

ASAP Summit 2 Powered Parachute, C-IFZX

AAIB Bulletin No: 2/2000 **Ref: EW/C99/7/1 Category: 3**

Aircraft Type and Registration: ASAP Summit 2 Powered Parachute, C-IFZX

No & Type of Engines: One Zanzottera MZ202R piston engine

Year of Manufacture: 1999

Date & Time (UTC): 4 July 1999 at 2000 hrs

Location: Cranfield Airfield, Bedfordshire

Type of Flight: Private

Persons on Board: Crew - 1 - Passengers - None

Injuries: Crew - 1 (Serious) - Passengers - N/A

Nature of Damage: Damage to trike frame and propeller

Commander's Licence: Private Pilot's Licence (Microlights)

Commander's Age: 52 years

Commander's Flying Experience: In excess of 86 hours (less than one on type)
Last 90 days - 2 hours
Last 28 days - Less than one

Information Source: AAIB Field Investigation

The aircraft consisted of a microlight type tricycle (trike) wheeled frame suspended below a ram air parachute. Two examples of this model carrying manufacturer's serial numbers 3002 (the accident aircraft) and 3003 had recently been imported from Canada and both retained their Canadian registrations. The type had not been flown in the UK previously.

In Canada, the type is classified as an 'Ultralight', being unregulated with no requirement for it to hold a Certificate of Airworthiness. The importer's intention was to arrange to have engineering inspections and flight testing carried out in order that the aircraft could be granted 'approved homebuilt' status and thus come under the auspices of the British Microlight Aircraft Association for the issuance of a Permit to Fly as a UK registered microlight aircraft. In order to achieve this, the BMAA would seek to ascertain whether the aircraft complied with BCAR Section 'S' (microlight aircraft). This process was only at an embryo stage at the time of the accident as the BMAA had received no technical documentation regarding the aircraft design or construction standards.

The importer arranged to have the initial flight testing conducted by an experienced powered parachute pilot and instructor. The pilot had extensive service experience as a parachute instructor and as a parachute tester. He also held an instructor rating for powered parachutes, he was a check pilot for the BMAA and was considered to be one of the most experienced powered parachute pilots in the UK. BMAA records indicate that on 22 December 1998 the pilot had a total P1 time of 157 hours.

The aircraft construction consisted of a rigid fore and aft keel beam, to which were attached two seats in tandem, the rearmost of which was mounted at the centre of gravity and on top of the fuel tank. The aircraft was fitted with a rear mounted engine and pusher propeller, protected by a circular hoop cage frame. Attached to the trike frame by a series of steel cables and nylon steering lines was the ram air parachute canopy. On the ground, the aircraft was steered by means of a conventional steering wheel in front of the front seat pilot position controlling a single nosewheel. A nosewheel brake was also available.

In the air, the trike unit was suspended pendulously below the canopy and directional control was by means of fore and aft movement of foot pedals mounted each side of the keel beam. These pedals adjusted the length of the steering lines, which, in turn, controlled the vertical position of the rear of the parachute canopy. By pushing forward on one pedal, the corresponding trailing edge of the canopy was pulled downwards, thus increasing the drag on that side, which in turn caused the aircraft to turn in that direction. The action of pushing forward on both pedals simultaneously was to effectively 'flare' the canopy for landing. The engine was controlled by a hand throttle, located on a quadrant positioned on the right side of the front pilot's seat. A mirror was provided to enable the pilot to visually check the status of the canopy. Engine instrumentation was fitted, but no altimeter or airspeed indicator was fitted.

Take off and landing should always be made into wind. In order to launch the aircraft, the parachute canopy was first laid out on the ground behind the aircraft, with the attachment cables and steering lines arranged either side of the propeller cage on special hooks. The propeller slipstream was normally sufficient to inflate the canopy in light wind conditions. The action of slowly taxiing forward fully inflated the canopy and it rose to a position above the trike unit.

The manufacturer indicated that at the time this aircraft, serial 3002, was shipped the trike unit had accumulated some 30 hours flight time. A replacement engine had been fitted, test run for one hour, then flown for a further 1.3 hours. A replacement canopy had also been fitted and this too had flown for 1.3 hours. The aircraft was then crated for shipment from Canada to the UK, fully rigged and flight tested, apparently to the manufacturer's satisfaction. The manufacturer confirmed that for shipment the canopy was packed in a bag and secured to the rear seat, with its attachment and steering lines still connected to the trike unit.

The importer indicated that this aircraft had arrived in the UK in a fully rigged state and had remained so up until the time of the accident. However, the aircraft was given a preliminary technical inspection by a BMAA Approved Senior Inspector on 30 June during which, the inspector recalled, the parachute rigging was not attached to this aircraft.

On 30 June, the CAA Applications & Certification Section issued the importer with a Certificate of Airworthiness Exemption in order to enable the aircraft to fly at the Popular Flying Association annual Rally at Cranfield in early July 1999. This Exemption was valid for a period of three months. In support of this application, the importer had provided the CAA with the Canadian Certificate of Registration for the aircraft, an Insurance Certificate, a statement from the aircraft

manufacturer attesting to the soundness and airworthiness of the aircraft and a manufacturer's product brochure.

