

# Gemini Flash II, G-MTBW, 15 April 1997

## AAIB Bulletin No: 8/97 Ref: EW/C97/4/2 Category: 1.4

<b>Aircraft Type and Registration:</b>	Gemini Flash II, G-MTBW
<b>No &amp; Type of Engines:</b>	1 Rotax 503 piston engine
<b>Year of Manufacture:</b>	1986
<b>Date &amp; Time (UTC):</b>	15 April 1997 at 1615 hrs
<b>Location:</b>	Aldridge 'Airport' near Walsall
<b>Type of Flight:</b>	Private
<b>Persons on Board:</b>	Crew - 1 - Passengers - 1
<b>Injuries:</b>	Crew - Fatal - Passengers - Serious
<b>Nature of Damage:</b>	Microlight destroyed
<b>Commander's Licence:</b>	Private Pilot's Licence
<b>Commander's Age:</b>	59 years
<b>Commander's Flying Experience:</b>	81 hours (of which 60 hours were on type) Last 90 days - 32 hours Last 28 days - 16 hours
<b>Information Source:</b>	AAIB Field Investigation

## Background

'The Airport' at Aldridge was opened in 1935 as a municipal aerodrome by Walsall County Borough. It had three grass strips, the longest of which was 890 metres. After WWII its runways became too short for aircraft of the day and the aerodrome fell into disuse. Although it still bears the name 'The Airport', the disused aerodrome is now a public amenity park controlled by Walsall Borough Council. Numerous sporting and leisure activities take place within the park which has some hard surfaced tennis courts and a social club building in the northern most corner. In winter there are several football pitches marked on the grass, each with its own goalposts which are left standing for the season. In early April the posts were removed to make way for cricket pitches.

Although model aircraft flying was the only aviation activity with formal permission to use the park, about three years ago a senior member of a well established aero club north of

Birmingham obtained informal permission to land microlight aircraft there provided that there were no football matches in progress and subject to there being no complaints from the public. In recent months several microlight aircraft have landed in the park during the evening and on Sunday lunchtimes, apparently without any complaint from the public. There is no designated landing strip and the microlights have usually landed on the western or southern fringes of the park. The pilot of G-MTBW had landed there at least three times before in the company of one of the flying club's more senior members who had briefed him on the preferred landing procedure which was to approach along the southern boundary of the park and land on the western side. For all three previous approaches the surface wind had favoured a landing in a north-easterly direction. There is no windsock at 'The Airport' and no reliable source of local wind information such as a nearby factory chimney.

The microlight was owned exclusively by the pilot who stored it at the aero club. The pilot commenced flying training with the club in September 1995 and qualified for his licence a year later. In April 1996 whilst part way through his flying training he purchased G-MTBW and had flown only this machine since July 1996. He was voted the club's 'best student of the year' in 1996 and had demonstrated his ability to cope with real and unexpected engine failures on two occasions, having landed his machine without injury or further damage.

The microlight was equipped with an aeronautical radio transceiver coupled to an intercom system. The transceiver was carried in a bracket attached to the keel tube; the battery was carried in a side pocket and the intercom box was mounted inside the front-seat frame. Headsets worn under the occupants' flying helmets enabled conversation between them and allowed the pilot to converse on the radio. There was no ground radio at the club airfield and the pilot had been discouraged from contacting Birmingham ATC.

### **History of Flight**

On the day of the accident the pilot arrived at the club airfield with two friends with the intention of taking each of them flying in the rear seat of his microlight. The machine was prepared for flight by attaching the previously rigged 'flex wing' to the dual seated 'trike unit' and the pilot carried out a detailed pre-flight inspection. He then 'booked out' for a local flight with the first passenger and took off uneventfully at about 1545 hrs.

The synoptic weather situation was governed by a ridge of high pressure established over the area with light and variable surface winds. Visibility was more than 50 km at nearby Birmingham Airport with a few clouds at about 5,000 feet altitude. The light wind was, however, unusually variable in direction. The 1520 hrs observation at Birmingham recorded extremes in wind direction of 260° through north to 090° whereas the 1550 hrs observation recorded extremes in direction from 240° through south to 160°. A meteorological aftercast stated that the general wind flow at 2,000 feet altitude was 100° at 10 kt and at 1,000 feet it was 070° at 5 kt. Witnesses at the accident site stated that the surface wind was from the north east at about 10 kt.

