Statens haverikommission
Swedish Accident Investigation Board

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Final report RL 2011:06e

Aircraft accident to SE-IDT at Älvsbyn/Högheden Airfield, BD County, on 1 October 2010

Case L-130/10

The report is also available on our web site: www.havkom.se

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

Statens haverikommission (SHK) Swedish Accident Investigation Board

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Statens haverikommission
Swedish Accident Investigation Board

28 June 2011 L-130/10

The Swedish Transport Agency

601 73 NORRKÖPING, SWEDEN

Final report RL 2011:06e

The Swedish Accident Investigation Board (Statens haverikommission, SHK) has investigated an aircraft accident that occurred on 1 October 2010 at Älvsbyn/Högheden Airfield, BD County, involving an aircraft with registration SE-IDT.

The Board hereby submits under the Regulation (EU) No. 996/2010 on the investigation and prevention of accidents and incidents in civil aviation, a report on the investigation.

The Board will be grateful to receive, by 28 September 2011 at the latest, particulars of how the recommendations included in this report are being followed up.

Carin Hellner Sakari Havbrandt

Copy to EASA.

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General points and definitions

The Swedish Accident Investigation Board (Statens haverikommission – SHK) is a state authority with the task of investigating accidents and incidents with the aim of improving safety. SHK accident investigations are intended as far as possible to determine both the sequence of events and the cause of the events, along with the damage and effects in general. An investigation shall provide the basis for decisions which are aimed at preventing similar events from happening again, or to limit the effects of such an event. At the same time the investigation provides a basis for an assessment of the operations performed by the public emergency services in respect of the event and, if there is a need for them, improvements to the emergency services.

SHK accident investigations try to come to conclusions in respect of three questions: *What happened? Why did it happen? How can a similar event be avoided in the future?*

SHK does not have any inspection remit, nor is its task in any way to apportion blame or liability concerning damages. This means that issues concerning liability are neither investigated nor described in association with its investigations. Issues concerning blame, responsibility and damages are dealt with by the judicial system or, for example, by insurance companies.

The task of SHK does not either include as a side issue of the investigation that concerns emergency actions an investigation into how people transported to hospital have been treated there. Nor are public actions in the form of social care or crisis management after the event included.

The investigation of aviation incidents takes place in accordance with Regulation (EU) No. 996/2010 concerning the investigation and prevention of accidents and incidents in civil aviation. The application and procedures in respect of the performance of such investigations are also in accordance with Annex 13 of the Chicago convention.

The investigation

The Swedish Accident Investigation Board (SHK) was notified on 1 October 2010 that an aircraft with registration SE-IDT had had an accident at Älvsbyn/Högheden Airfield, BD County, on the same day at 10.10.

The accident has been investigated by SHK represented by Carin Hellner, Chairperson, Sakari Havbrandt, Investigator in Charge, Nicolas Seger, Investigator Air Accidents and Patrik Dahlberg, Investigator Fire and Rescue.

SHK was assisted by Liselotte Yregård as medical expert.

The investigation has been followed by Bernt Kolm, Swedish Transport Agency.

Final report RL 2011:06e

L-130/10
Report finalised 28 June 2011

Aircraft; registration and type	SE-IDT, Piper Saratoga, PA32R-301T
Class/Airworthiness	Normal, valid Certificate of Airworthiness and the Airworthiness Review Certificate (ARC)
Owner/Operator	Siemens Financial Services AB/Alfaflight-Flygpilen Ek För.
Time of occurrence	1 October 2010, 10.10 in daylight
Place	Älvsbyn/Högheden Airfield, BD County. Position 65° 38.8 ′ N, 21° 03.7′ E, 69 mabove sea level.
Type of flight	Private
Weather	According to SMHI[1]'s analysis: wind variable 0-3 knots, visibility 10 km, local light fog, temp./dew point 0/-1 °C, QNH 1024 hPa
Persons on board: crew members	1
Injuries to persons	Minor
Damage to aircraft	Write off
Other damages	Limited oil and fuel spill
Pilot in command:	
Age, license	69 years, PPL (A) IR/SE/SP[2]
Total flying time	4,266 hrs, of which >1,000 hrs on the aircraft type
Flying hours previous 90 days	21 hrs, of which 14 hrs on the aircraft type
Number of landings previous 90 days	21, of which 11 on the aircraft type

Summary

The flight was a private flight from Bromma Airport to Älvsbyn/Högheden Airfield.

After a two and a half hour flight the pilot decided to hold over Älvsbyn Airfield for 30 minutes because of ground fog. When the ground fog dissipated, landing procedures began in the form of a right-hand circuit to runway 04. According to the pilot, the approach was carried out with full flaps and a final speed 70-75 knots, followed by a steep descent after passing a curtain of trees located just before the beginning of the runway.

The landing took place well into the runway. According to witnesses, touchdown occurred about 450 metres past the beginning of the runway. The pilot commenced to go-around at a late stage. After the go-around the aircraft became airborne immediately before the end of the runway, flew into a young mixed forest 10 meters after the end of the runway and ended up on a railway track 90 metres away.

[1] SMHI - Swedish Meteorological and Hydrological Institute
[2] PPL (A) IR/SE/SP – Private Pilot License (Aeroplane) Instrument Rating/Single Engine/Single Pilot

With the help of radar data, SHK has been able to establish that the speed was just over 110 knots at baseline and on the long final. For the final approach, the speed gradually decreased, but was much higher than the recommended final approach speed.

