

No: 11/89

Ref: EW/C1112

Category: 3

**Aircraft Type
and Registration:**

Hornet ZA Microlight Prototype, G-MVPP

No & Type of Engines:

1 Rotax 462 piston engine

Year of Manufacture:

1989

Date and Time (UTC):

9 June 1989 at 12.30 hrs

Location:

Martinsell Hill near Marlborough, Wiltshire

Type of Flight:

Flight test

Persons on Board:

Crew - 1 Passengers - Nil

Injuries:

Crew - 1 (fatal) Passengers - N/A

Nature of Damage:

Aircraft destroyed

Commander's Licence:

Private Pilot's Licence (Group D)

Commander's Age:

39 years

**Commander's Total
Flying Experience:**

410 hours (plus 1600 hours on hang gliders)

Information Source:

AAIB Field Investigation

Flight History

The aircraft was a prototype engaged in a series of test flights with the aim of gaining type approval. It had virtually completed the necessary development and flight testing, operating under a Permit to Fly issued by the CAA. It was decided to assess the handling of the aircraft with wing tip fairings fitted, and the pilot was briefed by the senior test pilot to complete one large circuit of the field at moderate speed. The aircraft was well below its maximum authorised weight for the flight, and weather conditions were good, with a wind of 220°/15 kt and good visibility.

The aircraft was observed to take-off normally from a microlight airstrip at Clench Common, 2 nm south of Marlborough, Wiltshire, and at an elevation of 600 feet amsl. It climbed towards the south at moderate speed and levelled off at a height of about 400 feet agl. It was next seen, just under two minutes later, by the pilot of another microlight who was airborne in the area. G-MVPP was over Martinsell Hill, which rises 350 feet above Clench Common 1 nm to the south-south-west. The aircraft was about 50 feet above the crest of the hill in a 30° banked turn to the left. The bank angle steadily increased as the aircraft entered a spiral dive before impacting on the face of the hill some 80 feet below the summit. The pilot was fatally injured.

Background

The aircraft was the prototype of a Hornet ZA, a microlight aircraft consisting of a 34.4 feet span sailwing with a trike unit suspended beneath. The wing comprised a framework of aluminium alloy tubes, braced by steel cables, over which was stretched a shaped fabric sail providing a full upper and lower surface skin. The trike carried two seats, the powerplant and a tricycle undercarriage, and was powered by a Rotax 462 cubic centimeter two-stroke engine driving a wooden two-bladed pusher propeller.

Flight control was by shifting the weight of the trike unit relative to the wing. In particular, control in roll was effected by lateral weight shift of the trike, which acted on a tip strut in each wing to automatically cause the outboard portions of the wings to warp differentially to each other and thus generate an aerodynamic rolling moment. Each tip strut acted between an attachment point on the leading edge member of the wing and the trailing edge tip of the sail fabric. Crossing beneath each diagonal tip strut in the space between the two wing skins was a chordwise tip rod, attached by a bearing to the leading edge member and designed to prevent excessive downward warping of the outboard portion of the sail under high speed conditions.

Available flight test records indicated that a number of modifications concerned with the roll performance of the aircraft and the behaviour of the tip rods had been carried out and flight tested over the four days prior to the accident. This included the tying together with elasticated shock-cord bungee of the tip struts and tip rods at the point where they crossed, and a change to the tip rod attachment bearing. The aircraft retained these modifications for the last flight. In addition, glass-reinforced polyester tip fairings were fitted for the accident flight, for the first time. The tip fairings fitted into the gap at each wing tip between upper and lower skins of the sailwing, closing it off, and were retained by two elasticated bungees per fairing tied to the tip strut. Flight with these tips fitted was not covered by the terms of the Permit to Fly.

Site Examination

Site examination showed that impact was in the centre of a large regular bowl in the east-facing dip slope of Martinsell Hill, which has a summit height of 948 feet, rising from a base of around 600 feet. The maximum up-slope was 40-45°, on a westerly line at the point of impact, and the surface was of thin loose soil overlying chalk. The aircraft struck, at around 850 feet above mean sea level, and slid a short way down the hill before being arrested by an isolated bush. Evidence from wreckage and ground markings indicated that at the point of ground impact the aircraft was tracking approximately south, ie almost directly across the local slope, was descending at an angle of 30-40° to the horizontal, with no major deviation in pitch angle from the flight path, and with a wing and trike bank angle of 40-60° to the left, relative to the horizontal. The evidence indicated that the propeller was rotating at impact, but at rather less than half maximum speed, and that the airspeed of the aircraft was probably in the order of 30-50 knots.

Thus, relative to the local ground, the trike struck generally erect with some degree of nose down pitch and a moderately high descent rate. Both the wing and the trike suffered multiple failures. This included compression buckling of both tip struts and breakage of each rear bungee attaching the wing tip fairings. All damage appeared consistent with the effects of the impact and no evidence was found to indicate that any of the damage had occurred before ground contact, although such a possibility could not be totally dismissed.

Detailed Examination

The possible effects on the roll performance of the aircraft of the modifications made in the period leading up to the accident were considered in some detail. This included consideration of possible effects on the sailing local profile of internal airflow changes caused by the tip fairings; effects on outer wing warping characteristics of loads applied to tip struts by the tip rod bungee and by the tip fairing bungees; and effects on outer wing warping of a sticking tip rod bearing. The evidence did not indicate that any of these possible effects on roll controllability was likely to be gross. However, in the absence of comprehensive test data it was not possible to ascertain conclusively that one, or a combination of, these features had not contributed to the cause of the accident.

Human Factors

Evidence was found indicating that the pilot had been under stress for some time because of a personal problem. The results of a postmortem examination revealed that the pilot had been suffering from a heart condition that could lead to incapacitation. The Coroner's Inquest recorded a verdict of Accidental Death.