In daylight hours the central area of 'The Airport' is frequently used by people exercising their dogs and there were several people so doing when G-MTBW arrived over the park at about 1610 hrs. The microlight was first noticed approaching from the north west in level flight with the engine running smoothly. Overhead the park the engine noise reduced as if it had been throttled back. The machine descended, apparently under control, in a left turn in such a manner that all the witnesses thought it was carrying out what appeared to them to be an approach and landing. However, during the final left turn onto a westerly heading the microlight's right wing was seen to strike a poplar tree at about

30 feet agl. Witnesses heard the engine power increase and saw the machine oscillating in roll before striking the ground heavily in a right wing low attitude.

After the crash several witnesses came to the aid of the occupants. The pilot was motionless and lying on the passenger's leg. The passenger was talking but trapped by his right leg and so one witness cut the pilot's lap harness to enable them to move the pilot and release the passenger. The autopsy revealed that the pilot had died at impact from internal injuries. The passenger also suffered from internal injuries and several broken ribs.

It was the passenger's third flight in a microlight. He recalled that the take off was normal and that they flew towards Walsall. Near the town the pilot decided to return to the departure airfield where he intended to land and exchange passengers. As they turned left the pilot throttled back the engine to reduce noise. The passenger remembered remarking to the pilot on the intercom system about the large number of green football pitches he could see ('The Airport') when there was a noticeable increase in background noise in the earpieces of his helmet-mounted headset. The passenger was aware that the intercom had partially failed and he knew that the pilot had suffered similar intercom problems during previous flights. Because of this partial failure the pilot's reply was inaudible but he gestured to the passenger by pointing downward towards the football pitches. The passenger then saw the pilot bending down, apparently trying to reach something within the cockpit under the control bar. At the same time he became aware of a steep spiral descent through approximately two revolutions. Late on during the descent he saw the poplar tree which the aircraft eventually hit; he was sure that the pilot had also seen the tree because at that point the engine power increased and he felt sure the pilot was 'going around' in order to avoid the tree. He was aware that they were travelling quite fast (between 40 and 50 kt) and climbing when the machine hit the tree.

### **Wreckage examination**

The aircraft had crashed in the north-eastern corner of 'The Airport', with the ground marks indicating that the impact track was around  $277^\circ$  magnetic. A line of four poplar trees, which bordered the tennis court, extended in an approximately south-westerly direction from the edge of the field. It was clear that the aircraft's right wing had struck the most westerly tree some 10 metres above the ground. The impact point was approximately 75 metres, and on a bearing of some  $265^\circ$ , from the tree. It was thus apparent that the impact with the tree had caused the aircraft to turn to the right by more than  $12^\circ$ .

The aircraft had landed heavily on its right main wheel, resulting in a structural collapse of the right-hand side of the trike. This had caused the right-hand corner of the 'A' frame (the cross-tube of which constitutes the control bar) to contact the ground, which then rotated the wing to the right relative to the trike. The 'monopole' (the vertical structural member of the trike that attaches to the wing) had suffered a bending failure during the ground impact. The aircraft had come to rest approximately 10 metres from its initial point of impact. Additional evidence of a high descent rate was indicated by the fact that the 'kingpost' on top of the wing (which is attached by cables to various points on the wing upper surface), had suffered a compression failure due to downwards flexing of the wing at impact. The only other significant structural failure was the right wing leading edge tube, which had failed 1.6 metres from the tip. The only cable failure was one of the dual redundant flying wires that connected the bottom of the 'A' frame to the underside of the right wing. Fragments of propeller blade leading edge tape were found embedded in the strands, indicating that the cable had been severed by the propeller during the impact.

Examination of the tree revealed that several of the lighter branches had been severed but that the central trunk, which was approximately 100 mm in diameter at that height, had remained intact. It had however been struck hard enough to remove a section of bark. The fabric on the underside of the wing had been smeared with foliage and bark deposits: these marks were orientated in a spanwise as opposed to a chordwise direction, indicating that the leading edge wing tube had failed upon striking the tree, and then trailed rearwards.

