FINAL REPORT

AAIU Synoptic Report No: 2008-001
AAIU File No: 2007/0078
Published: 21/01/08

In accordance with the provisions of SI 205 of 1997, the Chief Inspector of Air Accidents, on 7 September 2007, appointed Mr. John Hughes as the Investigator-in-Charge to carry out a Field Investigation into this Incident and prepare a Synoptic Report.

Aircraft Type and Registration:	Urban-Air UFM10 Samba, EI-DRM
No. and Type of Engines:	1x Jabiru 22A
Aircraft Serial Number:	3/10
Year of Manufacture:	2000
Date and Time (UTC):	7 September 2007 @ 12.30 hrs
Location:	Abbeyshrule, Co. Longford (EIAB)
Type of Flight:	Training
Persons on Board:	Crew - 2 Passengers - Nil
Injuries:	Crew - Nil Passengers - Nil
Nature of Damage:	Minor damage to nose gear and propeller
Commander's Licence:	PPL/A (IRL)
Commander's Details:	Male, aged 44 years
Commander's Flying Experience:	1,496 hrs, of which 1,340 were on type.
Notification Source:	AAIU Report Form submitted by Pilot.
Information Source:	Aircraft's Irish Agent

SYNOPSIS

The Instructor and his student took off from Abbeyshrule airfield in EI-DRM on a circuit detail. Following the final landing of the detail, the aircraft damaged its nose gear and propeller. There were no injury to persons, no fire and no damage to property.

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1. FACTUAL INFORMATION

1.1 History of the Flight

The Instructor, and his student who had 12 hours total flying experience, commenced a "touch and go" circuit detail at 11.40 hrs. They conducted six or seven circuits without a problem. On the last circuit the aircraft landed normally and rolled along the runway (see **Appendix A**). The student applied full power but as the aircraft approached flying speed the crew noticed a sudden aircraft vibration and the nose dropped about 4 inches. The instructor took immediate control. He pulled the stick back to prevent the nose from dropping further. The aircraft lifted 4 to 6 feet above the runway. He closed the throttle to idle and switched off the engine. The aircraft flew a further 150 metres down the runway. When it touched down, the Instructor progressively brought the stick back to keep the nose off the ground. The aircraft skidded on the runway for about another 150 metres before coming to a stop. Both occupants exited unhurt from the aircraft at 12.30 hrs.

1.2. Damage to Aircraft

The aircraft suffered minor damage. Both propeller blade tips were damaged up to 3 cm from the tip. An examination of the nose undercarriage revealed that the strut had partly collapsed at its weakest point but had not broken off. (see **Appendix B**). There was no damage to other property.

1.3 Aircraft Information

The Samba is a side-by-side Czech built ultra light aircraft that conforms to JAR-VLA (Very Light Aircraft). The structure is manufactured from laminated glass fibre and carbon fibre with a wing spar of carbon fibre reinforced plastic (CFRP). It has dual controls and the aircraft details are as follows:

Wingspan:	10 metres
Length:	5.9 metres
Height:	1.95 metres
Wing Area:	8.9 square metres
Maximum Take-off Weight (MTOW):	450 kg
Max Speed:	140 kts
Stalling Speed:	36 kts
Glide Ratio:	19:1

The nose wheel is held in a fork unit, similar to that on a bicycle (**Appendix B**). The fork tube is attached to the steering tube through a short internal 35 mm long sleeve, which is plug welded to the steering tube at three circumferential locations. A second internal tube held in place with adhesive extends up the steering tube about 100mm. The fork unit is formed from steel tube and includes a rubber shock absorber. The steerable nose wheel is connected to the rudder controls. Main wheels are mounted on a spring axle and are equipped with hydraulic brakes. A single brake lever mounted on the pilot's control column operates these and thus differential braking is not available.

This aircraft has a Jabiru 22A, 80hp engine and was manufactured in 2000. It has a total of 1,337 hours in service and a 50 hour service was conducted on 7 August 2007.

1.4 Meteorological Information

The weather in the area at the time was as follows:

Wind:	Westerly/ Calm
Visibility:	10 km +
Significant Weather:	None
Cloud:	None
Temperature/Dewpoint:	20/12°C

1.5 Pilot's Comments

The Instructor said that the aircraft had accumulated more than 1,300 hours of service. It had been used mostly for training purposes and the nose strut may have been weakened by a considerable number of hard landings during that time.

1.6 Aircraft Inspection

When the rubber shock absorber was removed from the strut the mode of failure was evident. The strut had only partly broken at the plug welds, bent backwards and to the side. There was some corrosion and evidence of weld slag at the plug welds. When the aircraft ran along the runway the bent strut impacted the ground and was scored adjacent to the shock absorber. Failure of the steering tube, on heavy impact of the nose wheel, is designed to fracture where the two internal tubes meet. This point is about 20mm upwards from the plug welds.

1.7 Additional Information

Further investigation shows that there are two types of nose fork applicable to this aircraft type. The original fork, used when a Rotax engine is installed, has a length of approximately 60 cm whilst the fork now used with a Jabiru engine is some 6 cm shorter. This latter was introduced because the original fork, if used with a Jabiru engine, might impinge on the underneath of the engine. The top fixing is vertically through two bolts rather than the one original horizontal bolt.

The AAIU have reported on two previous cases where a nose strut failure occurred on this type of aircraft. A Lambada aircraft, EI-DGT, (Report No. 2006-004) manufactured in 2000 by the same manufacturer, had a similar failure on landing in a cross wind in March 2005. Another Samba aircraft, OK-GUA24, (Report No.2007-024) also had a similar failure when, on landing, the aircraft had an off-runway excursion. However, this aircraft of later serial number, had only a one piece internal stiffener of 60mm in length and the fracture was a clean break above the stiffener.

