FINAL REPORT

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In accordance with the provisions of SI 205 of 1997, the Chief Inspector of Accidents, on 22 April 2003 appointed Mr. John Hughes as the Investigator-in-Charge to carry out a Field Investigation into this occurrence and prepare a Synoptic Report.

Aircraft Type and Registration:	Europa Classic Monowheel, EI-COE
No. and Type of Engines:	1 x One Jabiru 2200
Aircraft Serial Number:	286
Year of Manufacture:	2003
Date and Time (UTC):	21 April 2003 @ 14.00 hrs
Location:	Coonagh Aerodrome, Co. Limerick
Type of Flight:	Test Flight for Permit to Fly
Persons on Board:	Crew - One Passengers - Nil
Injuries:	Crew - Nil Passengers - Nil
Nature of Damage:	Damage to port wing tip,engine cowling and propeller
Commander's Licence:	CPL
Commander's Age:	Male aged 44 years
Commander's Flying Experience:	3,800 hours of which 60 hours were recent on taildraggers and 3 hours on type.
Information Source:	AAIU Aircraft Accident Report submitted by pilot.

SYNOPSIS

After a normal touchdown on RWY 28, the homebuilt aircraft began to diverge laterally during the rollout. The pilot could not control this divergence and the aircraft came to a halt with its nose approximately 3 metres off the North edge of the runway. There were no injuries to the pilot, but the aircraft suffered abrasions to the wing tip and nose area.

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1. FACTUAL INFORMATION

1.1 History of the Flight

1.1.1 The Landing

The pilot landed the aircraft on RWY 28 at Coonagh having completed a test flight as part of the flight test program to obtain a Permit to Fly certificate. Shortly after touchdown the aircraft started to veer to the left. The pilot corrected using rudder but was unable to prevent the swing becoming unstable. After a few divergent oscillations (which were getting worse although the aircraft was slowing down) he applied the brake. This caused the aircraft to finally veer sharply to the right by about 70 degrees and come to a halt. The propellor and port wingtip came into contact with the ground during this final manoeuvre. The aircraft came to rest on the mainwheel, spinner and port wingtip, as the aircraft left the runway. The engine stopped shortly after the propellor hit the runway surface. The throttle was selected at idle throughout the incident. The pilot switched off magnetos and electrical power and vacated the aircraft normally.

1.1.2 Pilot's Comments

The pilot subsequently stated that he should have abandoned the landing and that he should have immediately applied full power to go around at the first sign of oscillation. He considers that the aircraft configuration, whilst probably entirely suitable for large grass fields, is not ideal for routine operations from tarmac surfaces. The ground handling characteristics during the initial phase of deceleration on hard surfaces were extremely demanding. He believes that this is because the tailwheel has little or no stabilising influence initially. If a swing occurs it promotes further deceleration causing the tailwheel to have less influence. Brake application makes the situation worse. It increases the already unstable force couple that exists as a result of the aircraft undercarriage configuration, and it tends to decrease whatever stabilising influence the tailwheel has due to the tendency of the tail to rise with brake application.

Whilst the in-flight characteristics of this aircraft are entirely satisfactory he believes that its ground handling behaviour is unsuitable for routine operations from hard surfaces. He indicated that the manufacturers had acknowledged this and a tricycle undercarriage was now the favoured option for both this aircraft and a production version in the USA.

The pilot recalled later that a comparison between the airspeed indicator readings and the ground speed indicator readings led him to believe afterwards that there may have been a slight leak in the pitot static system. This would have given him a higher approach and landing speed.

1.2 Damage to Aircraft

This incident resulted in damage to the propellor, spinner, port wingtip and engine nose cowling.

1.3 Aircraft Information

The aircraft kit is designed for the first-time builder and no prior knowledge is assumed. The kit manufacturers state that it takes between 500 and 1,000 man-hours to build. The aircraft may be built with a tricycle undercarriage (Tri-gear) or a single mainwheel and tailwheel (Monowheel) (Appendix A).

The Europa comes as a complete build kit. The airframe is all-composite and uses a blend of materials and moulding techniques. The wings come pre-moulded and largely pre-assembled. Flaps, ailerons, rudder and tailplanes are supplied in pre-formed extruded foam. Special lightweight fillers are used to give a glass-smooth finish. All metal components come pre-made. The instrument module comes in one moulding so the builder can completely fit it out with all instruments, switches, radios, etc. prior to installation.

