

## Europa, G-IGII

<b>AAIB Bulletin No: 11/2004</b>	<b>Ref: EW/G2003/08/45</b>	<b>Category: 1.3</b>
<b>Aircraft Type and Registration:</b>	Europa, G-IGII	
<b>No &amp; Type of Engines:</b>	1 NSI EA-81/100 piston engine	
<b>Year of Manufacture:</b>	2002	
<b>Date &amp; Time (UTC):</b>	17 August 2003 at 1145 hrs	
<b>Location:</b>	10 miles north of Nottingham Airport, Nottinghamshire	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - None
<b>Injuries:</b>	Crew - None	Passengers - N/A
<b>Nature of Damage:</b>	Damage to tail plane, door hinges bent, slight bow in door, loss of much of the door transparency	
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence	
<b>Commander's Age:</b>	50 years	
<b>Commander's Flying Experience:</b>	3,500 hours (of which none were on type)	
	Last 90 days - 133 hours	
	Last 28 days - 32 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot. Discussions with the technical manager of the kit manufacturer, the pilot and the owner. Examination of a similar aircraft and discussions with its builder	

### History of the flight

The pilot, a flying instructor, was conducting an air test in order to check the aircraft and ascertain certain performance data for the aircraft, which had differences from other examples of the Europa. The relevant data for G-IGII were not available. It was then intended that he would provide type conversion and differences training for the owner.

The pre-flight checks, takeoff, departure and climb to 3,000 feet were uneventful. Having slowed to below the published manoeuvring speed the pilot completed 45 degree banked turns to the left and right through 360 degrees. There was then a loud bang and a rush of air into the cockpit. The pilot

realised that the port door was open, the perspex was broken and much of it was missing. (The perspex transparency forms the bulk of the area of the door.) He managed to close the door. The aircraft was now at 1,500 feet and he was concerned that he would not be able to maintain altitude because of the increased drag. He transmitted a distress call to Nottingham airport but there were no further problems and he was able to fly a normal visual approach and landing to Runway 09 at that airport.

The pilot considered it almost impossible to accidentally operate the latch and open the door, whilst manoeuvring the aircraft, with the occupant dressed, as he was, in a short sleeved shirt.

## **Door closure**

The Europa door, which is hinged at the top and opens upwards, has a gas-strut mounted at its rear edge, which acts to restrain the door when it is in the open or raised position. It is understood that some problems have occurred in the past when doors have twisted slightly whilst being closed rapidly. This resulted from the door being pulled downwards on its forward edge whilst movement was resisted by the gas strut at the rear edge. Sufficient twisting sometimes occurred to cause the forward latch to engage in its socket whilst the aft latch failed to do so, but instead rested against the fuselage skin alongside the socket. Such a scenario could account for the incident to G-IGII.

However, the pilot was convinced that the door was secure before takeoff. He frequently flew TB 10 type aircraft having a similar top-hinged "gull-wing" door arrangement and was particularly aware of the need to ensure that both the front and rear latches were carefully checked for engagement. He stated that the consequences of a door opening in flight on a TB 10 are known to be very serious. In addition an associate of his had watched the aircraft taxi out prior to departure and was convinced that she would have noticed the incorrect closure of the rear part of the door had the aft latch not been correctly engaged in the socket. Another associate of the pilot drew attention to the extent to which the trim on the interior of the door of G-IGII obstructed a clear view of the latches. It was suggested that this contributed to the possibility of an occupant failing to detect that a latch was not correctly engaged in its socket once the door had been closed prior to takeoff.

## **Bonding of the transparencies**

The doors were forwarded to the kit manufacturer for examination. They reported that the remainder of the transparency on the damaged door appeared to be securely bonded in position and proved very difficult to remove. The area of the bond line where the transparency was missing was of identical appearance to that of the areas where it remained attached. They concluded that the surface preparation had been uniform, that there was no evidence of bond variation and thus that the whole of the bond was of consistent and adequate strength. It should be noted that the door was supplied by the kit manufacturer without the transparency fitted and bonding of the latter to the door structure is carried out by the builder, using a specified adhesive.

Further discussion of details of the damage to the transparency held with both the pilot and an associate with extensive composite manufacturing experience, who was present when the aircraft landed, revealed their concerns with both the choice of adhesive material used to bond the transparency and the quality of the process as applied to G-IGII.

The frame of the door is known to be sufficiently stiff not to require the additional reinforcement of the transparency to ensure security of the latching arrangements once correctly closed, with both front and rear latches engaged. Therefore, it is not possible to readily envisage a mechanism by which initial failure of the bond of the transparency could have led to sufficient flexure of the door structure to allow either latch to disengage from its socket.

## **Airflow through the cockpit**

The manufacturer's Technical Manager reported that during subsequent conversations with the pilot, he was asked if the hinged fuel selector access flap, positioned on the central tunnel (under the pilot's right elbow) normally blew upwards in flight. The pilot mentioned that he had found it necessary to rest his elbow on this flap to keep it shut. The Technical Manager recalled that when this aircraft type was flown with the doors off the access flap, which has no latch, lifted as a result of a pressure difference between the cockpit and the central tunnel. He therefore suggested that air had been flowing from the cockpit during the early stages of the incident flight and a possible explanation was that, un-noticed by the pilot, the rear latch of the door had not been engaged. This would have allowed the door to flex and air to exit via the gap thus created at the rear. This in turn would have caused a flow of air into the cockpit via the selector access flap. It was suggested that increasing flexing of the door may then have allowed the forward latch to disengage from its socket and the sudden opening produced the shock-loading and increased flexing which then broke the transparency. However, the pilot had since flown the aircraft following repair and noted that some airflow still emanated from the region of the flap covering the fuel selector.

## **Summary**

It is clear that the stiffness of the door structure would not permit it to deflect grossly under the influence of airflow loads possible within the normal speed range of the aircraft if both latches were engaged. Any possible deflection would undoubtedly be insufficient for either of the latches on a correctly closed door to come out of engagement from their sockets in the door aperture as a consequence of initial bond separation even had it occurred at the forward edge of the transparency. Such disengagement of one or both latches would be a minimum requirement to enable the door to open in flight without the release being operated by an occupant.