# Whittaker MW-6S (Modified), G-MZIN

## AAIB Bulletin No: 8/99 Ref: EW/C99/3/1 Category: 1.3

| | |
|---|---|
| **Aircraft Type and Registration:** | Whittaker MW-6S (Modified), G-MZIN |
| **No & Type of Engines:** | 1 Rotax 503 piston engine |
| **Year of Manufacture:** | 1998 |
| **Date & Time (UTC):** | 28 March 1999 at 1040 hrs |
| **Location:** | Newnham, Hertfordshire |
| **Type of Flight:** | Private |
| **Persons on Board:** | Crew - 1 - Passengers - None |
| **Injuries:** | Crew - Fatal - Passengers - N/A |
| **Nature of Damage:** | Aircraft destroyed |
| **Commander's Licence:** | Private Pilot's Licence |
| **Commander's Age:** | 69 years |
| **Commander's Flying Experience:** | 89 hours (of which 15 were on type) |
| | Last 90 days - 2 hours |
| | Last 28 days - Less than 1 hour |
| **Information Source:** | AAIB Field Investigation |

**Pilot's experience**

The pilot had commenced his flying training on a Cyclone AX3 aircraft during November 1994, gaining his Private Pilot's Licence for microlight aircraft in July 1996, with a total flying experience of 55 hours. During the period leading up to June 1998, he had constructed this aircraft with the assistance of a friend. After several test flights and completion of its Popular Flying Association (PFA) flight test schedule on 2 August 1998, G-MZIN was issued with a Permit to Fly and a Certificate of Validity by the Civil Aviation Authority on 21 October 1998.

The pilot had recorded 25 flights in this aircraft in his personal flying log book prior to the day of the accident. His most recent recorded flight was on 31 January 1999.

## History of the flight

The aircraft was based at a private airfield at Newnham. On the morning of the accident, the pilot had carried out some taxi runs along the length of the strip in both directions. He had then shut down the engine and left the aircraft for some refreshment. He had intended to carry out a short flight in the vicinity of the airfield before coming back to land, prior to finally departing for Chatteris airfield in company with another aircraft.

G-MZIN was subsequently observed to take off apparently normally towards the west and initially climbed straight ahead. A gentle right turn was then made onto the crosswind leg. The aircraft was then observed to turn onto a wide downwind leg, at a slightly lower altitude than normal. The base leg was then completed and the aircraft was then observed to be flying somewhat slower and lower on final approach than was usual.

There were four eyewitnesses located on the airfield who observed the landing attempt and the ensuing accident. They all commented on the fact that the aircraft appeared to fly very slowly over the hangar (located just short of the touchdown end of the landing strip) whilst being subjected to some turbulence. The engine sound was heard to reduce and the aircraft descended towards the landing area, but began to drift to the right, probably as a result of the crosswind. The aircraft was then observed to commence a go-around and to initiate a bank to the right. The engine power was heard to increase and the bank to the right was observed to increase. The nose of the aircraft then began to drop as the aircraft appeared to enter an incipient spin, before it struck the ground in a steeply nose down and right wing low attitude. The witnesses rushed to assist and summoned the emergency services, but the pilot had suffered fatal impact injuries.

An aftercast from the Meteorological Office indicated that at the time of the accident, a moderate south-westerly airstream had covered the area. The surface wind was from 220° at 10 kt, with a visibility of 15 km, no significant cloud, temperature +12°C, dew point +03°C, and a mean sea level pressure 1014 mb. Some of the witnesses indicated that from their local knowledge and the prevailing wind conditions, low level turbulence, gusts and topographical effects were likely to have occurred.

## Aircraft description

The aircraft was a three axis microlight, with a rigid wing mounted above a faired tricycle unit (trike) which had two seats fitted side by side. The left and right wings were attached to a large diameter aluminium tube, to which the engine was mounted at the front with the tail surfaces attached at the rear. The tailboom, and each wing, were supported by various struts attached to the trike. A two cylinder,

two stroke engine was fitted, driving a two bladed wooden ground adjustable propeller through a gearbox. The airframe was largely constructed from aluminium alloy sections, and the wing and tail surfaces were covered in a lightweight fabric. A single control column was centrally mounted and all flying controls were operated by cables. Conventional ailerons were fitted, but the tail surfaces were of the 'all flying' configuration.

## Impact parameters

The aircraft had impacted in a level field of young crop, some 35 metres to the right of the airstrip from which it had been operating. It had initially struck the ground with the right wing-tip, at relatively low speed, whilst in a steep nose down attitude estimated at between 70° and 80° to the horizontal. At the moment of impact the aircraft's heading had been 120°M and it had been travelling slowly along a track of 010°M. The impact of the nose of the trike, together with the propeller and engine, had produced shallow depressions in the soil, indicating that it had come to an abrupt stop, although minimal crushing had occurred to the trike nose. The two blades of the wooden propeller had broken off at their roots, but although both blades were damaged neither had shattered. The relatively low degree of damage to these blades indicated that the engine had been turning at impact, but under low power. The plastic fuel tank was reportedly found nearly full of fuel immediately after the accident, but had been holed in the impact and some of the fuel had slowly leaked away; there was no fire.

