

Aircraft type and registration: Piper PA18-150 Super Cub G-AVPU (light single engine fixed wing aircraft)

Year of Manufacture: 1967

Date and time (GMT): 25 October 1984 at 1520 hrs

Location: Portmoak Airfield, Scotlandwell, Fife

Type of flight: Club Flying — Aerotow

Persons on board: Crew — 1 Passengers — None

Injuries: Crew — 1 (fatal) Passengers — None

Nature of damage: Aircraft destroyed by the ground impact and subsequent fire

Commander's Licence: Private Pilot's Licence

Commander's Age: 42 years

Commander's total flying experience: 2357 hours (of which 30 were on type)

Information Source: AIB Field Investigation

G-AVPU, which was one of two Super Cubs used by the gliding club for the purpose of aerotow launching gliders, had been operating for an hour prior to the accident, during which time it had performed five launches.

At approximately 1510 hrs, the club's 'course instructor' took over as tug pilot and prepared to launch a Schleicher K18. Whereas most club gliders are fitted with both a nose hook, used for aerotow, and a 'belly hook', used mainly for winch launching, this glider was fitted with only a 'belly hook' situated just forward of the main wheel.

On the first launch attempt the K18 overran the tow rope, which automatically back-released, although this was too late for the tug to abandon its take-off. The tug therefore flew a quick circuit and repositioned for another attempt with the same glider.

The combination then carried out a normal take-off run during which the K18, as is typical, became airborne before the tug and maintained a low height above the ground whilst the tug accelerated to its unstick speed of approximately 45 kt. The tug was seen to fly fairly level whilst continuing to accelerate and then to initiate a normal climb, habitually conducted at 60 kt.

During the initial climb, the K18 was observed to maintain an unusually low position behind the tug and to weave gently from side to side. Witnesses at the launch point stated that the glider then suddenly pitched up into an abnormally steep attitude and rapidly climbed to an excessively high position above the tug. Coincidentally with the latter part of this manoeuvre, and at about 200 ft, the tug was seen to pitch down violently into an apparently vertical dive from which it did not recover before striking the ground. The tug burst into flames on impact but the K18 was able to make a foreshortened circuit over the airfield and land without further incident.

The pilot of the glider stated that he released the tow rope as the tug disappeared from his view; however subsequent examination showed that the tow rope steel attachment rings were still engaged with the glider launch hook. Subsequent examination of the glider release mechanism showed it to be in a serviceable condition.

Examination of the wreckage of the aircraft failed to reveal any pre-impact defect which would have contributed to this accident. The tow rope was found just behind the aircraft wreckage and, although the rope had been largely consumed by the post-impact fire, it was apparent that it had failed at its connection with the glider attachment rings.

Post mortem examination did not provide any evidence to suggest that the tug pilot had suffered any medical condition which would have contributed to the accident.

Part of the tow rope used on the accident flight, together with a similar intact rope and samples of new rope, were later subjected to 'pull tests'. Failure loads of between 980 lbf and 3030 lbf were recorded, the particular values depending on the configuration and age of the rope. It is currently a CAA requirement that 'the breaking strain of the towing cable, or weak link if fitted, shall not exceed 1000 lbf when towing one glider'. As the exact breaking strain of any particular rope is difficult to quantify, the British Gliding Association have now ensured that all glider tow ropes are fitted with a suitable weak link.

Two main factors are now generally recognised as being of importance in tug upset accidents. Firstly, when aerotowing a high winged glider using the low set 'belly hook' there is a marked tendency for the glider to pitch up and

climb, if allowed to do so. Secondly, the speed with which the situation can develop is likely to take a glider pilot who has a low level of aerotow experience on 'belly hooks' by surprise. This effect will be exacerbated in turbulent conditions when the glider's Centre of Gravity is in an aft position.

Following this and several similar accidents the BGA, in conjunction with the CAA, has taken steps to identify the problems and produce suitable remedies. Considerable progress has already been achieved in such areas as:

- (a) Re-emphasising to all gliding clubs the dangers inherent in conducting aerotow operations and the importance of ensuring an adequate level of glider pilot training relevant to operation on 'belly hooks'.
- (b) The design, prototype manufacture and testing of automatic upward/load sensitive release hooks for tug aircraft.

In addition, the BGA have intimated that the provision of nose mounted hooks in gliders may, in the future, be a pre-requisite for BGA certification.

In due course, the results of such research and subsequent recommendations will be promulgated by the BGA.