2 ANALYSIS

This aircraft had accumulated a considerable number of landing and take-off cycles during its 7-year life and 1,300 hours of service. The aircraft is used primarily as a trainer with consequent high landing forces on the nose gear being repeated throughout the airframe's life.

The designed weak point appears to be where the 35 mm internal sleeve meets the 100 mm internal stiffening tube. This construction facilitates fracture at this location, in the event of possible overload, in order to reduce damage to the front structure and composite skin.

The weakest point of the fork/steering tube attachment in this incident was 2 cm below that point, along the circumference of the tube, where the three plug welds are located. This fracture may also have been assisted by a degree of internal corrosion.

3. CONCLUSIONS

(a) Findings

1. The Instructor was properly licensed by the Irish Aviation Authority.

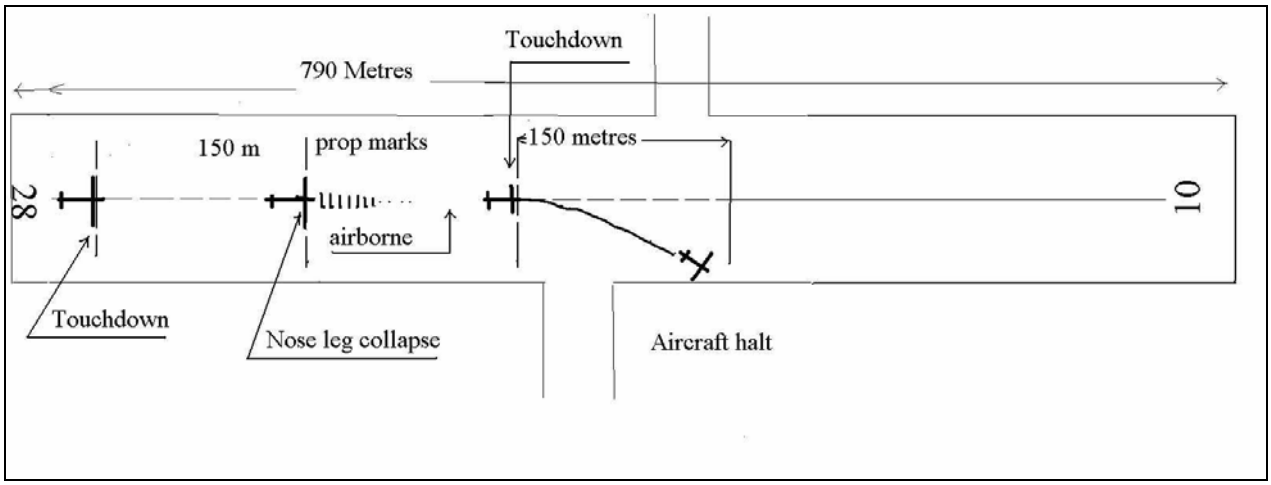
2. During the landing roll directional control of the aircraft was lost.

3. The nose wheel steering tube fractured near its weakest point when the nose wheel encountered a hard surface.

4. SAFETY RECOMMENDATIONS

This Investigation does not sustain any Safety Recommendations.

Appendix A



A schematic diagram of the runway at Abbeyshrule as submitted by the Instructor following this incident.

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Appendix B

Photo No.1: The bent nose undercarriage following the incident.

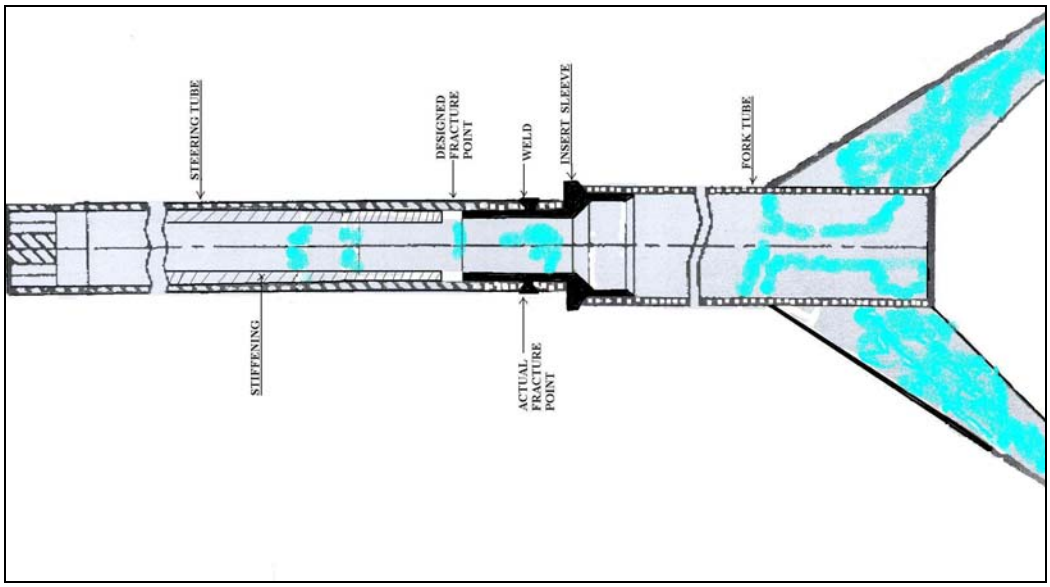

Photo No.2: Schematic cross-section drawing of nose strut found on EI-DRM.

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