Threshold crossing has probably occurred with the altitude and speed being too high.

The landing distance available was about a hundred metres too short for a landing with the required margins.

The accident was caused through the non-application of safe methods to identify and terminate an unsafe approach.

Recommendations

It is recommended that the Swedish Transport Agency:

- ensure safe methods to identify and abort an unsafe visual approach are implemented within general aviation.

It is recommended that EASA:

- ensure that safe methods to identify and abort an unsafe visual approach, at an earlier stage (i.e. 300 feet) than that provided in appendix 9, part 4 of the proposed PART-FCL, be included in future training plans for flight training.

1. FACTUAL INFORMATION

1.1 History of the flight

The flight was a private flight from Bromma Airport to Älvsbyn/Högheden Airfield. The weather on the route was characterised by high-pressure points with light winds and local ground fog.

The pilot had filed a flight plan under Instrument Flight Rules (IFR) via AROWeb[3], scheduled to start at 7.00 and climbed to an altitude of FL 110. No written operational flight plan was performed as the pilot, who had not flown to Älvsbyn earlier, considered that a full tank would be enough to fly to Älvsbyn and back to Bromma. No calculations for landing performance at the destination airfield were carried out as the margins were perceived to be sufficiently large.

The aircraft was refuelled in full, which meant there were 386 litres of fuel on board which gave a range of just over six hours. Daily inspection was carried out without any remarks. The pilot who was alone on board took off from Bromma at 07.10, climbed to flight level 110 and received clearance directly to Älvsbyn from air traffic control.

After a two and a half hour flight the pilot decided to hold over Älvsbyn Airfield for 30 minutes because of ground fog. The pilot had radio contact with a person at Älvsbyn's Flying Club. When the ground fog dissipated, landing procedures began in the form of a right-hand circuit to runway 04. According to the pilot, the approach was carried out with full flaps and a final speed 70-75 knots, followed by a steep descent after passing a curtain of trees located just before the beginning of the runway.

The pilot stated that the landing took place well into the runway and a go-around began after about a 50 meter roll. According to witnesses, touchdown occurred about 450 metres past the beginning of the runway. Police measurements showed that the tracks after touchdown started 350 metres from the end of the runway.

The image below shows that the tracks from the nose wheel and main wheels start along the same line. Because the nose wheel is 2.4 meters in front of the main wheels, it indicates that the aircraft landed with its nose wheel first.

[3] AROWeb – LFV:s (Luftfartsverket's) system for self-briefing

Fig. 1 Tracks after touchdown. Photo Älvsbyn Police.

After the go-around the aircraft became airborne immediately before the end of the runway, flew into a young mixed forest 10 meters after the end of the runway and ended up on a railway track 90 metres away.

With some difficulty, the pilot was able to evacuate from the wreckage by himself.

The accident occurred at 65°38.8 'N 21°03.7' E, 69 metres above sea level.

1.2 Injuries to persons

	Crew Members	*Passengers*	*Others*	*Total*
Fatal	–	–	–	–
Serious	–	–	–	–
Minor	1	–	1	–
None	–	–	–	–
Total	1	–	1	–

1.3 Damage to the aircraft

Written off.

1.4 Other damage

Limited oil and fuel spills.

1.5 Personnel information

1.5.1 Pilot in command

The pilot at the time was 69 years old and had a valid PPL(A) IR SE SP license. All necessary ratings to carry out the flight were valid. The flight crew license was however not renewed and therefore formally not valid.

Flying hours				
latest	*24 hours*	*90 days*	*Total*	*latest*
All types	3	5	21	4 266
This type	3	3	14	>1 000

Number of Landings this type over the previous 90 days: 11.
Flight training on type concluded in 1991.
Latest PC (Proficiency Check) carried out 18 June 2010 at Bromma.

In addition, the pilot stated the following:

- The pilot had been flying since 1972, with most of the flights being business trips IFR.
- Experience of grass field runways was limited.
- Siljansnäs[4], was an example of a short field that the pilot had experienced.
- This was the pilot's first flight to Älvsbyn.

1.6 Aircraft information

1.6.1 Airworthiness and maintenance

AIRCRAFT	
TC-holder	Piper Aircraft Corporation
Model	PA32R-301T
Serial number	32R-8129026
Year of manufacture	1981
Gross mass	Maximum permissible air mass 1,635 kg, actual 1,391 kg
Centre of gravity	84.5 inches, within allowable limits
Total flying time	5,206 hrs
Flying time since latest routine inspection	9 hrs
Fuel loaded before event	386 litres
Engine	
TC-holder	Lycoming Engines
Model	TIO-540-S1AD
Number of engines	1
Total operating time, hrs	471
Operating time since inspection, hrs	9
Propeller	
Manufacturer	Hartzell Propeller Inc.
Model	HC-E3YR-1RF
Operating time since latest inspection	129 hrs

The aircraft had a Certificate of Airworthiness and a valid Airworthiness Review Certificate (ARC).

[4] Siljansnäs runway length 850 m

Fig. 2 Piper PA32R Saratoga.

1.7 Meteorological information

General weather situation according to SMHI:

A high pressure was centered over the northern part of Sweden and northern Finland. There were widespread areas of stratus and stratocumulus over the Gulf of Bothnia and inland along the coast. Further inland (among others around Älvsbyn) there was local mist or fog banks that were about to clear. Wind: Variable 0-3 kt. Visibility: Local light fog 500 m. Otherwise >10km. Clouds: Local 100-300 ft. Temp: 0°C. Dewpoint: -1°C. QNH: 1 024 hPa.

