

ACCIDENT

Aircraft Type and Registration:	Europa, G-MIME	
No & Type of Engines:	1 Rotax 912 ULS piston engine	
Year of Manufacture:	2001 (Serial no: PFA 247-12850)	
Date & Time (UTC):	28 September 2017 at 1500 hrs	
Location:	Grove Farm, Wolvey, Warwickshire	
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:	National Private Pilot's Licence	
Commander's Age:	55	
Commander's Flying Experience:	546 hours (of which 48 were on type) Last 90 days - 12 hours Last 28 days - 1 hour	
Information Source:	AAIB Field Investigation	

Synopsis

The aircraft landed a significant distance down the runway at Grove Farm and was unable to stop before the end. The aircraft passed through a hedge and caught fire before coming to rest in the field beyond the end of the runway. Although both the pilot and passenger survived the accident, both subsequently died of the burns they sustained.

History of the flight

The pilot and passenger arrived at Grove Farm, where the aircraft was kept in a hangar, just after 1400 hrs. Witnesses stated that the purpose of the flight was to fly over a local site where both the pilot and passenger were working. There were no witnesses to the preparation or flight of the aircraft. It was picked up by radar for the first time at 1443 hrs and for the last time at 1445 hrs, and the radar track indicated that it took off from Runway 29, flew a circuit and made an approach back to Runway 29.

Just after 1500 hrs witnesses saw the pilot and passenger in the yard of the farm on which the strip is located; both were severely burnt. The aircraft had passed through the hedge at the end of Runway 29 after landing and come to rest in the field beyond. It was severely disrupted and had suffered significant damage from fire. Both the pilot and passenger subsequently died of the burns they sustained.

Accident site

The aircraft wreckage was located close to the western end of the runway. It had overshoot the runway, passed through a thick, four-foot high hedge and a shallow ditch before coming to rest approximately 10 m past the hedge (Figures 1 and 2). Evidence indicated that the aircraft was on the ground and turning slightly left when it contacted the hedge. As a result, the right wingtip contacted the hedge before the left wingtip and this slewed the aircraft back more in line with the runway centreline.

The internally mounted flap drive crosstube and its hinge attachments were found close to the hedge suggesting they had become detached as the aircraft passed through the hedge; the first signs of fire were visible on the ground in the vicinity. The engine and firewall forward section of the fuselage remained upright but the remainder of the aircraft was found inverted and the fuselage was substantially disrupted in the cockpit area; both doors were present. A post-impact fire, which burnt for over 30 minutes, consumed or severely damaged large parts of the aircraft including almost all the fuselage and empennage, but also the inboard parts of the wings and flaps.

The engine cowlings and engine were also severely damaged by the fire. All three blades of the propeller had broken off and were found close to the main wreckage; the nature of their damage and location indicated they were not under power when the aircraft passed through the hedge.



Figure 1

General view of accident site from the end of the runway through the hedge



Figure 2

General overhead view of the accident site (from AAIB UAS)

The runway was examined and it was in good condition with short grass and a reasonably firm surface. A touchdown mark from the single mainwheel was found close to the centre line of the runway approximately 73 m from the start of the runway (Figure 3). It indicated the aircraft had made a firm touchdown after which it became airborne again. Although there were more ground markings approaching the hedge, the subsequent touchdown point could not be identified.



Figure 3

View in direction of landing (from AAIB UAS)

Recorded information

None of the aircraft's avionics survived the post-accident fire and no aircraft recorded data was recovered; however, a limited amount of radar data was recorded that tracked the aircraft in a left-hand circuit for Runway 29. Transponder Mode C altitude information, corrected to the QNH of 1017 hPa and the runway elevation of 380 ft, indicated that the circuit was flown at a height of 485 ± 50 ft aal (Figure 4).



Figure 4

Circuit ground track from radar data

Aircraft information

General

The Europa is an amateur built side by side two-seat light aircraft of conventional layout and composite construction. It is available with either a tricycle undercarriage or as a mono-wheel version with a single mainwheel, tailwheel and outriggers on the wings.

It is sold in kit form and, in the UK, its construction is overseen by the Light Aircraft Association (LAA) through a network of approved inspectors. Once inspections and flight tests confirm the aircraft has been completed to the required standard, a Permit to Fly can be issued.

G-MIME was completed as a mono-wheel version in 2001 and had since flown approximately 500 hours. The accident pilot purchased the aircraft from its second owners in May 2016.

