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## **Report RL 2002:17e**

***Accident involving the ultralight aircraft SE-YUK  
at Borås/Viared airport, O County, Sweden, on the  
7<sup>th</sup> of April 2002***

Dnr L-015/02

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SHK investigates accidents and incidents with regard to safety. The sole objective of the investigations is the prevention of similar occurrences in the future. It is not the purpose of this activity to apportion blame or liability.

Translated from the original Swedish by Dennis Lynn Anderson, at the request of the Board of Accident Investigation.

In the event of discrepancies between the English and the Swedish texts, the Swedish text is to be considered the authoritative version.

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**Report RL 2002:17e**

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The Board of Accident Investigation (Statens haverikommission, SHK) has investigated an accident that occurred on the 7<sup>th</sup> of April 2002, at Borås/Viared airport, Ö County, Sweden, involving an ultralight aircraft with registration SE-YUK.

In accordance with section 14 of the Ordinance on the Investigation of Accidents (1990:717) the Board herewith submits a final report on the investigation.

Olle Lundström

Sakari Havbrandt

## Report RL 2002:17e

L-015/02

Report finalized 2002-06-28

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<i>Aircraft: registration, type</i>	SE-YUK, Ikarus C 42
<i>Class, airworthiness</i>	Ultralight, valid permit to fly
<i>Owner/operator</i>	Private ownership
<i>Time of occurrence</i>	2002-04-07, 16:45 hours in daylight <i>Note: All times are given in Swedish daylight saving time (UTC + 2 hours)</i>
<i>Place</i>	Borås/Viared airport, O County, Sweden, (pos 5742N 01251E; 172 meters above sea level)
<i>Type of flight</i>	Private
<i>Weather</i>	According to SMHI's <sup>1</sup> analysis: wind 130°, 5 knots, good visibility, 2–4/8 Cumulous with the cloudbase at 3,000–4,000 feet, temp./dewpoint +7°/–2 °C, QNH 1025 hPa
<i>Persons onboard:</i>	1
<i>crew</i>	1
<i>passengers</i>	
<i>Injuries to persons</i>	None
<i>Damage to aircraft</i>	Substantially damaged
<i>Other damage</i>	None
<i>Pilot in command:</i>	
<i>Age, certificate</i>	51 years old, Ultralight Pilot License
<i>Total flying time</i>	70 hours, of which 69 hours on the type
<i>Flying hours previous 90 days</i>	12 hours, all on the type
<i>Number of landings previous 90 days</i>	44

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The Board of Accident Investigation (SHK) was notified on the 7<sup>th</sup> of April 2002 that an accident involving an ultralight aircraft with registration SE-YUK had occurred at Borås/Viared airport, O County, Sweden, at 16:45 hours on that same day.

The accident has been investigated by SHK, represented by Olle Lundström, Chairperson, and Sakari Havbrandt, Chief Investigator.

Mikael Larsson has assisted SHK as technical expert.

The investigation has been followed by the Swedish Civil Aviation Administration represented by Gun Ström.

### History of the flight

The pilot took off from a private airport near Fjärås, south of Gothenburg, with the intention of flying to Borås with a passenger. After a flight of thirty minutes they arrived and performed a normal traffic pattern for landing on the runway 22. After touchdown, when the nosewheel came in contact with the runway, the pilot, who was seated in the left-hand seat, got the impression that the left rudder pedal "disappeared", whereupon the aircraft yawed sharply to the right. The nosewheel was broken off and the aircraft flipped over onto its back on the side of the runway. Both persons aboard were uninjured and were able to remove themselves from the wreck unassisted.

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<sup>1</sup> SMHI = Swedish Meteorological and Hydrological Institute

A technical investigation revealed that the left rudder pedal on the right-hand seat position had broken-off at the conjunction of a welding bead. Upon closer investigation of the fracture surface it was determined that the break had originated in connection with an earlier crack within the weld. In the area of this cracked weld, the rudder pedal is manufactured from an aluminum pipe with the dimensions of 28 x 1 mm. The fracture on the nosewheel strut also had its origin within a previous crack.

The force from the left rudder pedal on the left-hand seat position is transmitted to the left rudder pedal on the right-hand seat position by means of a torsion tube, which further transmits the force to the rudder cable and to the pushrod for the nosewheel steering.

According to the manufacturer of the aircraft type, the rudder pedal has been designed for a rupture load of 500 N<sup>2</sup> (approximately 50 kp<sup>3</sup>). Within the applicable German regulations, the country of manufacture, the required design load for a rudder pedal is 300 N (30 kp). The Swedish Civil Aviation Regulations (BCL-M 5.4) prescribe that where applicable, ultralight aircraft shall fulfill the requirements of JAR-22, which are the construction regulations applicable to glider aircraft. JAR-22.397 prescribes that a rudder pedal shall be designed for a load of 1000 N (100 kp). The safety factor for failure shall be at least 1.5 according to both the German regulations and JAR-22.

SHK has noted that reinforced rudder pedals are required for import to Great Britain.

The aircraft in question was subjected to an accident in 1999 when it, in connection with an emergency landing, collided with a stone wall. During repairs, the entire rudder pedal system and the nosewheel strut were replaced.

The maximum allowed gross weight for ultralight aircraft is 450 kg.

## Conclusions

The failure of the rudder pedal structure was serious from the standpoint of flight safety because it affected the flight control system of the aircraft. It can be attributed to fortunate circumstances that no serious personal injuries resulted.

As is evident from what is stated above, the applicable Swedish design regulations stipulate more than three times the strength requirements than do the corresponding regulations in Germany, with respect to the construction of the flight control system. Considering the significance of the flight control system for flight safety, it can seem remarkable that The civil Aviation Administration/Aviation Safety Department has, without restrictions, issued a type approval for an aircraft type that is constructed with lower strength requirements.

Even if the appearance of the earlier crack in the rudder pedal has been of significance for the chain of events, it is still evident however that the pedal structure was under-dimensioned.

This occurrence once again illustrates the risk that manufacturers of ultralight aircraft, in their ambition to construct aircraft as advanced as possible with respect to performance and comfort without exceeding the maximum allowed gross weight, do this to the detriment of strength.

The accident was caused by failure of the left rudder pedal, in connection with landing, whereupon the pilot lost control of the aircraft and it overturned. A contributory cause has been that the rudder pedal structure was under-dimensioned.

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<sup>2</sup> N = Newton, which is a unit of force

<sup>3</sup> kp = the force of gravity of 1 kg at the surface of the earth

Therefore, with reference to the cause of the accident, The Royal Swedish Aero Club (KSAK) has, in an official letter to all operators of the aircraft type within the country, urgently recommended them to inspect the condition of the rudder pedals. Furthermore, KSAK is taking into consideration a compulsory instruction concerning exchange of the rudder pedals, to a type that satisfies the Swedish requirements.

SHK has in addition, noted that the Swedish Civil Aviation Administration has now decided that all ultralight aircraft in Sweden with a valid flight permit shall be inspected by KSAK with respect to the flight control system being dimensioned in accordance with valid regulations.

### **Recommendations**

The Civil Aviation Administration is recommended to introduce routines which result in the possible differences between the Swedish construction regulations and those of the country from which the aircraft is imported, being taken into account upon the issuance of type approvals for ultralight aircraft (*RL 2002:17e RI*).