1.8 Aids to navigation

Not applicable.

1.9 Communications

Not applicable.

1.10 Aerodrome information

1.10.1 General

Älvsbyn/Högheden Airfield is 60 km west of Luleå. It is a private airfield and has the designation ESUV. Information about the airfield is partly available in KSAB's[5] Swedish Airfields, and also in AIP[6].

The airfield had a runway with the designation 04/22. The runway surface was grass. The runway dimensions were 730 x 30 metres and the elevation was 69 metres. A distinctive feature of the airfield was that both runways had moved their thresholds in, which means that the approach landing should be started further in from the beginning of the runway. Right-hand circuit applied for the traffic pattern to runway 22. The surrounding terrain rises steeply southeast of the field.

[5] KSAB – Royal Swedish Aeroclub Service Company
[6] AIP – Aeronautical Information Publication

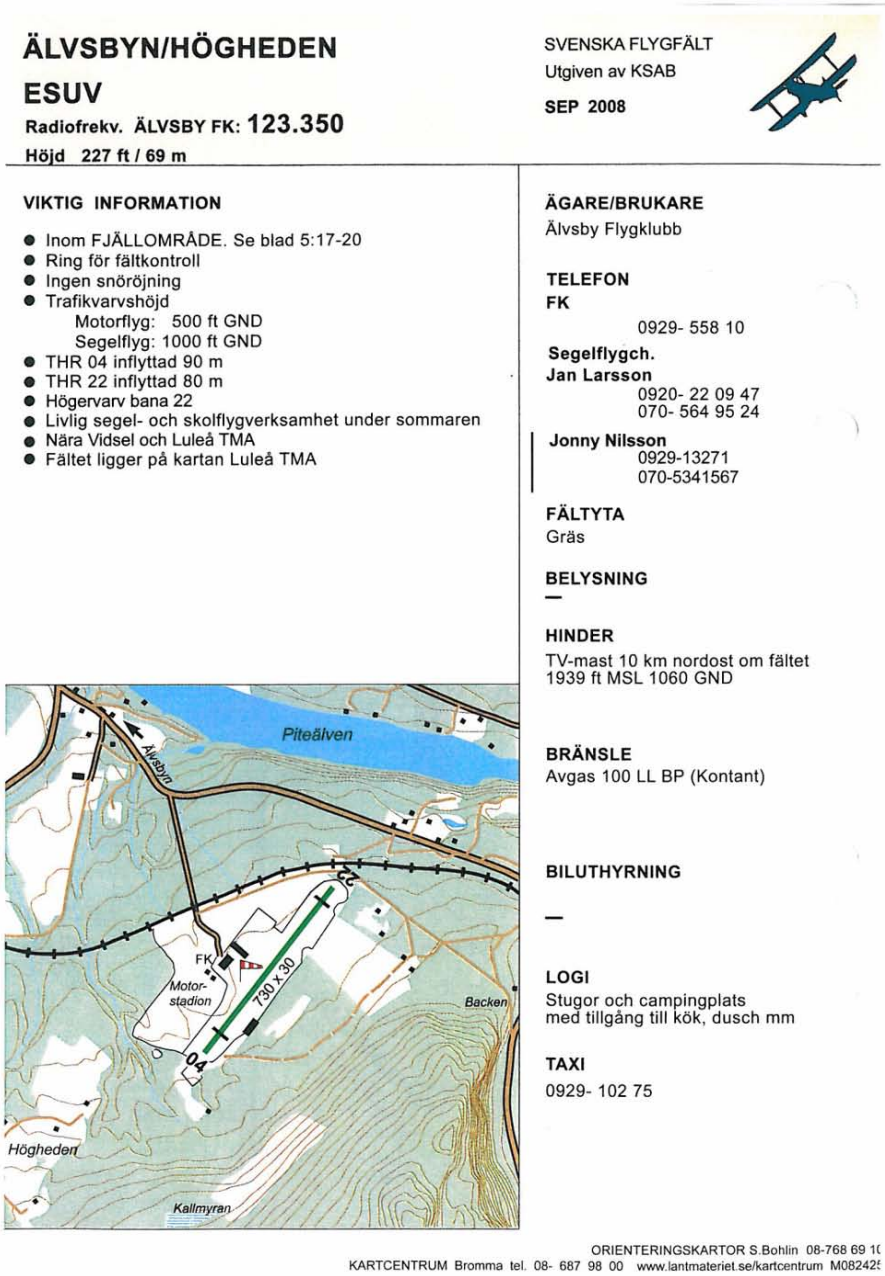

Fig. 3 Älvsbyn/Högheden Airfield. Map from KSAB's Swedish Airfields.

AIP SVERIGE/SWEDEN			18 NOV 2010				AD 1.1-37
ÄLVSBYN ESUV 653845N 0210341E (*) 1.1 NM SE 227 ft	04/22	730x30	Grass	No	100LL	123.350	Non-licensed AD Älvsbyn flygklubb +46 (0)929 558 10 +46 (0)929 558 16 THR 04 displaced 90 m. THR 22 displaced 80 m.

Fig. 4 Excerpts from LFV AIP Sweden AD 1.1-37.

