

ISSN 1400-5719

Report C 1999:6e
Accident involving aircraft N3711B,
19 July 1998, at Varberg-Getterön
Airport, N county, Sweden

L-68/98

1999-02-08

L-68/98

Swedish Civil Aviation
Administration

601 79 NORRKÖPING

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The Swedish Board of Accident Investigation (Statens haverikommission, SHK) has investigated an accident involving an aircraft with registration N3711B at Varberg-Getterön airport, which occurred on 19 July 1998, N county, Sweden.

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

Olle Lunström

Rune Lundin

Henrik Elinder

This is an English translation of the Swedish final report. If there are any discrepancies caused by the translation the Swedish version is valid.

Translation made by Bob Arnesen

Contents

SUMMARY		4
1	FACTUAL INFORMATION	6
1.1	History of the flight	6
1.2	Personal injuries	6
1.3	Damage to the aircraft	6
1.4	Other damage	6
1.5	The crew	7
1.6	The aircraft	7
1.7	Meteorological information	7
1.8	Navigational aids	8
1.9	Radio communications	8
1.10	Airport data	8
1.11	Flight and sound recorders	8
1.12	Accident site and aircraft wreckage	8
1.12.1	<i>Accident site</i>	8
1.12.2	<i>The aircraft</i>	8
1.13	Medical information	8
1.14	Fire	9
1.15	Survival aspects	9
1.16	Special tests and investigations	9
1.17	The airline's organisation and management	9
1.18	Other information	9
1.18.1	<i>Takeoff performance calculation</i>	9
1.18.2	<i>Witness reports</i>	10
2	ANALYSIS	10
3	CONCLUSIONS	11
3.1	Findings	11
3.2	Causes of the incident	11
4	RECOMMENDATIONS	11
APPENDICES		
1.	(Not applicable in this English version)	

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Report finalised 1999-02-08

<i>Aircraft: registration and type</i>	N3711B , Beechcraft Sierra C 24 R
<i>Owner</i>	European Aircraft Charter INC, Wilmington, U.S.A.
<i>Time of incident</i>	19 July 1998 at 1145 hrs. in daylight <i>Note:</i> All times in the report are given in Swedish summer time (SST) =UTC + 2 hour
<i>Place</i>	Varberg-Getterön airport, N County, (pos 5707N 1213E, 1 m above sea level)
<i>Type of flight</i>	Private
<i>Weather</i>	Wind south Southeast 4 Kt., visibility more than 20 km, scattered cloudbase 1500-3000 ft, temp. 15 °C/ dewpoint 12 °C, QNH 1005 hPa
<i>Numbers on board: crew</i>	1
<i>passengers</i>	1
<i>Personal injury</i>	none
<i>Damage to aircraft</i>	substantial
<i>Other damage</i>	limited damage to terrain
<i>Pilots age and licence</i>	48 years old, A-licence (German) and US PPL
<i>Pilots total flying hours</i>	190 hours, of which 50 hours on type

The Board of Accident Investigation (SHK) was notified on 19 July 1998 that an accident with an aircraft registered N3811B had occurred at the Varberg-Getterön airport, N county, on the same day at 1145 hrs.

The accident has been investigated by SHK represented by Olle Lundström, chairman, Rune Lundin, Chief investigator flight operations, and Henrik Elinder, Chief technical investigator (aviation).

SHK has been assisted by technical expert Lars Danielsson.

The investigation was followed by the Swedish Civil Aviation Administration represented by K-G Bask.

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.

SUMMARY

During takeoff from runway 06 at Varberg-Getterön airport the aircraft climbed to a height of about ten meters. Thereafter it descended, bounced several times and then came to rest in a marsh off the end of the runway. The pilot felt at the time that the engine was not developing full thrust.

No technical faults or defects were found with the aircraft. During takeoff the grassy surface was unusually soft and in spots quite drenched with rainwater. The pilot selected a 10 degree flap setting instead of the operating manuals recommended 15 degrees. Witnesses to the accident testified that the pilot had applied full nose up

elevator right from the start of the takeoff roll. These factors contributed to an increase in the takeoff distance.

SHK has not been able to reach a clear explanation for the accident. It is quite evident however that the aircraft never developed enough lift to remain airborne.

The most probable cause of the accident was the pilot's method of taking off on the very wet grassy runway.

Recommendations

None.

1. FACTUAL INFORMATION

1.1 History of the flight

The pilot and his passenger were part of a group of German private pilots who were participating in a so called “fly-in” at the Varberg-Getterön airport. The group had arrived on July 15th and made a return trip to Laesö in Denmark on the 16th.