Engine

This aircraft was fitted with the recommended Rotax 912 ULS engine with an optional carburettor heat system modification which used hot coolant from the cooling system to heat the carburettor bodies and thereby prevent carburettor ice formation.

The electrically controlled variable-pitch propeller was driven via the engine's reduction gearbox.

Fuel system

The fuel tank was fitted in the fuselage behind the seats and was saddle-shaped to fit around the pitch and flap control push rods. The two sides of the tank were configured to provide a main tank of approximately 60 litres and a reserve tank of approximately 8 litres.

In 2003, this aircraft had been fitted with an approved modification which installed two electric fuel pumps in parallel instead of the normal single electric fuel pump in series with a mechanical engine driven fuel pump. The system also included a feature which provided an automatic changeover of the fuel supply to the reserve tank in the event of a loss of fuel pressure from the main fuel tank feed. Because of this modification, the LAA had agreed that a fuel vapour vent return line was not required as this system design and installation, which had been validated by testing, mitigated the risk of fuel vapour formation. This modification also approved the replacement of some flexible fuel pipes with stainless steel corrugated pipes.

The aircraft did not have water drain valves fitted to the fuel tank outlets but did have a gascolater¹ in the fuel supply line to the engine.

The aircraft was being operated using E5 MOGAS² which required inspection and certification documents to approve its use.

Electrical system

A system consisting of a battery and an integral engine generator provided electrical power for the aircraft. The battery was located behind the cockpit area along with an external power connection socket. Various cables, switches and circuit breakers were installed to distribute the electrical power.

Relevant maintenance history

The aircraft had been issued with a Permit to Fly and the date of expiry of its Certificate of Validity was 21 October 2017.

The aircraft, engine and variable-pitch propeller logbooks were inspected and contained records of the regular maintenance and inspection work that were required.

Footnote

¹ A drainable filter and water collector.

² E5 MOGAS is regular forecourt unleaded petrol which meets EN228 Standard and can contain up to 5% ethanol.

Inspections and a test flight relating to the renewal of the Certificate of Validity had been undertaken during September 2017 but the completed form had not been submitted to the LAA. The LAA inspector who carried out the Annual Inspection reported that the aircraft was “nice and well looked after.”

No inspection and certification documents approving the use of E5 MOGAS could be located.

Aircraft examination

Due to the extent and severity of the post-accident fire, the extent of any inspection was limited as most components had been consumed or were melted by the fire; mainly steel parts survived along with the core of the engine and the outer portions of the wings.

The remains of the engine were taken to the UK Agent for inspection. The engine core was disassembled and inspected. No anomalies were identified that would have affected the performance of the engine. Inspection of the engine ancillary components, such as the ignition system or fuel system carburettors, was not possible as they were too severely damaged by the fire.

The propeller was inspected and found to be in the fine pitch position. This is the normal position for takeoff and landing.

Survivability

Both the pilot and passenger survived the accident but suffered extensive burns in the subsequent fire which was not survivable.

The pilot

The pilot undertook some flying training in 1980 and 1981, resumed training in 1999 and gained a PPL(A) in 2000. Much of his experience had been gained on microlights with the conversion to the faster and heavier Europa aircraft being within the previous 14 months. At the time of the accident, he was operating under the privileges of an NPPL(A). He was familiar with operating a microlight from Grove Farm but less so in the Europa, although his conversion to the aircraft included a visit to the strip with an instructor before he moved the aircraft there permanently. The instructor commented that he felt the pilot had adapted well to the Europa and to operating it from short strips.

According to witnesses who knew the pilot and had flown with him from Grove Farm, he tended to have the radio in the aircraft tuned to Coventry Airport Air Traffic Control (ATC) to obtain local weather and traffic information. On the day of the accident, however, he did not contact Coventry ATC, and no distress call was heard on any frequency.

Toxicology

The results of the Forensic Toxicology Report on the pilot were negative except for drugs consistent with his medical treatment after the accident. The test for carbon monoxide poisoning was also negative.

Airfield information

Grove Farm is a grass farm strip orientated 110°/290°M which is 350 m long and at an elevation of 380 ft amsl. Circuits are flown at 500 ft agl. Airfield guides include a warning about a 4 ft hedge on approach to Runway 11 (departure end of Runway 29). This is a substantial hedge made up mainly of hardwood species such as hawthorn.

There are numerous large trees close to the strip which do not interfere with the approach directly but, with a southerly wind, might generate some turbulence or wind effects on short finals to Runway 29.