1.10.2 Thresholds moved in

Both thresholds had been moved in at Älvsbyn Airfield. For the approach in question, the pilot used runway 04 whose threshold had been moved in by 90 metres. The threshold for runway 04 was equipped with day markings on the left side. The markings consisted of four slabs of approximately 40x40 cm. The slabs were painted in white paint that had almost completely peeled off which made them difficult to detect.

Fig. 5 Day marking threshold runway 04.

1.10.3 The surrounding terrain

KSAB's map shows the terrain rises steeply southeast of the airfield.

1.10.4 Traffic pattern

Traffic pattern is as BCL-T[7] i.e. a left-hand circuit, unless otherwise indicated. At Älvsbyn Airfield, a right-hand circuit applied only for runway 22.

1.10.5 Conditions at the airfield at the time of the accident

At the time of the accident, the grass was cut short and was wet with dew.

1.11 Flight recorders

Flight and sound recorders were not present and were not required. An onboard GPS of the type Garmin GNS-430 was available. It has not been possible to derive any (flight) information from the unit.

1.12 Accident site

1.12.1 The accident site

The aircraft bounced on a dirt road and ended up on a railway track about 100 metres beyond the end of the runway with its nose in the direction of the airfield.

[7] BCL-T – Bestämmelser för Civil Luftfart-Trafikregler (Regulations for Civil Aviation-Traffic regulations)

1.12.2 Aircraft wreckage

Fig. 6 The aircraft wreckage. Photo Älvsbyn Police.

The aircraft was substantially demolished. The engine and propeller had separated from the fuselage and lay at the aircraft's rear left side. The nose section had been bent upwards and backwards and the windscreen and the front of the cabin had been pushed in. Both the wings and the tail unit were severely deformed.

The instrument panel, whose top edge had rotated towards the pilot, was relatively intact. The pilot's steering yoke was broken on the right-hand side and the right steering yoke was resting against the front passenger seat. Both yokes were in their rearmost positions. The flap and the flap lever was fully extended. Gas, propeller and mixture controls were in their frontmost positions.

Nothing has emerged to suggest that the aircraft had any technical faults.

1.13 Medical information

Nothing has emerged to suggest that the pilot's mental or physical condition was impaired before or during the flight.

1.13.1 Oxygen

According to LFS 2007:58, the following rules apply:

"§ 33 Flights to be carried out by aircraft without a pressurized cabin at altitudes above 10,000 feet (3,000 metres) relative to the standard atmosphere, may not be started unless a supply of oxygen to breathe is carried in sufficient quantities to meet the needs of the crew and at least 10 per cent of all passengers in each period exceeding 30 minutes when the flying altitude is between 10,000 ft (3,000 m) and 13,000 feet (4,000 m) calculated according to standard atmosphere.

34 § It should be possible to provide oxygen continuously to both crew and passengers in accordance with § 33 above.

50 § If oxygen is needed, all pilots who are members of the flight crew must use oxygen during the flight."

The altitude for the flight in question was FL110, corresponding to 11,000 feet in a standard atmosphere. The pilot has reported that oxygen was not carried during the flight.

1.14 Fire

There was no fire.

1.15 Survival aspects

1.15.1 Rescue Services

Rescue services relates to the Civil Protection Act (2003:778) for protection against accidents, LSO, i.e. emergency operations that the state or local governments must provide in the event of an accident and the imminent danger of an accident aimed at preventing and limiting injury/damage to people, property and to the environment. The geographic location of the impact was known from the outset and no search was required, which meant that it was the municipal rescue services and Älvsbyn's rescue services that were responsible for the local emergency services. The services were alerted via the SOS-centre in Luleå.

1.15.2 Raising the alarm and efforts

An emergency call from an individual was received via the mobile telephone network to SOS Alarm at 10.14. The information given was that an airplane had crashed at Högheden and that the plane was standing on the railway tracks and that one person was out of the plane. The individual who raised the alarm also said that a train was coming because the signal from the level crossing had been activated.

The SOS operator called rail traffic management and asked for an emergency disconnection of power and that trains be stopped while the emergency services were alerted. There was no indication that a train was about to pass along the track in the area at that time according to the operations management, the railway level crossing protection system had been activated by the plane short-circuiting the track.

The first unit from the emergency services arrived on the scene at 10.24 together with an ambulance and the police. Arriving at the site of the accident, protective earthing was made of the track area before medical and rescue personnel were permitted to approach the plane. A paramedic took care of the pilot who was driven to Sunderbyn Hospital at 10.33.

It was not possible to confirm whether the emergency transmitter (ELT[8]) with frequency 121.5 Mhz had been activated during the accident. The ELT was made currentless by the emergency services shortly after the accident.

A mobile crane was requisitioned and the plane was lifted off the rails without damage to the rails and the overhead lines. The plane was placed in a hangar at the airfield and the rescue operation ended at 11.26.

[8] ELT - Emergency Locator Transmitter

1.15.3 The pilot's position, injuries and evacuation

The pilot who was restrained with a lap-diagonal belt in the pilot's seat had a slight cut on his head but was able to get out of the wreckage on his own after pressing the ceiling upwards.

1.16 Tests and research

1.16.1 Guidelines for performance calculations for flying an aircraft

The Swedish Transport Agency provides instructions in LFS 2007:14 relating to performance calculations for landing which should be carried out when the flight is being planned.

When the landing distance is being calculated for a single engine aircraft and the wind is calm on arrival at the destination airfield, the aircraft must be able to land within 70 per cent of the available landing distance, otherwise the start mass must be reduced. see fig. 7 below.

