each one being found at a different angle on the hinge pin relative to the others (see the accompanying diagrams and figure). All the lugs were found to be immovable on the steel pin due to the latter being in a corroded condition along most of its length, with only a very few remaining 'bright' areas. The bores of the lugs, which could be removed only after sectioning them longitudinally, were contaminated with corrosion product but were not themselves corroded. There was no evidence of any lubricant within the lug bores. However, oil residues were found in the recesses between the lugs.

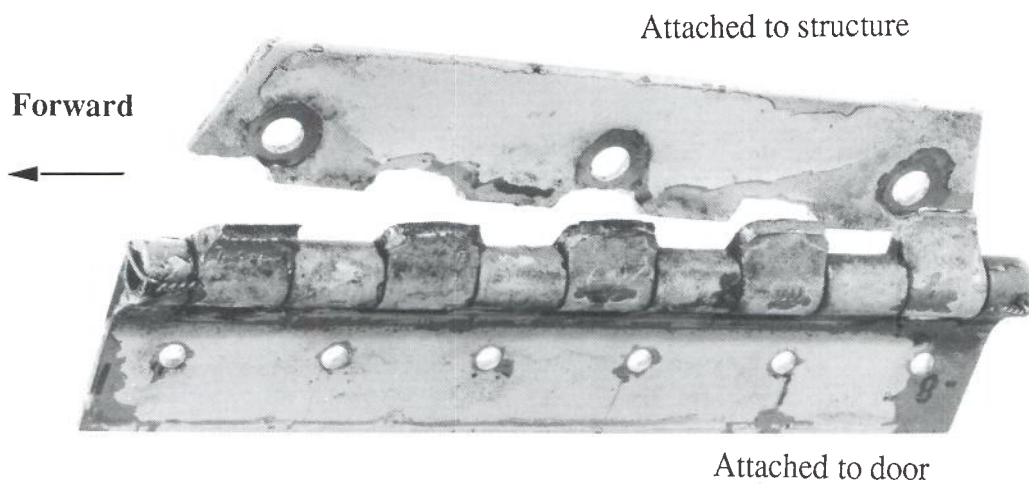
The fracture surfaces of the lugs were all virtually identical in appearance and were indicative of fast, ductile fracture; there was no evidence of associated fatigue. A bright band along a longitudinal edge of each lug indicated a compression/shearing process, and was therefore the final part of the failure which had occurred by overstressing in bending in an inboard (ie gear retracting) direction. The as-found positions of each failed lug indicated that failure had progressed, during a single retraction cycle, in a rear-to-front direction.

It was concluded that the failure had occurred as a result of a lack of hinging action due to seizure of the two hinge halves on the hinge pin. The absence of fatigue on the fracture faces was perhaps surprising, as a partially seized hinge would be expected to result in reverse bending loading of the hinge lugs during the gear extension and retraction cycles. It was thus possible that the apparent seizure had occurred relatively suddenly, such that the lugs were overloaded during a single retraction sequence.

It was noted that the hinge on the intact (ie right-hand side) main gear door also did not display any evidence of lubrication; however its hinging action did not appear to have been significantly impaired. It was additionally noted that the aircraft had flown only 33 hours since renewal of its Certificate of Airworthiness, some five months before the accident.



Main Landing Gear Door Details



Photograph of G-BENJ main gear door hinge, showing failed lugs in their as-found positions.