No: 11/88 **Ref: EW/C1071** **Category: 3**

Aircraft Type and Registration:	Gemini Flash Microlight, G-MMUF	
No & Type of Engines:	1 Fuji Robin EC 44 PM two-stroke piston engine	
Year of Manufacture:	1983	
Date and Time (UTC):	19 June 1988 at 1615 hrs	
Location:	Harlington, near Bedford	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - 1 (Fatal)	Passengers - 1 (Fatal)
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	Private Pilot's Licence Group D	
Commander's Age:	31 years	
Commander's Total Flying Experience:	Approximately 160 hours (of which 16 were on type)	
Information Source:	AAIB Field Investigation	

History of the flight

The pilot flew the aircraft from his own operating field to another some 18 nm distant to participate in a club "fly-in", where guests of the club were to be given pleasure flights. The weather was clear and sunny with good visibility and a light north-easterly wind. There was light thermal turbulence over the area.

He flew two such pleasure flights during the afternoon before taking off on a third flight at approximately 1545 hrs and heading to the north. Some 30 minutes later he was seen flying southbound at approximately 1000 feet above the ground. At this time another microlight aircraft was flying north, outbound from the field, also at about 1000 feet. The pilot of this second microlight, although not on a collision course, turned to the left. He saw the other aircraft also initiate a gentle turn to its left. He then saw the nose of the trike unit of the other microlight drop away sharply before the trike fell free from the wing. Some witnesses reported hearing a loud bang as the trike separated. The trike unit fell quickly to the ground, turning over as it fell, whilst the wing descended more slowly in a gentle spiral. The two parts of the aircraft fell into a field of barley and came to rest separated by some 200 metres.

Examination of the wreckage

On examination it was found that the monopole with its internal cable had fractured in overload with some rearwards bending. The front strut bottom section had also failed. There was no evidence of the control frame having struck the front strut. The lower rear cable on the left side of the wing had broken at both ends and was missing. The remaining ends showed typical tensile overload failures. This cable is routed in the immediate vicinity of the propeller and it is likely that it wrapped around one of the blades and pulled out at both ends, during the break-up sequence. Sufficient wood for only one propeller blade, and the hub, was found with the wreckage, which was consistent with the other blade having struck the cable.

The front strut bottom section was constructed from two aluminium tubes (see diagrams 1 and 2). The bottom end of the inner tube had been cut short with a pipe cutter, leaving tensile loads in the strut to be taken only by the aluminium pop rivet shown in the diagrams. This rivet is intended for location only and does not carry any flight loads when the strut is constructed correctly. Compressive loads in the strut were transmitted directly into the centre section by the ends of the outer tubes butting together, so relieving the rivet. Diagram 1 shows the correct arrangement of the front strut bottom section with the inner tube taking tensile loads between the rigging pin and the bottom attachment bolt. It could not be established with certainty when the front strut was modified from the design standard.

In an effort to understand the loads applied to the front strut more fully, the AAIB carried out some test flying with another Gemini-Flash microlight fitted with strain gauges. This work indicated that with reasonably careful flying and ground handling the rivet could have survived a number of flights. Of the nine take-offs, circuits and landings for which data was recorded, only one touch-down generated tensile loads large enough to fail the rivet. The results confirmed that the front strut carries significant loads in normal operation and is an important structural member.

Regulatory aspects

The pilots of microlight aircraft are required to comply with Section 32 (c) of the Air Navigation Order which requires the commander of an aircraft to satisfy himself that the aircraft is in every way fit for the intended flight. In addition, the Civil Aviation Authority require microlight aircraft to be inspected annually for the issue of a Permit to Fly. Responsibility for inspection and issue of permits is delegated to the British Microlight Aircraft Association (BMAA), which appoints engineering inspectors to carry out these tasks. The BMAA requires that structural modifications or repairs carried out between annual inspections should also be examined by a BMAA approved inspector before further flight. In the case of this accident, the owner/pilot had recently been employed by a major company as a flight development engineer and had not requested such an examination. This latent structural weakness should have been discovered, if the pilot had complied with the BMAA inspection requirement and the front strut had been inspected before it was refitted to the aircraft.