The calculations must take into account the airfield's altitude, the surface condition of the runway and other factors that are important according to the pilots operating handbook.

Paragraph 22 of the LFS 2007:14 reads as follows:
"The landing distance according to the pilots operating handbook is measured as the horizontal distance from when the airplane passes a height of 15 metres (50 feet) above the landing threshold until the aircraft has stopped. The speed over the landing threshold shall be presumed to be at least 1.3 V_{S0}[9]."

When the surface condition of the runway consists of a wet short-cropped grass surface, the landing distance must be increased by at least 20 per cent.

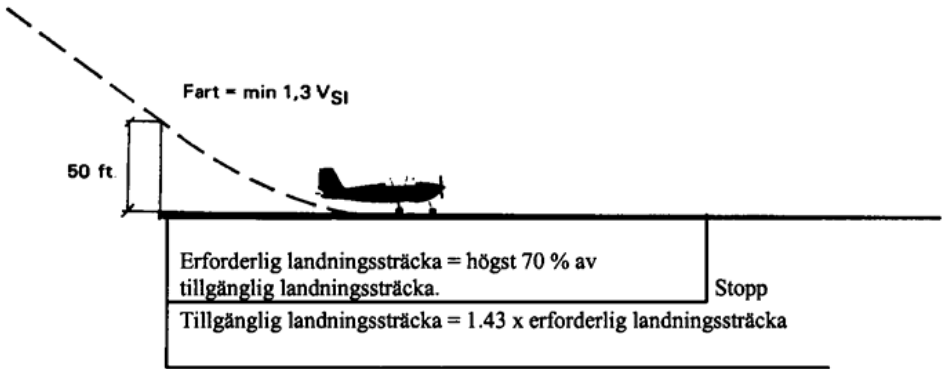

Fig. 7 Required landing distance according to LFS 2007:14.

1.16.2 Performance calculations for the aircraft in question

The aircraft's flight manual contains tables for performance calculations. There is a table for calculating landing distance, and a table for calculating the landing ground roll.

[9] V_{S0} – Stalling speed during the landing configuration

Both tables are based on the following conditions:

- Power - Throttle closed
- Flaps position 40°
- Touchdown with stall speed
- Maximum braking
- Covered, smooth and dry runway
- Correct approach speed

Each table contains information on the approach speed for different landing masses.

The actual landing mass of 3,050 lbs means that the approach speed should be 76 knots.

With the prevailing temperature, landing mass and the wind, SHK has estimated that a landing distance over 50 feet will be 1,500 feet, or 457 m (see fig. 8).

Since the condition of the runway surface was made up of a wet short-cropped grassy surface, the landing distance must be increased by at least 20 per cent. The corrected landing distance is therefore 548 m (457 x 1.20).

The condition of the runway surface causes an increase in the landing distance by 91 m (548-457=91 m). The required landing distance is therefore 784 m (548 x 1.43).

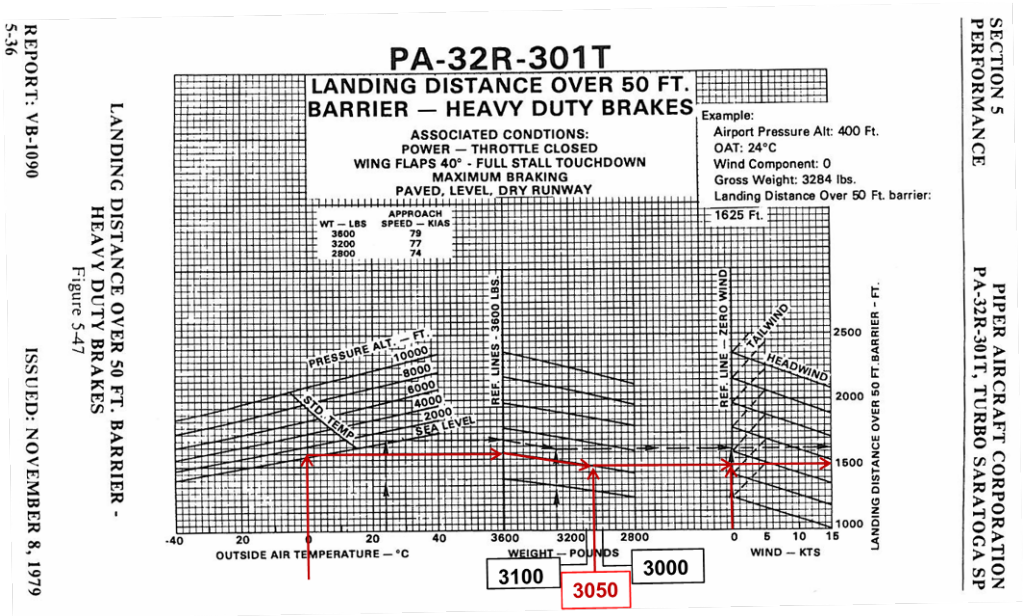

Fig. 8 Landing distance.

The SHK has similarly calculated landing run to 560 feet or 171 m (see fig. 9 below).

