DHC-1 Chipmunk 22, G-BCSL

AAIB Bulletin No: 2/2004	Ref: EW/G2002/07/37	Category: 1.3
Aircraft Type and Registration:	DHC-1 Chipmunk 22, G-BCSL	
No & Type of Engines:	1 De Havilland Gipsy Major 10 Mk 2 piston engine	
Year of Manufacture:	1951	
Date & Time (UTC):	6 July 2002 at 1400 hrs	
Location:	Barton Aerodrome, Manchester	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Propeller and spinner destroyed, left wing fuel tank ruptured, left wing damaged, engine shock-loaded	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	43 years	
Commander's Flying Experience:	345 hours (of which 105 were on type)	
	Last 90 days - 8 hours	
	Last 28 days - 2 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Background

This accident was not reported to the AAIB until 20 October 2003, some 15 months after it occurred.

The Chipmunk has a wide wheelbase, hand operated wheelbrakes and a castoring tailwheel that cannot be locked to the rudder. A lever on the right sidewall of the cockpit is pulled rearwards to apply the wheelbrakes. Directional control whilst taxiing is available by using differential wheelbrake which is achieved by varying the position of the rudder pedals. If full pedal is applied in one direction, no braking is applied to either main wheel if the wheelbrake application lever is in the OFF (fully forward) position. However, as the lever is moved aft, progressively more brake pressure is applied to the wheel corresponding to the rudder pedal that is held forwards. In this way the effect of wheel braking augments the aerodynamic effect of propeller slipstream impinging upon the rudder. A combination of lever movement and rudder pedal displacement is used to modulate the differential braking force.

G-BCSL was fitted with non-standard Cleveland wheelbrake parts but the method of brake operation was unchanged from the standard Chipmunk. A finger-operated collar (later described in an engineering report as a latch) at the base of the wheelbrake lever hand-grip can be set to hold the lever in a given position so that the appropriate brake is operative when a rudder pedal is moved forward but both brakes are inoperative when the rudder pedals are centralised. The various lever positions are defined by the teeth of a ratchet like device.

History of the flight

The aircraft was parked outside a hangar facing the hangar door. The pilot assessed that there was sufficient turning area in which to taxi and to turn left without striking any obstacles. She started the engine, throttled back and released the wheelbrakes intending to commence a left turn. She applied left rudder to start the turn but this had no effect so she attempted to apply left wheelbrake to expedite the turn. This did not have the desired effect and the aircraft continued to move forward slowly whilst the pilot continued to apply brake and rudder. The pilot stated that "Whilst still attempting to achieve full left rudder, the aircraft's propeller impacted with the hangar door." The impact stopped the aircraft and its engine. Two bystanders assisted the pilot from the aircraft and switched off the magnetos and fuel supply.

Chipmunk taxiing technique

The technique for starting to taxi a Chipmunk is to close the throttle, release the wheelbrakes and allow the aircraft to move forwards, using power if necessary. Immediately the aircraft moves forwards, the throttle is closed and the wheelbrakes tested by applying them symmetrically (ie with the rudder bar centralised). Once the brakes have been tested and proved, before moving off the pilot should apply one pedal fully forward, pull back the wheelbrake lever until resistance is felt and then lock the lever in that position with the collar. This is the normal setting for taxiing. Power is then applied with the throttle to initiate movement and the aircraft turned using the rudder pedals. Once familiar with the aircraft, pilots generally find this brake setting procedure is simple and eventually they gain an instinctive feel for their preferred lever position.

The pilot's view over the aircraft's nose is somewhat restricted and so it is good practice to turn frequently whilst taxiing. The setting of the wheel brake lever may be refined if necessary to give more or less differential braking effect for a given rudder pedal displacement. Tight turns can be made by opposing engine power with almost full rudder/wheelbrake on one side. When taxiing in a straight line, pulling the wheelbrake lever progressively aft with the throttle closed and the rudder pedals centralised should stop the aircraft without any significant tendency to turn.

Engineering investigation

A locally based company maintained the aircraft and had done so for several years. After the accident it was assessed by a Licensed Engineer from that company in the presence of some of the aircraft's owners. The investigation lasted 30 minutes and no faults were found with the 'handbrake system, locking latch and ratchet'.

Aircraft history

G-BCSL was owned by a large group and well utilised during the summer months. According to the person reporting the accident, during the month before the collision with the hangar door it had been flown for some 30 hours without any recorded defects. On the day of the accident it had already flown once. After refuelling it was parked facing the hangar door by a pilot who was also a member of the group. He reported that the wheelbrakes were working normally when he parked the aircraft.

The pilot involved in the accident had a different perception. She reported that the aircraft had a history of intermittent wheelbrake problems and she cited five events. According to her, brake problems were experienced in January 1999, summer 1999, December 2000, August 2001 and on 30 June 2002, a week before the accident. She had not been on board the aircraft during any of these events and she had not previously experienced brake problems on G-BCSL. According to the person reporting the accident, none of these events had been recorded in the aircraft's documentation.

Analysis

The accident pilot attributed the collision to a completely ineffective combination of left rudder and left wheelbrake but no fault was found immediately after the accident. A spokesperson for the ownership group declared that the aircraft had been fault free for the month before the accident and at the end of the flight preceding the accident. Consequently, the facts are contradictory; some suggest a problem with pilot handling technique rather than an aircraft technical defect but the pilot's evidence

indicates that the aircraft did (and possibly still does) have a dormant fault which occasionally causes the wheelbrakes to operate intermittently.

Given the passage of time since the accident, the AAIB was unable to verify any of the details. It would, however, seem sensible to park the aircraft facing away from solid obstacles such as hangar doors. Moreover, if the wheel braking fault ever recurs, it should be documented in the aircraft's logbook and resolved by qualified technicians.