Immediately adjacent to the ground impact mark made by the right main wheel was a cut in the turf made by the propeller. Fragments of wood from the propeller were scattered over a wide area, with the degree of fragmentation suggesting that the engine had been delivering considerable power at impact. The fuel tank was more than half full of fuel and had remained intact apart from a damaged filler cap. Fuel spillage was confined to a small quantity released as a result of the float chamber bowl becoming detached from the carburettor.

A more detailed examination of the wreckage revealed that the union between the fuel line and the selector valve was weeping slightly. The presence of an oily deposit around the union suggested that fuel had been seeping out for some time, with the petrol having evaporated from the two-stroke mixture. It was noted that the standard end-fitting on the fuel line had been replaced with an ill-fitting jubilee clip. Whilst the condition of the union gave rise to the possibility of air being entrained into the fuel inlet line, the indications of power at impact, plus the witness statements, suggested that engine operation had not been affected. The intercom unit had broken up during the ground impact, and could not be checked.

This aircraft was equipped with 'roll tips' on the wing, a feature which allows incidence washout at the tips in order to improve the handling close to the stall. The wing fabric is bolted to the tip portion of the leading edge tube, which is able to rotate, on a bearing, relative to the inboard (ie fixed) section of the tube. The effect of this arrangement is to allow the wing tip to off-load the aerodynamic lift by rotating to a lower angle of incidence. A spring-loaded button locates into one of a series of five holes in the inboard section, which limits the minimum angle to which the tip can rotate. This facility is provided as a method of trimming the wing in the event of a tendency for the aircraft to turn when in straight and level flight. Examination of GMTBW revealed that the button mechanism had been damaged such that the button was not located in any hole. In this condition, the tip portion would have been unconstrained in rotation, although in fact the tension in the wing fabric acts to restrict tip movement. After removing the left and right tip assemblies, it was found that the left tip bearing was comparatively new in appearance, with fresh looking grease applied to the area. Additional evidence of maintenance activity in this area was provided by the use of an aluminium pop rivet in the assembly. The corresponding item on the right wing, which is presumed not to have been touched since manufacture, was of stainless steel and of a smaller diameter.

The aircraft log book contained no entries concerning work on the left wingtip, and the aircraft manufacturer had no record of any parts, such as the replacement bearing, being ordered by the pilot who was the owner at the time of the accident (there were two previous owners). The aircraft had a current Certificate of Validity on its Permit to Fly, and had had all its annual inspections necessary for the issue of successive Certificates. However, neither of the two BMAA Inspectors associated with the aircraft were aware of any work on the wingtip, and stated that they would expect the owner of an aircraft to inform them of any such activity, thus giving them the opportunity of inspecting it.

The aircraft manufacturer conducted a flight test subsequent to the accident, in which a wingtip was deliberately unconstrained by its index button. The results indicated no untoward effects of operating

the aircraft in this condition, although there was the possibility of lateral trim problems close to the stall.

### **Analysis**

When powered after the accident, the pilot's radio was found to be tuned to Birmingham Airport's ATIS (Automatic Terminal Information System) which broadcasts the wind direction at the airport. If the pilot had listened to this broadcast just before the accident, he would have heard the 1550 hrs wind observation which was 060°/06kt but variable in direction from 240° through south to 160°.

The passenger thought that the pilot might have been attempting a forced landing at 'The Airport' after suffering an engine failure and that he had been attempting to start the engine by reaching down to operate the starting cord when the engine suddenly re-started. This was inconsistent with the bulk of the witness evidence. It is more likely that the pilot was reaching down to adjust the intercom and, having failed to correct the problem, he decided on the spur of the moment to land at 'The Airport', where he had landed before, to rectify the problem. Unfortunately he attempted a tight spiral descent over the central area whilst an easterly wind (at 500 feet and above) drifted the microlight towards the tree belt surrounding the social club and tennis courts. The pilot appears to have misjudged the final turn, when the wind was in the microlight's rear left quarter, resulting in a downwind and downhill approach towards the trees. He saw them and attempted to avoid them by climbing but the right wing tip struck the trunk of the leftmost tree. Failure of the leading edge tube on impact resulted in loss of roll control. However, it is possible that the machine stalled whilst the pilot was attempting to avoid the trees and that loss of full control preceded impact.

In accordance with their usual practice, the BMAA will publish the details of this accident in a future issue of their magazine. It is anticipated that emphasis will be placed on the necessity of any work conducted by owner/pilots on their aircraft being notified to the appropriate inspectors.