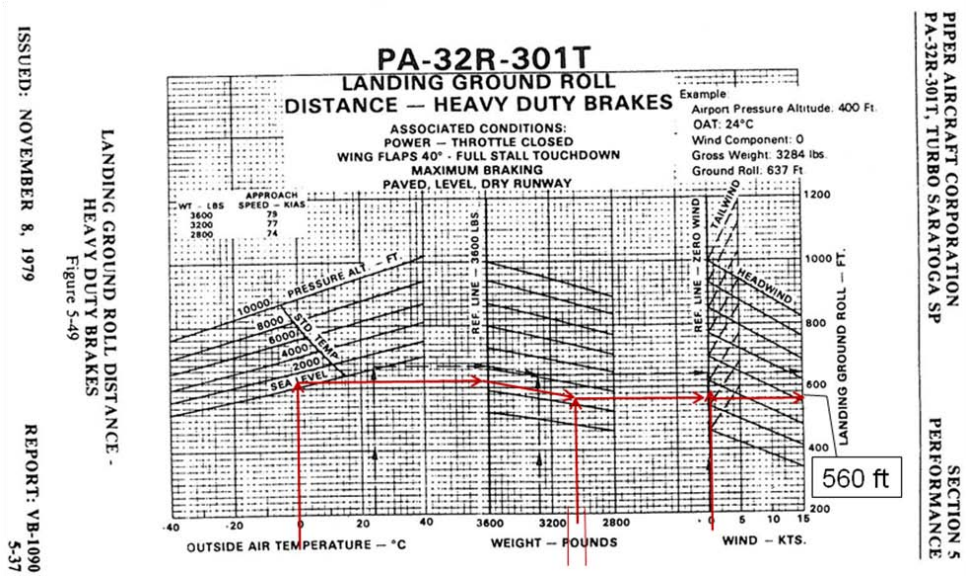

Fig. 9 Landing distance.

Landing run corrected due to the wet grass is 262 m (171 + 91).

1.16.3 Take-off run

According to the pilots operating handbook, the take-off run (distance) is based on a power output of 2700 rpm [10] and 36″ manifold pressure before rolling is started, on a hard-surfaced runway which is dry with 25° flap. The take-off run for the landing weight in question was at least 339 m adjusted for dry short cut grass. Take-off distance was at least 235 meters with the corresponding correction.

1.16.4 Radar data from the Armed Forces.

SHK has studied the radar information from the Armed Forces regarding the approach in question. A total of a 20 meter correction should be added to the altitudes to take into consideration the prevailing atmospheric pressure. The last radar point 10:08:43 is on a short final (see fig. 10).

The radar information shows that the pilot made a final approach with a right-hand circuit.

[10] Rpm – Revolutions per minute

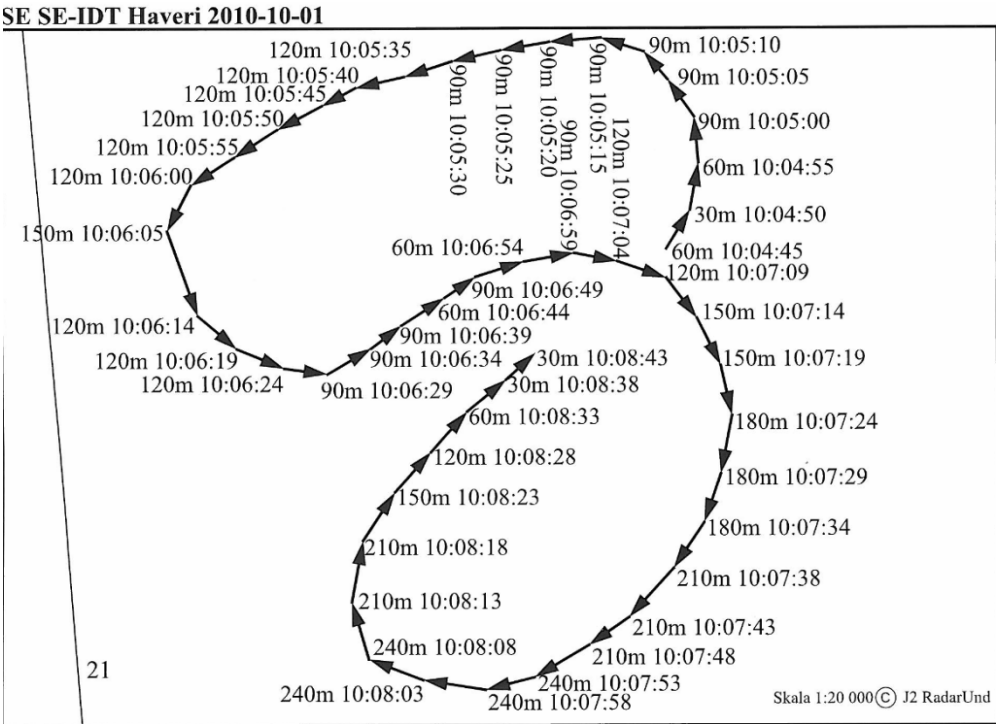

Fig. 10 The approach to Älvsbyn Airfield.

Speed data calculated after the radar points are not exact. SHK has therefore chosen to present the speed as a floating average of four points as shown in fig. 11.