A departure on runway 06 was planned for the return home on July 19th. The aircraft had a full load of fuel and at this point only hand baggage was loaded. The short runway at Varberg-Getterön necessitated an enroute landing at nearby Halmstad airport, where much more runway was available to accommodate the greater takeoff weight after loading the remaining baggage and boarding a second passenger.

The pilot testified that he became airborne within about 2/3 of the runway length but that he felt that the engine at lift-off was not developing full thrust. The aircraft would not accelerate despite lowering the nose. He finally lost control of the aircraft and it descended into the terrain.

Witnesses revealed that the takeoff started normally and that the aircraft initially climbed to a height of about ten meters. It then descended, bounced several times on the runway, missing some bushes at the end, before coming to rest in water in a marsh 180 meters from the runway end.

The pilot and the passenger were uninjured and required no assistance in leaving the aircraft.

The accident occurred at position 5707N 1213E; 1 meter above sea level.

1.2 Personal injuries

	<i>Crew</i>	<i>Passengers</i>	<i>Other</i>	<i>Total</i>
Fatal	-	-	-	-
Seriously injured	-	-	-	-
Slightly injured	-	-	-	-
No injuries	1	1	-	2
Total	1	1	-	2

1.3 Damage to the aircraft

Substantial

1.4 Other Damage

Limited damage to the terrain at and around the accident site, predominantly tire tracks left by vehicles retrieving the aircraft.

1.5 The crew

The pilot was 48 years old at the time and had a valid German A- Licence and a U.S. PPL.

Flying hours

<i>previous</i>	<i>24 hrs</i>	<i>90 days</i>	<i>Total</i>
All types	0	12.2	190
This type	0	10	50

Number of landings this type previous 90 days: 16.

1.6 The aircraft

<i>Owner:</i>	European Aircraft Charter INC, 3511 Silverside Rd. STE 105, Wilmington, DE 19810-4902, USA
<i>Type:</i>	Beechcraft Sierra C 24 R
<i>Serial number:</i>	MC 743
<i>Year of manufacture:</i>	1981
<i>Gross weight:</i>	Certified MaxTOW 1247 kg (2750 lbs) Estimated actual TOW 1080 kg (2380 lbs)
<i>Centre of gravity:</i>	Within limits
<i>Engine manufacture:</i>	Lycoming
<i>Engine model:</i>	IO-360
<i>Number of engines:</i>	1
<i>Fuel loaded before event:</i>	Avgas 100LL
<i>Aircraft flying time:</i>	1500 hours
<i>Operating time since last periodic check:</i>	30 hours
<i>Operating time since last engine overhaul:</i>	30 hours
<i>Operating time since last propeller overhaul:</i>	30 hours
<i>Propeller manufacture:</i>	Hartzell

The aircraft had a valid Certificate of Airworthiness.

1.7 Meteorological information

The passage of several troughs and the associated rainfall during the days prior to the accident had left quite a bit of water on and about the airport. Approximately 5mm of rain fell that morning. After 1100 hrs the weather started to clear from the west, with the visibility increasing to above 20 km and only a scattered cloud base between 1500-3000 ft. The temperature was 15 degrees C with a light wind from the Southeast.

1.8 Navigational aids

Not applicable.

1.9 Radio communications

There was a normal exchange of radio communication between the aircraft and the Flight Information Service at the airport.

1.10 Airport data

The airport was in full compliance with the information contained in the A.I.P. Certain restrictions were in effect regarding the use of the runway and other airport surfaces because of the fly-in.

Runway 06/24 is 600 meters long and 50 meters wide. It is a grass surface with a mixture of sand and earth under. The grass had been cut the day before the accident.

Rain had fallen almost continuously during a period up until about an hour before the accident. There was however still quite a bit of water on the surface of the airport creating difficulty for some of the other aircraft to manoeuvre without assistance.

1.11 Flight and sound recorders

Not applicable. (no requirement)

1.12 Site of accident and aircraft wreckage

1.12.1 *Site of accident*

The aircraft came to rest in marshy area that is a designated bird reserve. There were bushes in the area.

1.12.2 *The aircraft*

Substantial damage occurred to the forward sections of the aircraft and nose gear. The propeller, the driveshaft and the engine mount were all damaged. The nose gear was sheered off and damaged the left trailing edge flap.

1.13 Medical information

Nothing indicates that the mental and physical condition of the pilot had been impaired before the flight.