**Wreckage examination**

The wreckage was examined both on site and later after recovery to the AAIB at Farnborough. It was established that prior to the accident the airframe had been structurally intact and that all flying and engine related controls were properly connected. The fuel cock (tap) had been in the ON position and all fuel filters appeared clean. Debris, consistent with having been generated from the inside of a painted metal fuel can, was found present in the plastic fuel tank but was of a size considered unlikely to have been capable of completely blocking the small mesh filter located at the lower end of the fuel suction pipe. The relatively undamaged engine was removed from the wreckage and was subsequently test run using a quantity of fuel recovered from the fuel tank. With a similar propeller fitted, the engine test demonstrated that it was capable of achieving close to maximum power, the slight shortfall being attributed to the different propeller used and the relatively warm ambient conditions during the test. It was noted when the wreckage was first examined that the throttle lever linkage had been found at minimum power. Inertial forces during the impact, however, would have tended to move the levers forward and this raised the possibility that the throttle may have been intentionally closed prior to the impact.

The airspeed indicator (ASI) had sustained little apparent damage in the accident. This instrument covered the range 0 to 150 kt over a needle arc of 340° and displayed a green arc over the range 0 to 130 kt, with a blue line at 100 kt and a red line at 130 kt. The ASI appeared identical in all respects to the type of ASI often installed in Bell 206 Jet Ranger helicopters. Records for G-MZIN indicated that during the test flights the stall speed had been recorded as 35 kt and that the 'Never Exceed' speed (Vne) had been set at 80 kt. However, neither of these speeds had been highlighted on the ASI. When the ASI was removed, it was found that it had been installed with a single plastic tube between the pitot pipe on the rear of the ASI case and a probe mounted at the front of the trike fairing, and that covering the end of this pipe on the instrument was a 'push on' brass dust cap, of the type normally fitted when such instruments are in storage. A small hole was present in the centre of this cap. The plastic tube was not found to be a particularly tight fit over the cap, as it had stretched and was found secured with plastic adhesive tape. There was no tube connection to the static pipe on the ASI and this had also been fitted with a 'push on' brass cap, but in which there was no hole.

A check calibration of the ASI's accuracy in this configuration showed that over the range of 20 to 80 kt it indicated 'low' by up to 2 kt, but it was very sluggish in its response to reducing speeds below 45 kt. However, with the dust caps removed from the pitot and static pipes on the ASI, the instrument responded normally and calibrated to within 1 kt accuracy. A subsequent strip examination of this unit revealed no defects.

It was evident that the seats in this microlight were simple moulded plastic chairs, but with their metal tubular legs removed, mounted to the trike structure through the leg attachment holes. It was also evident that the pan of the pilot's seat had fractured in the accident. Both seats were fitted with a good quality four point harness and 'aircraft' type buckles attached to the airframe. Neither the pilot's harness or the structure local to the points of its attachment had failed in the accident. However, it was apparent that the attachment of both harnesses was not in accordance with the designer's drawings and, in one significant respect relating to the shoulder straps, did not conform to the recommended geometrical arrangement specified both in the British Civil Aircraft Requirements (BCARs), section S (small light aeroplanes), or Joint Airworthiness Requirement (JAR) 22. The shoulder straps were joined together immediately behind the pilot's neck to form a single strap and this was secured to the airframe by being looped around the tubular wing root rear connection to the tailboom.

**Discussion**

As a result of the findings associated with the ASI it was considered that its sluggish response to decreasing airspeed, as installed with the dust caps having been left fitted to the pitot and static pipes on the instrument, may have delayed the pilot's recognition of an incipient stall, if the aircraft had suffered a reduction in airspeed as it had turned downwind during its go-around just prior to the accident.

With regard to the pilot's harness, the diagrams in Figure 1 to 3 illustrate the recommended geometry of harness installation, including the turn angles of the shoulder straps over the seat occupant's shoulder. The intent of this is to provide a pre-existing rearward acting restraint force on the upper torso, whenever the straps are normally tensioned prior to flight, thus minimising the relative forward movement of the occupant with respect to the airframe in the event of a sudden deceleration of the aircraft. Such forward movement can otherwise result in increased shock loading to the occupant as the slack in the straps is taken up when they suddenly become taut.

The report of the consulting pathologist who performed the autopsy concluded that the cause of death (which would have been virtually instantaneous) was injury to the brain associated with a broken neck, although he determined that other injuries would also probably have rendered this accident non-survivable. A photograph taken of the pilot seated in the aircraft with his harness fastened immediately before the accident flight indicated that there was no change in the angle of the straps over his shoulders. This was later confirmed by tests carried out on the re-assembled wreckage. Thus in the accident no initial restraint of the upper torso would have been provided upon impact of the aircraft, which would have allowed the pilot's upper body to rotate forward about the lap strap. In this circumstance it was considered likely that the pilot's head had struck part of the airframe and had been effectively forced back relative to his shoulders before the straps had tightened against this forward rotation. As a result of these findings, changes to the location of the mounting point for the shoulder straps on this type of microlight are being considered by the Popular Flying Association.