

Europa, G-MKPU

AAIB Bulletin No: 9/2000 **Ref: EW/C2000/03/06** **Category: 1.3**

Aircraft Type and Registration: Europa, G-MKPU

No & Type of Engines: 1 Rotax 912 piston engine

Year of Manufacture: 2000

Date & Time (UTC): 24 March 2000 at 1345 hours

Location: Upwood Airfield, Cambridgeshire

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: 60 years

Commander's Flying Experience: 91 hours (of which none were on type)

 Last 90 days - 1 hour

 Last 28 days - 0 hours

Information Source: AAIB Field Investigation

The aircraft had been acquired by the owner, who was the pilot in the accident, in a partially built condition some two years earlier. It was built and kept at Upwood Airfield, Cambridgeshire, of which he was also the owner. The aircraft had been completed and was now undergoing a certification test flying programme. So far one hours flight testing had been carried out by a Popular Flying Association approved test pilot.

On the day of the accident the aircraft was due to undergo further test flights, in particular to evaluate the stalling characteristics, but these were cancelled due to an insufficient cloudbase. During the morning the certification engineer for the project had conducted some engine ground runs and taxi tests. Later he parked the aircraft on some grass opposite a hangar and left it in the charge of the owner. The engineer left the airfield at approximately 1330 hours at which time the owner was seated in the aircraft. He thought the owner intended to do some further taxiing using grass Runway 23 which was 3,700 feet long and into wind.

At 1410 hours the engineer returned to the airfield and saw that the aircraft was in an area some distance from the grass runway. Realising there must be a problem he went to investigate. He found the aircraft inverted with fuel escaping and the pilot partially underneath. He ensured the electric power was removed from the aircraft and called the emergency services. They attended the scene within 15 minutes but the pilot had suffered fatal injuries in the accident.

Meteorological conditions

The 1350 hours METAR from RAF Wyton, located 6 nm south of Upwood, was as follows: Surface wind 200°/16 kt, visibility 8 km, scattered cumulus at 2,200 feet, broken at 3,000 feet and QNH 1005 mb.

Pathology

There was no evidence of any medical factor having had an influence. The pilot had been thrown partly clear of the aircraft in the accident and no injuries to him from the harness were evident. He suffered fatal injuries at the time of the impact.

The aircraft

The Europa is a two seat homebuilt aircraft made of composite materials. This model had a retractable mono wheel main gear, the operation of which was coupled to retractable outriggers and wing flaps. These were operated together by a single mechanical lever, centrally mounted, close to the throttle and brake levers. It was also fitted with an extended tailwheel, introduced by Europa to improve directional control on the ground. During the test flights the stall speed with flap down was recorded at 41 kt. Part of the flight test procedure was to evaluate the stalling characteristics of the aircraft and to fit stall strips. The strips are fitted to the inboard leading edges of the wing to act as a trigger to cause that part of the wing to stall first. Their purpose is to give the aircraft pre-stall buffet and benign stall characteristics but they had not yet been fitted to this aircraft.

The owner's manual contained a comprehensive section on flight testing procedures. Under a section headed "Taxi testing" the following information was given: "It is quite a common occurrence to suddenly find that you are actually airborne and flying when you only had the intention of conducting a taxi test." Normal taxi testing was done with the stick held in the full aft position and the manual says that if you should become airborne from this tailwheel on the ground attitude the recovery action would be to move the stick forwards to decrease the angle of attack and thereby increase the margin from the stall. There were further cautions under the heading "High speed taxi testing" as follows: "Warning: Make sure that you and the aircraft are flight ready. High speed taxi testing should ideally be done in calm weather conditions, maximum wind 10 kt down the runway."

The actual weight of the aircraft could not be determined because the fuel load was not recorded or subsequently measurable.

Pilot's experience

The pilot had been gliding for a number of years and started flying powered aircraft in 1997. He qualified for his Private Pilot's Licence during 1998; all the flying being carried out on a Cessna 152 aircraft. He had no recorded experience of the Europa aircraft and it was not known whether he

had previously taxied it on his own. It was the pilot's intention to receive dual training in the aircraft once the test flying programme had been completed.