Weight and balance

The investigation could not confirm how much fuel was loaded on G-MIME and therefore could not calculate the actual weight and balance of the aircraft.

The maximum takeoff and landing weight of the aircraft is 621 kg. It was possible to estimate the minimum takeoff weight of the aircraft on the day of the accident as follows. The aircraft empty weight was 392 kg, and the combined weight of the two occupants was 189 kg. A reasonable minimum fuel load for the intended flight would have been 30 litres (22 kg) (including a 30-minute reserve). Although the actual fuel load could not be verified, these figures suggested that the aircraft weight would have been close to its maximum.

Aircraft performance

The length of the strip at Grove Farm was adequate for the Europa at maximum operating weight, allowing for the performance factors recommended for landing in Civil Aviation Authority (CAA) General Aviation Safety Sense Leaflet 7c – ‘*Aeroplane Performance*’ (15% for dry grass and a further 43% as a safety margin).

Meteorology

There are no weather reporting facilities at Grove Farm. Birmingham International Airport is 15 nm to the west and was reporting a southerly wind of 8 kt, with visibility greater than 10 km, few cloud above 3,000 ft aal and a temperature of 18°C. The QNH was reported as 1017 hPa. Images from a police helicopter that attended the scene shortly after the accident indicated that the wind speed and direction were similar to those at Birmingham and perpendicular to the runway at Grove Farm.

Analysis

The aircraft passed through a hedge at the end of Runway 29 on landing at Grove Farm strip and caught fire immediately. Ground marks showed that the aircraft touched down some distance from the beginning of the runway and bounced before touching down again with insufficient distance to stop before the hedge.

The ground marks indicated that the aircraft was on the ground at the end of the runway and evidence from the propeller indicated the engine was at low power. As the aircraft

passed through the hedge and the shallow ditch beyond, the fuselage was disrupted, particularly in the area behind the cockpit. This most likely caused damage to the fuel system that allowed fuel to escape which was then ignited by a spark from the damaged electrical system.

There were no witnesses to the preparation or flight of the aircraft and no distress calls were heard on the radio.

The technical examination was limited by the severity and extent of the post-accident fire but, within these limitations and after a review of the maintenance documentation, no anomalies that may have contributed to the accident were identified.

The aircraft was eligible for approval to use E5 MOGAS fuel, but the inspections and checks of the fuel system required for approval had not been completed. These verify that the fuel system design and installation is compatible with the use of E5 MOGAS to avoid issues associated with its use such as chemical compatibility of components, vapour locking, carburettor icing and water absorption. Carburettor icing was considered unlikely during the accident flight because the aircraft had a permanent carburettor heat system fitted. It could not be determined whether the other issues associated with this type of fuel had an adverse effect on the accident flight.

It was not determined why the pilot decided to fly a circuit before attempting to land rather than completing the local flight as intended. He had significant experience of operating into the strip and would have been familiar with the need to touch down close to the beginning of the runway. A technical fault, or a change of plan for some other undetermined reason may have led to the pilot's decision to immediately return to land and, if so, this distraction might have contributed to the touchdown point being significantly further down the runway than intended. However, no cause for such a distraction was identified during the investigation.

It is likely that there was turbulence in the final stages of the approach caused by the southerly wind crossing the trees immediately south of the Runway 29 threshold. It is possible that this affected the aircraft's touchdown point.

Conclusion

The aircraft took off from Runway 29 at Grove Farm with a pilot and passenger on board who, according to witnesses, intended to fly into the local area. After takeoff, for a reason that was not determined, the aircraft was immediately positioned for an approach to land. The aircraft touched down beyond the threshold of the runway, bounced and touched down again with insufficient distance to stop before a hedge at the end of the runway. It passed through the hedge, caught fire and came to rest in the field beyond. Although both the pilot and passenger survived the accident, they subsequently died of the burns they sustained.

Safety actions/Recommendations

The aircraft was eligible to use E5 MOGAS, but no evidence could be found to show that the inspections and checks of the fuel system required for approval had been completed. Although it could not be determined whether the type of fuel being used was a contributory factor, this is the second recent accident where there was no evidence of the correct procedures being followed to approve the use of E5 MOGAS³.

The LAA agreed during discussions with the AAIB that it would remind all owners, via a Safety Spot article in their members magazine, of the importance of correctly following the published procedures to approve the use of E5 MOGAS in their aircraft.

This article was published in the January 2018 edition.

Footnote

³ See report into the accident to Europa, G-NDOL in AAIB Bulletin 11/2017.