The aircraft uses a range of Rotax engines but the builder opted to install the Jabiru 2200 engine and a Kremen propellor. The stall speed with flaps extended is 44 kt and the nominal cruise speed is 140 kt. The max take-off weight is 1,370 lbs (623 kg). The Tri-gear reduces the useful load by 30 lbs (13 kg). The quoted landing roll is 600 ft (184 metres)

The large single main wheel, located well forward of the CG, partially retracts about half way into the fuselage. The single hydraulic disk brake is operated by a lever alongside the throttle lever. The hinge flaps are deployed by the same lever that extends the undercarriage. Stabilizing outriggers, with small wheels, are located near the outboard ends of the flaps. These rotate to the horizontal position when the flaps are retracted.

The manufacturers have demonstrated that the aircraft is capable of handling a 25 kt cross wind, however, they publish a 15 kt crosswind limit as being a sensible limit for the average pilot. The builder and owner of this aircraft has a PPL and 100 hours flying experience, all on aircraft with tricycle undercarriage. The pilot, who has experience of tail wheeled aircraft, offered to test the aircraft for him.

1.4 Meteorological Information

The pilot reported the weather at the time of the incident to be as follows:

CAVOK, Wind approximately 340º Magnetic, 10 kt

1.5 Aerodrome Information

RWY 28/10 at Coonagh, located 9.5 NM SE of Shannon with a tarmac surface, is 416 metres in length and is 10 metres wide.

1.6 Organisation and Management

The aircraft was purchased in kit form in 1996 and the build completed in 2003. The Fitness for Flight Certificate was valid between 17/4/03 and 16/5/03 and was signed by a Society of Amateur Aircraft Contractors (SAAC) licenced engineer.
The engineer is not required to leak check or calibrate the pitot static flight instruments during his inspection nor to record such a check in the aircraft's build book.

The pilot, who had a CPL and a total of 3,800 hours flying experience had completed about 3 hours on this aircraft. The flight test schedule demands that if the aircraft to be tested is a tail wheel-equipped type, then the pilot must have current experience of such types. Before commencing the test for a Permit to Fly the aircraft must be flown not less than five hours total flying time and must include 15 satisfactory landings. Aerobatic Manoeuvres are not allowed during this initial period nor is the carriage of passengers permitted. The test pilot in this case was well experienced on tricycle and taildragger aircraft.

2. ANALYSIS

With a considerable crosswind from the right the pilot would have to have made a landing with a crab angle to the runway and to kick the aircraft into runway alignment at the moment of touchdown. Also because the outriggers are so close to the ground it would be necessary to hold the wings fairly level at touchdown.

As the aircraft had only one main landing wheel the aircraft at touchdown tends to pivot about the contact area in the yaw and pitch axes. In conventional gear aircraft lateral forces on landing are absorbed by the undercarriage and are of less concern to the pilot.

In landing this aircraft a certain precision is required in order to retain directional control following touchdown. The manufacturers say that there is a need on landing to concentrate on directional control rather than airspeed. The Investigation agrees with the pilot of EI-COE, that he should have applied full power to go around on the first sign of oscillation.

A flight evaluation of this monowheel aircraft in the United States by the Cafe Foundation indicated that the approach speed is critical and should not be more than 65 kt in a crosswind. They state the aim should be to stall the aircraft tail low as the aircraft touches the ground. Their advice is to take off again if it starts to wander on the tarmac.

The owner of the aircraft has little experience of taildragger aircraft and none on monowheeled aircraft. The Investigation agrees with the pilot in this case that the owner should convert the monowheel to a tri-gear during the rebuild. This is particularly so if operation from a tarmac surface is envisaged.

The incident flight was a test flight to establish flight parameters prior to an Application for a Permit to Fly. The Investigation is of the opinion that the pitot static system should therefore be leak checked and the check recorded in the build book by the engineer prior to releasing the aircraft as Fit to Fly.

3. CONCLUSIONS

The pilot lost directional control on landing the aircraft and departed the runway.

