No: 12/89 **Ref: EW/C1131/25** **Category: 5**

Aircraft Type and Registration:	Caproni Vizzola Calif BGA 1957	
No & Type of Engines:	None	
Year of Manufacture:	1974	
Date and Time (UTC):	5 August 1989 at 1436 hrs	
Location:	Bidford-on-Avon, Gloucestershire	
Type of Flight:	Private - pleasure	
Persons on Board:	Crew -2	Passengers -None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	Private Pilot's Licence with BGA Assistant Instructor's Rating	
Commander's Age:	33 years	
Commander's Total Flying Experience:	1200 hours of which 1100 hours were on gliders	
Information Source:	AAIB Field Investigation	

History of the Flight

At about 1530 hrs the glider was launched with the pilot-in-command in the left hand seat and another qualified glider pilot in the right hand seat. The object of the flight was to complete a short soaring cross-country flight returning to the launch site. Both pilots were experienced on type and the aircraft was below its maximum authorised weight and within the prescribed CG limits. The weather was fine and the pilots reported that there was good smooth lift with little turbulence out of cloud.

On returning to the landing site, the aircraft was configured with the spoilers in and the flaps in the high speed (reflex) position. Speed was increased to 110 kt which was above the rough air speed of 91 kt and below the Vne speed of 136 kt. The limiting speed for selecting flap to any position other than full reflex was 86 kt. The flight manual states that

"At speeds higher than 86 kt, the elevator control is very sensitive to small stick movements"

In the above configuration and at a height of about 1500 feet agl, the pilot-in-command was holding a moderate forward pressure on the control column and reached forward to operate the trim control which is located forward and slightly left of the flap lever when the latter is in the "reflex" detent. As the pilot's hand reached the trim control, the aircraft pitched up rapidly accompanied by the onset of

moderate g reported by the pilot as about +4. The aircraft then pitched violently nose down to about minus 20° generating sufficient negative g to cause the leg of the pilot in the right hand seat to rise and shatter the windscreen. The aircraft then pitched up to about plus 30°. The g generated was described as "beyond anything I had previously experienced". At this point the right hand wing detached from the aircraft which rolled rapidly to the right. During the pitching manoeuvres, the pilot-in-command states that his left arm was locked to prevent a pilot induced oscillation and that he was unaware of any stick movement. The right hand seat pilot however states that the control column was moving fore and aft but only a little.

The decision was immediately made to abandon the aircraft and the pilots each released the canopy latch on their side of the cockpit. The right hand seat pilot tried to push the canopy off but it would not move. At this time the aircraft was pitching violently and as the left hand seat pilot released his restraint harness he was ejected through the shattered windscreen. The canopy then left the aircraft and the right hand seat pilot made his exit over the right side. Both pilots' parachutes deployed normally and the pilots landed uninjured.

Examination of the Wreckage

The wreckage was taken to AAIB Farnborough for examination and it was apparent that there had been a structural failure of the right wing approximately 3ft from the root. The detached portion of wing had landed 100 yards or so from the main part of the aircraft. The fin and tailplane (which is of T-configuration) had also become detached in the air and had landed close to the wing. Examination of the fin/fuselage attachment structure revealed overload failures of both the front and rear attachments, with the front failing first causing the fin to break off rearwards and to the right. It is thought probable that this was a secondary failure caused by a combination of aerodynamic and inertial forces following the loss of the right wing.

Examination of the wing failure showed that this was also due to overload. The direction of failure was upwards with a slight forward component. The outboard sections of both wings displayed a permanent upwards set and the upper surface wing skins were wrinkled. It was thus clear that the wings had been subjected to a considerable aerodynamic up-load.

The combined flap/airbrake system is operated by a lever moving in a slot on a tunnel between the seats. In addition to the notch-type detents at each end of the slot, there is a third detent approximately 35% aft of the fully forward position. This corresponds to a flap position of 8° up, *ie* a reflex setting. Moving the lever fully forwards causes the flaps to be set 8° down. Movement of the lever aft of the reflex detent progressively extends the flaps into the "airbrake" regime and also deploys the spoilers on the wing upper surfaces. The cockpit lever is attached to a teleflex type cable which operates a lever on top of the wing centre section. This in turn operates the flaps by means of a gearbox and torque tubes.

By aligning the torque tube fracture direction with those of the adjacent stringers and skin fragments at the wing failure position, it was possible to derive the flap setting at the time of the failure. This proved

to be a few degrees down from the fully up position and equated to a flap lever position of approximately 1 inch forward of the reflex detent. On initial examination of the wreckage, the lever was found to be in this position. When the detached right wing struck the ground, scratches were made on the underside. Where these had crossed adjacent flap sections, they would only line up at a unique flap setting: this was the same as that given by the fractured torque tube and showed that no significant movement had occurred during the descent.

The pitch trim system consists of a lever moving in and out of the plane of the instrument panel, the end of which is attached to a leaf spring which in turn bears on a cross tube connecting the two control columns. Thus rearward stick movement is against the spring pressure. The lever is locked by means of serrations on its lower edge engaging on the edge of a slot in a brass block set in the panel. Consideration was given to the possibility of the trim lever becoming unlocked which would have resulted in a violent pitch-up at high airspeed. However the system appeared positive in operation, with no undue wear on either the serrations or the brass block. Moreover such an event did not accord with the crew's recollection. It was noted however that with the right hand placed on the trim lever, it was very easy for the forearm to contact the flap lever with the latter at the reflex detent. The edges of the detent exhibited considerable wear and the spring action which biased the lever into the gated position was weak. The results of ground tests showed that it was easy to inadvertently move the flap lever forward of the reflex detent while reaching for the trim control from the left-hand seat.