

AAIB Bulletin No: 11/95

Ref: EW/G95/06/09

Category: 1.2

Aircraft Type and Registration: Beech B60 Duke, N1024L

No & Type of Engines: 2 Lycoming TIO541-E1A4 piston engines

Year of Manufacture: 1969

Date & Time (UTC): 15 June 1995 at 1349 hrs

Location: Liverpool Airport

Type of Flight: Private

Persons on Board: Crew - 1 Passengers - None

Injuries: Crew - None Passengers - N/A

Nature of Damage: Propeller tips bent, engines shock loaded, flaps, wing and fuselage underside scraped and locally buckled

Commander's Licence: Airline Transport Pilot's Licence

Commander's Age: 64 years

Commander's Flying Experience: 16,313 hours (of which 139 were on type)
Last 90 days - 26 hours
Last 28 days - 7 hours

Information Source: Aircraft Accident Report Form submitted by the pilot and enquiries by the AAIB

Following a flight from Dublin the aircraft arrived downwind for Runway 27. The pilot carried out his downwind checks and selected the approach flap setting and landing gear down. The landing gear selection produced no result. He recycled the gear selector and then checked that the circuit breaker was closed and that the indicator lights were serviceable. He closed the throttles and the warning horn sounded, confirming that the gear was not down and locked. He then flew past the tower and the controller confirmed that the gear was still retracted. The pilot cleared the circuit and set up an orbit at 1,500 feet on autopilot while he attempted to sort out the problem. He began to follow the Emergency Gear Lowering Procedure in the Pilot's Checklist. When he released the Emergency Gear Handle the red 'GEAR UNLOCKED' light illuminated. He started to wind the handle but was puzzled that there was no back-resistance; it did not seem to be driving anything. He recalled (correctly) that it should require 50 turns but gave it 100 turns before giving up. He was then cleared to 4,000 feet and he carried out some manoeuvres to assist the deployment of the gear but did not obtain three green indications. When he flew past the tower for a second time the controller reported that the main gears appeared to be down but he could not be sure that the nose gear was fully down. On approach there

were still no green indications and the warning horn was sounding. As the mainwheels touched the pilot stopped the engines and when he lowered the nosewheel on to the runway the right main leg collapsed, followed by the left main leg and then the nose leg. The emergency services were on hand immediately but the pilot exited the aircraft normally with no injuries.

The landing gear had retracted on touchdown as landing loads buckled the actuating rods in the extension system. The downlocks were undamaged and it appeared that the gear had been almost fully deployed but without the downlocks engaged. A rigging check has not been possible because of the deformation in the system. Further investigation revealed that the electrical motor driving the retraction/extension system was unserviceable; one brush was severely worn, with less than 1 mm extension. (It was also found that the nose gear green indicating light had failed though it had been serviceable during the flight.) The manual extension system had failed to operate because the slot in the end of the worm gear shaft which was normally engaged by a key in the end of the manual drive output shaft had become so eroded by wear that the slot had ceased to exist (Photo). No other defect was found in the landing gear actuator that could have contributed to the deterioration of the slot end on the worm gear shaft. The Manufacturer's Maintenance Manual schedules overhaul or replacement at 4,000 hour for the actuator or "on condition". The aircraft had completed 4,354 operating hours.



**N1024L - Landing gear actuator worm gear shaft and manual drive gearbox
(Showing eroded end of worm gear shaft)**