4 SAFETY RECOMMENDATIONS

4.1 The owner of this aircraft should install an approved modification to his aircraft during rebuild in order to replace the monowheel undercarriage with a tricycle undercarriage**.** **(SR 26 of 2004)**

4.2 The SAAC should require their inspectors to carry out a leak check on the aircraft pitot static system prior to releasing the aircraft as Fit to Fly and to record this check in the aircraft's build book**. (SR 27 of 2004)**

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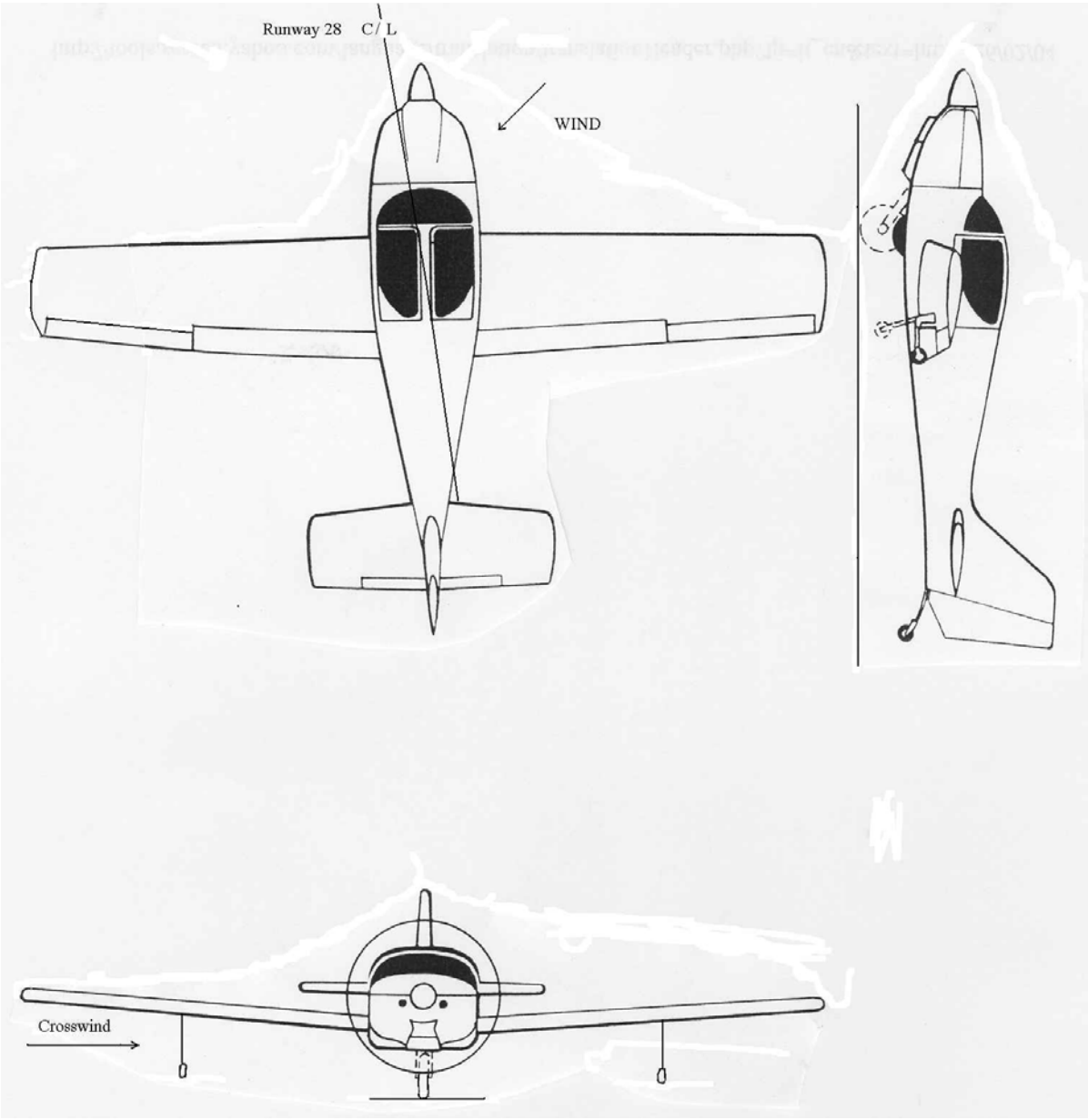
APPENDIX A



Sketch of the Europa Classic monowheel homebuild aircraft. Cables from the rudder pedals are linked directly to the tailwheel designed to provide positive steering on the ground. The outriggers with small wheels rotate to the horizontal when the flaps are retracted.