Witness information

There were no witnesses to the accident. A number of people in the local area thought they may have seen the aircraft flying around shortly before the accident. There were a number of Grob 115E aircraft operating in the general area, which are of broadly similar appearance to the Europa but there were no other aircraft operating over the airfield at the time of the accident. One person, from a distance of 2 to 3 miles away, saw an aircraft low over the airfield perform what they described as a flat topped loop. Another witness saw the aircraft in its crashed position, unaware there had been an accident, at a time estimated to be 1345 hours.

A search was made of recordings from Debden Radar but no returns that could be linked to this aircraft were observed.

Engineering investigation

The aircraft had come to rest on a crop to the left of the grass Runway 23, about 700 feet from the centreline and about 1,000 feet from the 'into wind' end. There were no ground marks either on the grass runway or leading to the wreckage location, however ground marks at the wreckage location indicated that at impact the aircraft had been banked about 70° or 80° to the left, with the nose about 40° below the horizon. There was some limited evidence from the wreckage that right rudder was applied at impact and the turn indicator also showed 2 1/2 units of right turn. The fuselage had come to rest inverted on a heading of about 170°, however the track across the ground at impact had been about 080°. The Vertical Speed Indicator showed 800 feet/min rate of descent. No other meaningful indications were obtained from the instruments, however the above were broadly consistent with the impact attitude obtained from the ground marks, especially if right rudder had been applied. The distance of the aircraft from the grass runway, and the lack of ground marks between the runway and the aircraft impact, showed that it had been flying. From the degree of damage and the limited movement of the aircraft across the ground after initial impact, it was concluded that it had been flying slowly at impact, probably close to the stalling speed. The impact attitude was consistent with a wing drop at the stall. The propeller was rotating slowly at impact, engine power was low and the throttle valves in the two carburettors were closed.

Due to the degree of break up in the cockpit area it was not possible to determine the positions of the switches. However it may be assumed that the Battery Master switch was on, since this was required for starting and also caused power to be supplied to the electrical flight instruments. The Avionics Master switch was off, as was the transponder and intercom. It was subsequently found that the GPS had not been powered at the time of the accident, and the communications radio would also not have been powered with the Avionics Master switch off. A number of other switches were broken out of the panel and separated from their wiring. From the wreckage it appears that the pilot's harness was not in use.

The aircraft was fitted with an electrical pitch trim system which was actuated by a mechanical servo in the tail. This servo provided an output signal to an electrical trim indicator in the cockpit. The trim servo was controlled by a stick mounted trim switch. To activate the electrical trim system, both the Battery Master and Trim Isolation switches had to be on. The Trim Isolation switch could not be positively identified. With either switch off, the system would not be powered. In this condition the trim indicator, which was a simple analogue electrical meter, would return to

its de-energised state in which it indicated full nose-down trim irrespective of the trim servo position. Measurements on the tail surfaces and on the trim servo showed that the trim was at or near fully nose up. If the trim system had been energised the trim indication would therefore have changed from fully nose down, to fully nose up.

Flight tests by the manufacturer showed that with fully nose up trim the aircraft would fly off the ground at minimum speed, in ground effect. As it climbed out of ground effect the test aircraft progressively pitched up, as expected for a conventional aeroplane. This condition then required positive handling to prevent a stall.

Discussion

The impact evidence indicates that the aircraft became airborne and achieved enough height above the ground to fly some distance and to enable a steep bank angle to be attained. The witness description of an aircraft flying low and doing a "flat loop" over the airfield was probably their observation of the aircraft pitching up followed by a loss of control and stall. The question arises as to whether it was the pilot's intention to fly the aircraft, or whether the flight was inadvertent.

There were a number of indicators to suggest that the flight was unintentional. The aircraft had not completed the test programme and the pilot had not yet been trained to fly the aircraft. The pilot was not wearing a harness, which would be unusual if there was any intention of flight. The tailplane trim was not in the take-off position, suggesting that no pre-flight checks had been carried out. The aircraft can become airborne inadvertently, as cautioned in the Owner's Manual.

The prevailing wind conditions coupled with ground effect would have enabled the aircraft to become airborne at a relatively low groundspeed. Once the aircraft climbed away from ground effect it would need positive nose down corrective action to maintain flying speed, but with the condition of full nose up trim this would be difficult for an inexperienced pilot to apply. The trim position as found would have caused the nose to continue to pitch up quickly after take off, putting the aircraft rapidly into a stalled condition.

The severe nature of the impact and the extensive break-up of the cockpit would probably have meant the accident was not survivable even if the harness had been used.