1.14 Fire

No fire occurred.

1.15 Survival aspects

The emergency locator transmitter (ELT) was not activated upon impact.

1.16 Special tests and investigations

A technical investigation was done on the aircraft's engine and fuel system. A trial run of the engine was not possible as the driveshaft was bent out of alignment. An engine tightness test was performed, the timing and ignition was tested and the flow of fuel to the cylinders was measured, all showing normal values. The engine fuel injector was sent to maintenance for testing and it showed only a slightly higher than normal flow rate. Nothing in the tests revealed that the engine would not be able to develop full thrust during takeoff. The aircraft had a full fuel load (220 liters).

An investigation of lever and switch position revealed that:

- * the elevator trim was slightly nose up
- * the flaps were at 10 degrees for takeoff
- * the electric trim switch was in position ON
- * the propeller pitch lever was fully forward
- * the fuel tank levers were in position OPEN
- * all circuit breakers were in

1.17 The airline's organisation and management

Not applicable.

1.18 Other information

1.18.1 Calculation of takeoff performance

Using the aircraft operating manual as a basis, the following estimated take-off performance was calculated:

Conditions

Engine rating	max thrust (set prior to brake release)
Takeoff flap position	15 degrees
Runway surface	low cut grass
Temperature	15 degrees C
Air pressure (QNH)	1005 hPa
Density altitude	approx. 240 ft. (30 ft/hPa)
Takeoff weight	max certified (2750 lbs)
Wind	less than 5 knots headwind

The calculated takeoff performance using these conditions

Takeoff distance	approx. 350 meters (1150 ft)
Takeoff distance to 50 ft height	518 meters (1700 ft)

1.18.2 *Witness reports*

SHK obtained testimony from senior members from the local flying club who had witnessed both a previous takeoff on the round trip to Laesö as well as the takeoff on the day of the accident. The pilot had aborted the first takeoff attempt when departing for Laesö as he felt the engine was not developing max thrust. The second attempt was normal.

Witnesses testified that the engine appeared to perform normally during the takeoff prior to the accident but noted that the pilot had applied full nose up elevator from the start of the takeoff roll.

2 ANALYSIS

Technical analysis of the aircraft has shown that no fault or defect existed which could have caused the engine to not develop max takeoff thrust, such as the pilot has testified to. However it cannot be ruled out that some intermittent problem existed that later could not be duplicated.

SHK's takeoff performance calculation shown in para. 1.18.1 was based on max certified takeoff weight. The actual takeoff weight was approximately 170 kilos less than max and should under normal circumstances have given a takeoff distance of less than 350 meters. As the takeoff distance according to the pilot was about 400 meters other factors must have affected performance.

A substantial amount of rain had fallen during the morning and other aircraft at the airport had required assistance to manoeuvre out to the runway. Witnesses have revealed that the ground was quite soft and in spots thoroughly drenched. This would result in roll resistance during the takeoff run and a greater takeoff distance. The pilot had checked the tires and the existing tread prior to takeoff.

The aircraft operating manual specifies the use of 15 degrees flap for takeoff. The pilots selection of 10 degrees most probably increased the takeoff distance.

Witnesses testified that the pilot applied full nose up elevator during the entire takeoff run. This would result in an increase in the induced drag over the elevator as it became more effective at higher speeds, decreasing the rate of acceleration and giving a greater takeoff distance.

It is quite apparent that when the aircraft finally became airborne, the amount of lift being developed was far to little to keep the aircraft in the air and accelerating as it left the so called "ground effect", which resulted in the unavoidable descent into the terrain and crash.

SHK has not been able to render a completely clear explanation for the accident. As the pilot himself had positioned the thrust and propeller pitch levers correctly, the most probable cause would have to be the pilot's method of taking off on the wet and very soft runway.

3 CONCLUSIONS

3.1 Findings

- a)* The pilot was qualified to perform the flight.
- b)* The aircraft was airworthy.
- c)* A technical fault or defect in the aircraft engine was not found
- d)* The grassy runway was both wet and soft after considerable rainfall, which increased the takeoff distance.
- e)* The pilot testified that he had earlier had problems obtaining max thrust from the engine.
- f)* The pilot started the takeoff using 10 degrees of flap instead of the recommended 15 degrees while at the same time applying full nose up elevator.

3.2 Causes of the accident

The accident was most probably caused by the pilot's method of taking off, when applied to the existing conditions on the wet grassy runway.

4 RECOMMENDATIONS

None