

**Aircraft type and registration:** Gemini Flash G-MNEJ (Microlight aircraft)

**Year of Manufacture:** 1985

**Date and time (GMT):** 22 October 1985 at about 1305 hrs

**Location:** Middleton Sand, near Morecambe, Lancashire

**Type of flight:** Private

**Persons on board:** Crew — 1                      Passengers — None

**Injuries:** Crew — 1 (fatal)                      Passengers — N/A

**Nature of damage:** Aircraft destroyed

**Commander's Licence:** Student Pilot

**Commander's Age:** 31 years

**Commander's Total Flying Experience:** 30 hours and 20 minutes (all of which were on type)

**Information Source:** AIB Field Investigation.

The pilot had made a previous arrangement to meet his flying instructor at Middleton Sand, on the afternoon of 22 October 1985, in order to carry out a practice flight of the manoeuvres required to be demonstrated during the qualifying flight test for the issue of a Private Pilot's Licence (Group D). Included is the requirement to demonstrate an ability to recover from a stall, both in level flight and with up to 30° of bank in a turn. In the event the flying instructor was delayed, and it appears that the pilot decided to carry out the flight without the supervision of a qualified ground observer.

Shortly after 1245 hrs on that afternoon two eye-witnesses who were walking along the shoreline, report that they were aware of a microlight aircraft flying above Middleton Sand, and at least one take-off and landing were observed. Their attention was re-drawn to the aircraft when they heard a sharp crack or bang. On looking up they saw that the tricycle cockpit section had separated from the wing and was descending steeply, nose down, towards the sands. The wing section continued flying in a random fashion before coming to rest on the sand the right way up. On arrival at the cockpit section they found that it was on its side, partially inverted, and that the pilot had sustained fatal injuries.

Examination at the scene showed that the wing had landed a few hundred yards south of the impact position of the trike and pilot. At 200 yards and 400 yards north of the trike two fragments of propeller blade were found. The wing control bar had contacted the ground first and tipped the wing on to its nose breaking the port leading edge near its inboard end, and buckling its attachment plates at the keel. Before proper control over the accident site could be established by the police the wing was dragged, by someone attending the site, behind a tractor across the sand and laid near the trike. This caused further damage.

The pilot's body lay next to the trike. His seatbelt (lap type) lay across his body still buckled, although it had failed in overload at the point where it would normally pass under the trike's keel

loosely restrained by a secondary strop. The trike lay upside down and ground impact marks clearly showed that it had landed inverted. The trike frame had been grossly distorted and disrupted by the ground impact. It is possible that the safety belt failed in the air during the in-flight break-up.

The trike had separated from the wing through failures in the mast and the front strut. The mast had failed primarily in rearward bending, but with some torsion, at the attachment of the cross beam which supports the engine bearers. The fracture line ran between the locating holes of the two securing bolts which penetrate the mast at right angles to one another. The torsion evident in the fracture was in the direction of starboard wing advancing and port wing retreating. No evidence of pre-existing defect was found in the mast fracture. The safety cable within the mast had failed in tension and bending at the point at which it had been bent over the broken edges of the mast.

The front strut had failed at a point 9 inches above its lower assembly break. The failure of the double, co-axial, aluminium alloy tubing was in bending; the bend being outward to starboard. On the strut's surface in the area of compression collapse on the inside of the bend were found a number of impact pits. The circumferential fractures of both tubes were almost identical and had originated on either side of a hole containing a rivet which positioned the inner tube within the outer. There was no pre-existing defect present in either fracture and the bending of the tubes was caused by impact, the rivet hole being fortuitously close to the impact point. It therefore formed a stress concentration and a point of initiation of fracture in what was an overload failure due to an impact.

The wing from the accident aircraft was mounted on another identical trike and it was found that, with the control bar moved fully forward and to the right (wing pitched up and rolled to the left), the inboard of the two bolts in the control bar end fitting approached the front strut at the position of the impact marks and failure. Other damage was found which confirmed that the wing and trike had been in the relative positions described above, and illustrated in the sketch.

All the evidence was consistent with a sequence of damage and failure following an initial failure of the front strut, the failure being the result of impact by the left hand end of the control bar and continuing violent movement of the wing and trike relative to one another in the directions indicated.

The engine was damaged by ground impact and could not be run. The hand throttle was found closed, and the damage associated with the propeller suggests that this was rotating under low power.

No irregularity was found attributable to the pre-flight assembly and rigging. It was found, however, that the majority of the pre-formed top surface battens in the starboard wing were curved beyond their specified camber. Some battens in the port wing were similarly affected but only to a minor degree.

The wing contains under-surface battens, two on either side in the inboard section of the wing, which provide a convex under-surface profile. In the starboard wing both battens were found to have rotated in their pockets in the wing fabric making the under-surface concave. On the port side only the outboard of the two battens had reversed.

The batten deformation could well be the result of the wing's ground impact but it could be indicative of an aerodynamic overload biased towards the right wing.

In sum, therefore, the mechanical evidence is most consistent with a failure sequence starting with an asymmetric aerodynamic load on the wing which caused it to tilt violently left and to pitch up relative to the trike. When the control bar hit the front strut high loads would have been generated in accelerating the mass of the trike and pilot. The failure of the front strut, due to such an impact, was the beginning of the break-up sequence. The front strut is a primary structural member and the mast was not designed to sustain the high bending loads to which it was exposed when the front strut failed.

It was not possible to find any eye-witness who had observed the aircraft at the precise moment

that the in-flight structural failure sequence commenced, and thus the aircraft's attitude or manoeuvre at that time could not be determined. A study of a video film, provided by the BMAA, of stalling trials carried out on a similar aircraft did not reveal any adverse handling characteristics. Within the limits of the tests, which were from wings level to up to 30° of bank, stall recovery appeared to be immediate with minimal loss of height.

A meteorological aftercast of weather conditions prevailing at the time of the accident shows that it was generally fine, the lowest recorded cloud was 2200 feet, and low level winds were easterly between 10 and 15 kt. Visibility was restricted to about 8 kilometres due to smoke and haze, and there was probably some light, occasionally moderate, low level turbulence. A professional pilot, who was flying in the north Lancashire area about 30 minutes before the accident, described the conditions as very hazy with poor air-to-ground visibility. In certain directions there was no readily discernable horizon. If these conditions prevailed at the time of the accident, then the possibility that pilot dis-orientation was either a causal or contributory factor cannot be discounted.

