

No: 10/89

Ref: EW/C1123

Category: 5

**Aircraft Type
and Registration:**

EoN 460 (Olympia glider) BGA 1371

No & Type of Engines:

None

Year of Manufacture:

1966

Date and Time (UTC):

2 July 1989 at 1448 hrs

Location:

Parham near Pulborough, Sussex

Type of Flight:

Private (pleasure)

Persons on Board:

Crew - 1

Passengers - None

Injuries:

Crew - Fatal

Passengers - N/A

Nature of Damage:

Aircraft destroyed

Commander's Licence:

BGA approval

Commander's Age:

37 years

**Commander's Total
Flying Experience:**

42 hours of which 5 were on type (107 launches)

Information Source:

AAIB Field Investigation

History of the flight

The pilot of the glider was a qualified pilot with a total of 42 hours flying time and 107 launches. She had completed all relevant training and check flights. She was 5 feet 2 inches tall and weighed 112 lb. Because of her light weight, she was required to fly with a ballast weight of 43 lb to ensure that the aircraft's CG was within the permitted range. This weight was found properly attached in the aircraft wreckage. The aircraft is said to be sensitive to elevator control and this sensitivity increases as the CG of the aircraft moves aft. AAIB calculations indicated that, on the accident flight, the CG of the aircraft was towards the aft limit but safely within the permitted range. However, there was some margin of error in these calculations since no record of aircraft weighing could be found since 1972.

The pilot had recently joined the syndicate which owned and operated the accident aircraft. Prior to the accident flight she had flown one sortie of just over 2 hours in the accident aircraft. On the day of the accident the aircraft was launched by aero-tow at 1145 hours. Soaring conditions were good and she remained airborne in the Parham area until at 1448 hours, she was seen in a gentle turn to the right at a height of about 3000 feet agl. The aircraft was then seen to pitch violently nose down until it was well past the vertical. It then recovered to the vertical which it maintained while gaining speed. At a height estimated to be just below 2000 feet, the aircraft was seen to pitch up for a short time as if attempting to

pull out of the dive. The pitch rate was not sustained however and the aircraft returned towards the vertical adopting a pitch attitude that was less steep than before the original pitch-up. This manoeuvre was repeated twice more until on the third pitch-up at a height estimated by witnesses as about 500 feet, the left wing separated from the aircraft. The fuselage and right wing continued vertically downwards and impacted in dense woodland. The impact was not survivable.

A search of the wreckage revealed that no objects were present in the cockpit which could have interfered with the controls. It was also noted that despite it being a hot sunny day the pilot had not taken any liquid refreshment with her. Her sun-hat was later found in her car. The pilot's restraint harness was found in the unlocked position. A post mortem examination revealed that the pilot had sarcoidosis, a condition that affects the vital organs and has the potential to cause sudden death. There was no evidence, however, that this condition contributed to the accident.

Examination of the wreckage

Examination of BGA 1371 at the accident site showed that it had struck the ground at an angle of about 75° to the horizontal and that it had been rotating rapidly to the left. In addition to the main wreckage, there was further wreckage spread over a distance of some 400 metres to the west and this included the outboard 15 feet of the left-hand wing, the fragmented remains of the inboard section of that wing and portions of the fin.

Reconstructing the wreckage at AAIB Farnborough, it became apparent that the initial structural failure had occurred within the port wing and had been a nose-down torsional failure leading to an immediate downward bending failure of that wing. The fin had then been struck by the inboard portion of the wing and had become detached in several pieces, although the rudder had remained loosely attached to the aft fuselage by the rudder cables. The structural failures had not occurred along glue lines but within virgin wood and there was no sign of any previous damage or abnormality within the failed structure; the torsional failure of the wing was, however, consistent with structural overload at high speed.

Using the plotted positions of some 40 items of wreckage and the results of a series of drop tests on the items, a simple analysis shows that the in-flight structural failure occurred at an altitude lower than 1000 feet, probably at a height between 600 and 800 feet.

The flying controls of the glider, being mostly cable, had remained largely intact and the failures which had occurred were consistent with the in-flight break-up sequence and the subsequent ground impact. The left-hand airbrake "paddles" were extensively damaged and appear to have opened when the left-hand wing failed; there was no corresponding damage to the right-hand airbrake system and it was found "closed" in the wreckage, indicating that the airbrakes had not been operated. The rudder pedals are simple horizontal bars and were found with the correct adjustment for a short pilot.

Pieces of the cockpit canopy and frame were identified in the wreckage and the distribution of the transparency pieces indicated that this had partially fractured in the air. The canopy locking mechanism showed that at impact, the canopy was still locked although when the pilot was removed it was noted that the lugs at the ends of the shoulder straps and one lap belt were not engaged with the buckle on the other lap belt. The pilot's lead ballast weight, weighing 43 lbs, was identified and was still attached to the lap retention cables, which had only failed in the final impact.

Ground tests

Subsequent to the accident, trials were conducted in a similar aircraft using a female subject of the same height and weight as the deceased. The ballast weight from the accident aircraft was fitted to the trial aircraft and it was demonstrated that it would not have interfered with the flying controls. The four point safety harness was adjusted to the same size as that in the accident aircraft and the subject was strapped in using cushions from the accident aircraft and a parachute of the same type as that used by the deceased. It was found that the harness was a loose fit with the buckle sitting high up on the torso and that with pilot movement the cushions moved allowing further slackening of the harness. When simulating the forces that would be present with the aircraft vertical, it was found that the subject's body could slide through the harness forcing the control column forward (see photograph). The gap between the lower edge of the rudder pedals and the cockpit floor was sufficiently large to allow the subject's feet to pass beyond the pedals to an area where there was no support for the feet with the aircraft vertical. Had the deceased got into this position in the air there would be little chance of her regaining control of the aircraft. The flight path of the aircraft during its final dive was consistent with the pilot being in this position. It was determined that it was possible to jettison the cockpit canopy from this position. There was no evidence of any attempt having been made to jettison the canopy.