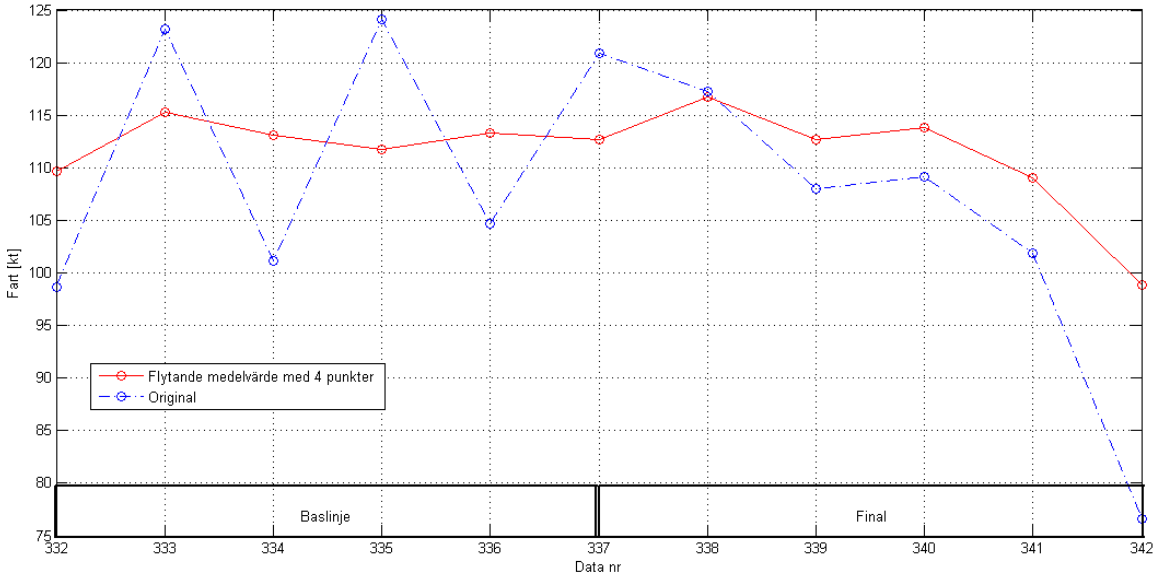

Fig. 11 The graph shows the speed of the last points on the radar base line and final.

1.17 Organisational and management information

Not applicable.

1.18 Additional information

1.18.1 Gender issues

Not applicable.

1.18.2 Environmental aspects

Reduced fuel and oil spills.

1.18.3 Resources for Private pilots

The Swedish Transport Agency in the context of the air safety project H50P has produced the 'Operating Handbook for Private pilots' - "DHB/P". The handbook is designed to cover the gap between BCL (Bestämmelser för Civil Luftfart- Rules of Civil aviation), training and practical flying. Since the spring 2002, all private pilots, and later some other pilot categories, have received a folder for the storage of the compendia, which together make up the DHB/P.

The DHB/P includes a booklet entitled "Go-around", which deals with missed approaches and landings, where the following is written:

"A prerequisite for a successful landing is that the pilot has made his mind up on short final. That is, the right speed and right glide path are adopted at 300 feet."

"If correct values are not obtained when crossing the threshold, a new go-around should be made."

1.18.4 Future regulations from EASA

In PART-FCL, which is a proposal for future requirements on flight training, the following is proposed in appendix 9, part 4 regarding missed approach

4.5 Approach and landing with idle power from up to 2000 feet above the runway (single-engine aeroplane only).
4.6 Go-around from minimum height.

1.19 Special or effective investigation techniques

Not applicable.

2. ANALYSIS

2.1 The aircraft flight operations

2.1.1. Planning of the flight

The pilot flew almost exclusively IFR (Instrument Flight Rules) and was used to long paved runways, which probably led to the pilot not normally carrying out the calculations required to evaluate landing performance. In addition, the pilot was of the opinion that the runway at Älvsbyn Airfield had significant margins. These circumstances may explain why landing performance calculation had not been carried out.

2.1.2. The flight performance

The flight was carried out normally with the exception that oxygen was not used at flight level 110, which is 1,000 feet higher than the permitted height for a flight without the use of oxygen.

In view of the fact that the flying altitude was marginally higher than that allowed and that the approach was initiated after 30 minutes of waiting over the field, SHK is of the opinion that the moderate oxygen deficiency (hypoxia) which the pilot was subjected to, did not exist at the time of the accident.

2.1.3. Approach and landing

SHK has not been able to determine why the approach was carried out in the form of a right-hand circuit. The direction of the traffic pattern has contributed to the height of the final approach being too high.

It has probably not been possible to reduce the height at the same time as the speed should be reduced to the approach speed.

With the help of radar data, SHK has been able to establish that the speed was just over 110 knots at baseline and on the long final. For the final approach, the speed gradually decreased, but was much higher than the recommended final approach speed.

Threshold crossing has probably occurred with the altitude and speed being too high.

The marks on the ground after landing showed that the aircraft had landed with its nose wheel slightly before the main landing gear which shows that the speed was much higher than recommended.

The landing distance available was about a hundred metres too short for a landing with the required margins. In practice, it would have been possible to carry out a relatively safe landing, provided that the height at the threshold had been less than 50 feet and that the speed had not been greater than that recommended. To succeed with this, the final approach must be carried out with extreme precision and be followed up so that the threshold crossing occurs at the right speed and height.

The fact that the pilot perceived that the margins were considerable and that the calculations for landing performance had not been carried out indicate that the pilot did not understand that the landing was difficult or problematic. This may explain why the final approach and landing were not carried out with high precision and that the final approach was not interrupted at an earlier stage. Moreover, the unclear threshold markings probably hampered the assessment of the touchdown point.