The AAIB has written to the BMAA to recommend that they reinforce their requirement that any structural modifications or repairs should be inspected by a BMAA approved inspector before further flight.

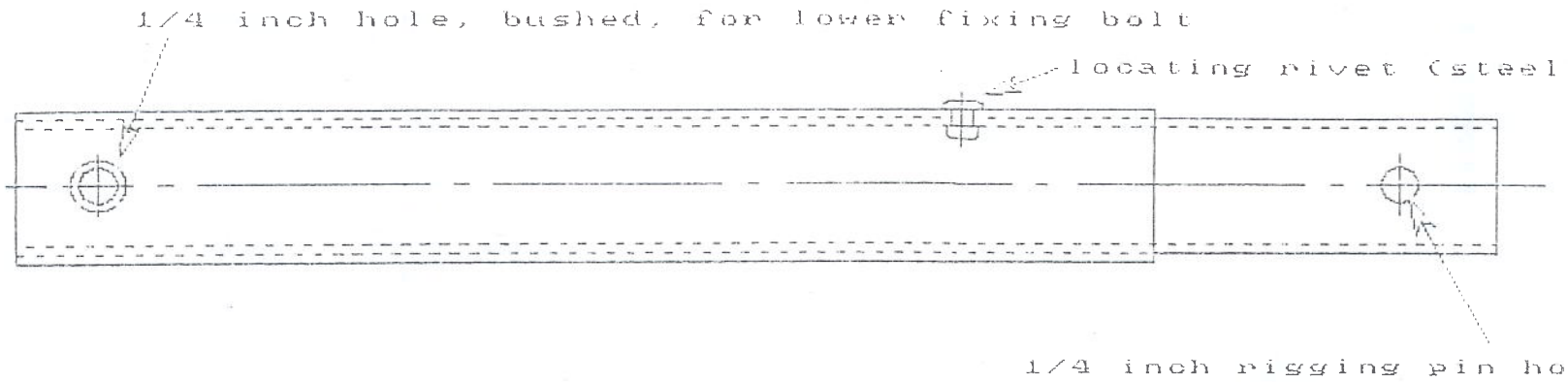

Diagram 1
Gemini front strut bottom section connect to drawing

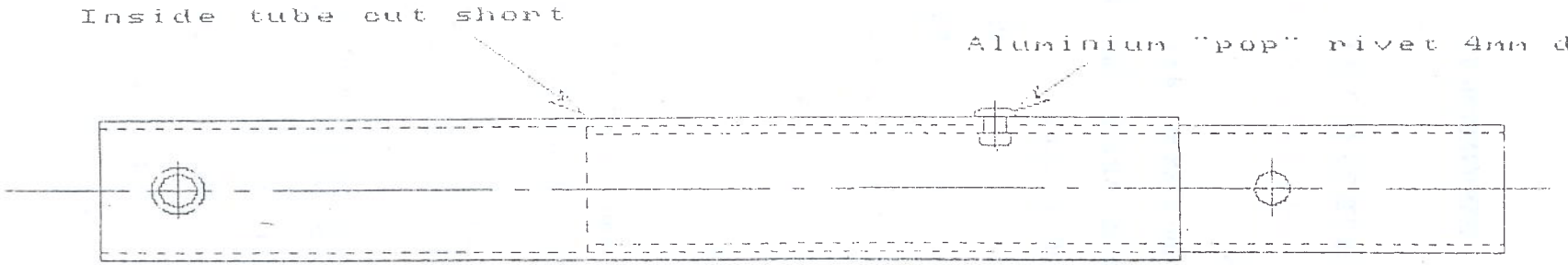

Diagram 2
Front strut from G-HMUE