There were no maintenance documents, rigging instructions or pilot's handling notes available in the UK at that time. The Exemption precluded the operation of the aircraft for public transport or aerial work flights, but did permit flights for the purpose of public exhibition or public demonstration. The exemption indicated the need for a placard to be fitted to indicate that the aircraft had not been certified to an international code of airworthiness requirement. No such placard was subsequently found fitted to the aircraft.

In the event, the aircraft could not fly during the period of the PFA Rally. The aircraft conducted a series of taxi sessions at Cranfield during the afternoon of Sunday 4 July. After the conclusion of the Rally, there followed a series of three short flights. After one of the first two flights, the aircraft's steering lines to the pedal controls were adjusted, although no record could be found of the nature of the adjustment. Some difficulty in directional control was noted by witnesses during these take offs and flights, including one take off which had to be abandoned because of incorrect chute inflation.

At the commencement of the third such flight, the aircraft took off from the grass into wind and then made a short left hand circuit around the operating area. Eyewitness photographs of the aircraft taken during this flight indicated that the pilot had full forward pedal applied on the right side, and almost full aft pedal on the left side. This was maintained while the aircraft was in a left turn (during which the opposite control inputs would have been expected).

Eyewitness accounts of the accident varied. One eyewitness reported that the pilot seemed to be pulling down the right steering line with his right hand. On release of this steering line, the aircraft appeared to turn sharply to the left (towards the downwind position) and the left side of the canopy deflated. Another eyewitness reported that the aircraft made an approach to its operating area and then appeared to commence a right turn. The engine power then suddenly increased and the trike unit began to pitch up, as if overtaking the canopy. The canopy partially collapsed and the trike fell pendulously towards the ground from a low height. The canopy began to reinflate but there was insufficient height to recover. The trike unit hit the ground on the nose and the right side. The pilot was wearing a full harness and hard helmet but became unconscious on impact. He suffered serious head and shoulder injuries which necessitated prolonged intensive care treatment before recovery. Subsequently, the pilot had no memory of the events leading up to the accident.

An aftercast from the Met Office indicated that, at the time of the accident, a light southwesterly airstream covered the area, with a surface wind from 220° at 5 kt. The estimated winds were from 230° at 8 kt at 500 feet and from 240° at 10 kt at 1,000 feet. The visibility was around 30 km, scattered cloud base 2,500 feet, temperature +19°C, dew point +15°C, mean sea level pressure 1008 mb.

Inspection of the aircraft at the scene of the accident confirmed that it had struck the ground at a low forward and vertical speed. There was distortion of the frame, particularly on the right hand side, and damage to the right landing gear, propeller cage and propeller. The impact had been sufficiently hard to fail the main longitudinal frame member, but the structure had remained essentially intact. The damage to the wooden propeller showed that little power had been delivered at impact. The canopy was laid out and it was confirmed that the canopy was undamaged and all the lines and cables were unbroken and attached.

The aircraft was recovered and taken to the AAIB facility at Farnborough where a more detailed examination was carried out. The trike unit appeared to be quite sturdily constructed and no pre-impact defect was found in the structure, engine or propeller. The canopy was rechecked and found to be undamaged. As no rigging instructions were available in the UK, the manufacturer sent by E-mail some information and photographs. It was understood that this information was also sent to the importer at the same time, ie after the accident flight.

The rigging instructions and photographs showed that the steering lines had sewn-in white markers which were required to be aligned with part of the non-adjustable rigging. With the alignments made, the steering lines were then required to be fed around the pulleys for the foot pedals and tied off to the airframe structure. Some limited adjustment of the steering lines is then permitted for final trimming. It is also possible to accommodate different pilot leg lengths by re-tying the steering lines without altering the alignment of the markers. Inspection showed that the right hand side was rigged about 3 inches shorter than nominal, an acceptable deviation which had apparently been the result of trimming, but the left side was rigged 28 inches too short which was well outside the expected range for trimming, which should not have exceeded six inches. The effect of this would be to induce high drag on the left side and a turn to the left, which would be controllable only with right pedal, putting the parachute in a condition similar to the landing 'flare'. Also, it was observed that several of the brackets securing the non-adjustable steel cables which transferred the parachute lift forces to the trike had rotated slightly, possibly due to impact, however discussions with the manufacturer showed that they were still in positions which were acceptable and therefore had probably been correctly rigged for the flight.

Tests on the canopy were conducted by attaching it to the other, unflown trike unit (serial 3003) and inflating it without becoming airborne. Initially, the rigging was set up as found, ie with 25 inches of asymmetry. The canopy repeatedly swung to the left, however it was not immediately apparent whether this was due to rigging or the effects of a slight crosswind component. When the canopy was correctly rigged, it handled normally.