

ACCIDENT

Aircraft Type and Registration:	Beech 95-B55 (T42A), N7148R	
No & Type of Engines:	2 Continental Motors Corp IO-470 SER piston engines	
Year of Manufacture:	1977	
Date & Time (UTC):	22 October 2011 at 1618 hrs	
Location:	Exeter Airport	
Type of Flight:	Training	
Persons on Board:	Crew - 2	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Underside of the aircraft and propellers	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	63 years	
Commander's Flying Experience:	1,600 hours (of which 1,000 were on type) Last 90 days - 5 hours Last 28 days - 1 hour	
Information Source:	AAIB Field Investigation	

Synopsis

The crew were forced to make a wheels-up landing after the landing gear could not be extended by the normal or backup systems. Subsequent examination revealed the reason for the malfunction to be damage to the left gear operating mechanism, but it was not evident what had caused this damage.

History of the flight

The aircraft was being operated by the owner, accompanied by an instructor, for the purpose of carrying out his UK Multi Engine Piston rating proficiency check. The owner occupied the left seat with the instructor on the right. At the time, the owner's US pilot's licence was current.

Following takeoff from Dunkeswell and having flown a series of exercises, the owner was requested to demonstrate a stall recovery with the landing gear extended. Having reduced airspeed to below 153 kt, he selected landing gear down. Shortly afterwards a strong smell of burning was noted and some smoke was observed in the cockpit. The landing gear circuit breaker tripped and the smoke and smell dissipated.

The owner endeavoured to lower the gear using the manual extension system in accordance with the pilot operating handbook procedure. This requires 50 turns of a crank handle to lower the gear to the fully locked position. After approximately 30 turns, the system jammed. A series of fly-bys of the Dunkeswell operations

building were carried out between attempts to lower the gear. Observations of landing gear positions by ground personnel were radioed to the aircraft following each pass. After the third fly-by it became obvious that the gear could not be extended to the fully down position for landing. It was therefore raised manually in order to limit the landing hazard. A final fly-by was made after which observers reported that the gear was raised but the gear doors were not shut.

Owing to the limited fire cover and restricted runway length at Dunkeswell, the aircraft diverted to Exeter Airport. It was decided that less risk would result from a landing on the main runway than on the grass. In order to reduce fuel load and limit disruption to commercial traffic, the aircraft held off until deteriorating weather and approaching darkness dictated the need to land. A successful wheels-up landing was then executed.

Post-accident examination

The organisation that removed the aircraft from the runway reported that it was lifted and an attempt made to lower the landing gear using the manual handle. Only by turning the handle forcibly whilst another person pulled the left main gear leg towards the fully down position was it possible to make the gear safe to support the aircraft. On subsequent examination, no obvious reason for the failure to extend was evident. The wings were then removed and the aircraft transported to its maintenance base.

A more detailed examination, with the cabin floor panels removed, showed that the inboard section of the operating rod of the left main gear was severely distorted. The rivets securing the two curving channel sections together had failed and one of the two lugs supporting the inboard bearing forming the attachment to the operating bell crank had also failed. The

corresponding leg of the bell crank was bent out of its normal plane. The distortion of the rod had allowed the curved channel section to come into contact with the cutout in the spar web in such a way that the system had become jammed and further movement in the extension sense was prevented. Consequently, further rotation of the bell crank in the corresponding direction was also prevented, stopping further extension of the nose and right landing gear legs.

On removal of the damaged operating rod, it was noted that the tubular section was also bent out of alignment. The bend took the form of localised compressive buckling of one side of the tube at approximately mid-length. Microscopic examination of the fracture faces of the failed lug indicated that failure had resulted from a tensile/shear mechanism.

Some of the damage to the channel sections and rivets, the inboard bearing lugs and the drive arm of the bell crank was consistent with buckling created when the forceful attempts to turn the manual lowering handle were resisted by the fouling of the channels against the spar web cut-out. Damage to the tubular section was however, only consistent with end-load applied over the whole length of the rod between its attachment to the leg and the attachment to the bell crank.

Operation of the actuator hand-crank, with the operating rods disconnected, showed that the mechanical gearbox functioned correctly.

Discussion

It was concluded that an obstruction to the free downward movement of the left gear leg had caused an end-loading on the operating rod sufficient to cause the buckling of the tubular section of the rod. Some degree of distortion or damage of the inboard channel

sections of the rod and the bell crank may also have been caused. The total distortion must have been sufficient, ultimately, to cause the channel sections to foul the spar web during the attempts to lower the gear.

It was not evident how this distortion had originated. There were no recent reports of landing gear problems on this aircraft.