2.1.4 *The go-around*

If you combine the actual landing profile with the shortest possible take-off distance in accordance with the performance table in the operating handbook, you can get an idea of the problems associated with a late go-around.

After touchdown, speed reduces in accordance with the landing profile, and when the engine once again produces power after the go-around, acceleration, lift off and climb take place in accordance with the start profile.

SHK has performed calculations of the actual landing profile as described below (see fig 12). In the calculations, it has been assumed that the touchdown speed was 80 kn.

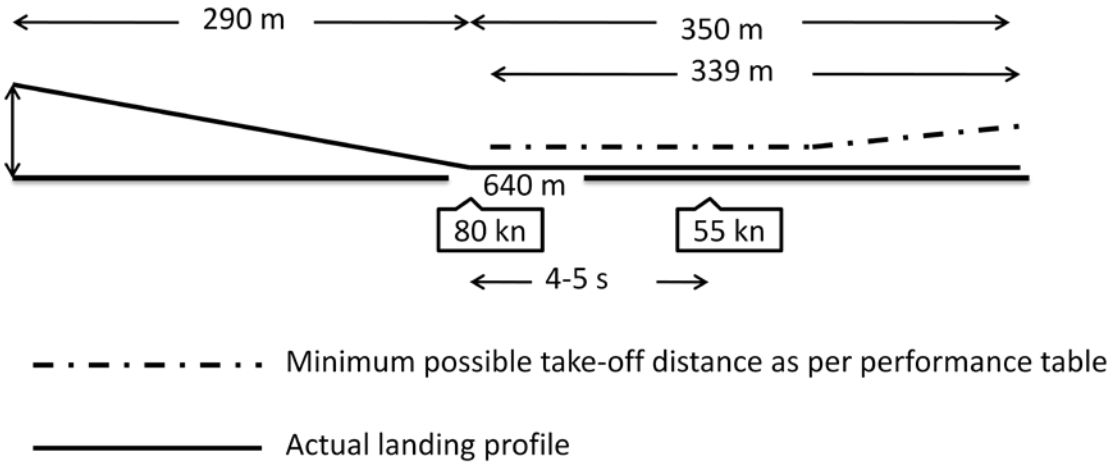

Fig. 12 Go-around from touchdown at 80 knots.

Fig. 12 shows that the latest possible go-around point is at about 55 knots, and the time available for the go-around procedure which is 4-5 seconds.

Go-around was probably started less than 300 meters from the end of the runway. The flap was fully extended during the go-around impeding acceleration, lift off and climb.

In the event of a go-around from idle, it always takes some time before the engine reaches full power, which further extends the take-off distance.

In this case the pilot only had 4-5 seconds to complete the procedure for the go-around which included the following:

- Landing the airplane and staying on course
- Discovering that the runway is not long enough
- Analyzing the alternatives
- Evaluating the alternatives
- Making a decision to go-around
- Accelerating

2.1.5. Go-around methods

SHK is of the opinion that an unplanned late go-around is not a safe procedure.

In order for a go-around to be performed safely, the go-around point must be carefully defined partly by using the performance tables in the pilots operating handbook, and partly with the help of the airfield manuals. The go-around point will then form the basis for a decision to land or make a go-around. If touchdown has not been done before the go-around point, a go-around will be carried out.

If touchdown in the unlikely event occurs after the go-around point, it is debatable whether it is safer to go through with the landing rather than making a go-around. If the remaining length of the runway is too short in order to stop, it is probably also too short for a safe take-off. The consequences of a collision with obstacles at the end of the runway is very likely lower in the event of a long landing compared to an unsuccessful take-off.

Furthermore, the analysis in 2.1.4 indicates that a decision to undertake a go-around at a given time can lead to a successful take-off. A few seconds delay can have serious consequences.

The method behind the go-around point should be the last decision point in an approach procedure.

The identification of an unsafe approach can be carried out much earlier by using other methods. Such methods can be found for example in the H50P compendium.
For example, the following decision points could be used:

- During the final approach: 300 feet, the right speed and right glidepath
- Over the threshold: a maximum of 50 feet and the right speed

SHK considers the proposal for future regulations EASA PART-FCL does not address the above problems in an appropriate manner.

2.2 The rescue operation

The rescue operation was conducted in an appropriate manner.

3 CONCLUSIONS

3.1 Findings

a) The pilot was in possession of valid operational and medical competence.
b) The pilot's flight crew license was formally not valid.
c) The aircraft had a valid C of A and ARC.
d) The pilot considered that the runway had sufficient margins.
e) The approach took place in the form of a right-hand circuit.
f) Day markings for the runway threshold 04 were unclear.
g) The aircraft 's altitude above the threshold was probably greater than 50 feet.
h) The aircraft's speed over the threshold was high.
i) Touchdown occurred well into the runway at high speed.
j) The grass on the runway was wet from fog and dew.
k) Go-around was probably carried out with full flaps.
l) Remaining runway length was inadequate for the pilot to carry out and have the time for a go-around in a safe way.

3.2 Causes

The accident was caused through the non-application of safe methods to identify and terminate an unsafe approach.

4. RECOMMENDATIONS

It is recommended that the Swedish Transport Agency:

- ensure safe methods to identify and abort an unsafe visual approach are implemented within general aviation.

It is recommended that EASA:

- ensure that safe methods to identify and abort an unsafe visual approach, at an earlier stage (i.e. 300 feet) than that provided in appendix 9, part 4 of the proposed PART-FCL, be included in future training plans for flight training.