Federal Public Service
Mobility and Transport
Air Accident Investigation Unit

Air Accident Investigation Unit
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Safety Investigation Report

ACCIDENT
PIPER PA-28-181
AT SAINT-HUBERT
ON 10 JUNE 2016

Ref.:
AAIU-2016-06

Issue date:
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Status:
Final

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FOREWORD

This report is a technical document that reflects the views of the investigation team on the circumstances that led to the incident.

In accordance with Annex 13 of the Convention on International Civil Aviation and EU Regulation 996/2010, it is not the purpose of aircraft accident investigation to apportion blame or liability. The sole objective of the investigation and the Final Report is the determination of the causes, and to define recommendations in order to prevent future accidents and incidents.

In particular, Article 17-3 of the EU regulation EU 996/2010 stipulates that the safety recommendations made in this report do not constitute any suspicion of guilt or responsibility in the accident.

The investigation was conducted by the AAIU(Be).

SYMBOLS AND ABBREVIATIONS

’	Minute
AAIU(Be)	Air Accident Investigation Unit (Belgium)
AIP	Aeronautical Information Publication
AMSL	Above mean sea level
AR	Arrêté Royal (French for Royal Decree)
BCAA	Belgian Civil Aviation Authority
CAP	Civil Aviation Publication (from UK CAA)
CAT	Category
E	East
EASA	European Aviation Safety Agency
EBSH	Saint Hubert Airfield
ESN	Engine Serial Number
EU	European Union
FH	Flight hour
ft	Foot (Feet)
GND	Ground
ICAO	International Civil Aviation Organization
KB	Koninklijk Besluit (Dutch for Royal Decree)
Kt	Knot(s)
LDG	Landing
LFAM	Berck sur Mer airfield,France
LFLQ	Montelimar airfield, France
LFNE	Salon airfield, France
LFSA	Besançon airfield, France
LH	Left hand
m	Metre(s)
ME	Multi-Engine
METAR	Aviation routine weather report (in aeronautical meteorological code)
MHZ	MHz
N	North
NE	North-east
NOSIG	No significant change (used in trend-type landing forecasts)
NOTAM	Notice To Airmen
P/N	Part Number
QNH	Pressure setting to indicate elevation above mean sea level
RH	Right hand
RWY	Runway
TKOF	Take-off
TRU	Thrust Reverser Unit.
UTC	Universal Time Coordinated [1]
VFR	Visual Flight Rules

[1] About the time: For the purpose of this report, time will be indicated in UTC, unless otherwise specified

TERMINOLOGY USED IN THIS REPORT

Safety factor: an event or condition that increases safety risk. In other words, it is something that, if it occurred in the future, would increase the likelihood of an occurrence, and/or the severity of the adverse consequences associated with an occurrence.

Contributing safety factor: a safety factor that, had it not occurred or existed at the time of an occurrence, then either:
(a) the occurrence would probably not have occurred; or
(b) the adverse consequences associated with the occurrence would probably not have occurred or have been as serious, or
(c) another contributing safety factor would probably not have occurred or existed.

Other safety factor: a safety factor identified during an occurrence investigation which did not meet the definition of contributing safety factor but was still considered to be important to communicate in an investigation report in the interests of improved transport safety.

Safety issue: a safety factor that
(a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and
(b) is a characteristic of an organization or a system, rather than a characteristic of a specific individual, or characteristic of an operational environment at a specific point in time.

Safety action: the steps taken or proposed to be taken by a person, organization or agency on its own initiative in response to a safety issue.

Safety recommendation: A proposal by the accident investigation authority in response to a safety issue and based on information derived from the investigation, made with the intention of preventing accidents or incidents. When AAIU(Be) issues a safety recommendation to a person, organization, agency or Regulatory Authority, the person, organization, agency or Regulatory Authority concerned must provide a written response within 90 days. That response must indicate whether the recommendation is accepted, or must state any reasons for not accepting part or all of the recommendation, and must detail any proposed safety action to bring the recommendation into effect.

Safety message: An awareness which brings to attention the existence of a safety factor and the lessons learned. AAIU(Be) can distribute a safety message to a community (of pilots, instructors, examiners, ATC officers), an organization or an industry sector for it to consider a safety factor and take action where it believes it appropriate. There is no requirement for a formal response to a safety message, although AAIU(Be) will publish any response it receives.

SYNOPSIS

Date and time:	10 June 2016 – 15:07 UTC
Aircraft:	Piper PA-28-181 Archer II, msn 28-7890345
Location:	Off EBSH airfield.
Type of flight:	General Aviation - Private
Phase:	Take-off
Aerodrome of departure:	Saint Hubert Airfield (EBSH)
Aerodrome of destination:	Besançon Airfield (LFSA)
Persons on board:	4
Injuries:	None
Occurrence type:	LOC – G, Loss of aircraft control while the aircraft is on the ground.

Abstract
An airplane with 4 occupants on board was taking off from the EBSH grass runway. During the ground run, the airplane bounced. The airplane slowed down and deviated from its path.

The pilot lost control of the airplane, that collided with the perimeter fence and crashed 15 m further.

All occupants left the airplane, before it caught fire and was totally destroyed

Cause

The accident was caused by the loss of control of the airplane during the ground run.

Contributing factors

- The late decision to abort the take-off.
- Aircraft weight most probably higher than calculated.
- No correct handover of flight controls. (co-pilot intervenes to push the throttle forward)

1 FACTUAL INFORMATION

1.1 History of the event.

The aircraft was part of a group of 56 aircraft participating in the Challenge "Grass Cockpit tour". The purpose was to make a tour through France and Belgium along 5 airfields with grass runways.

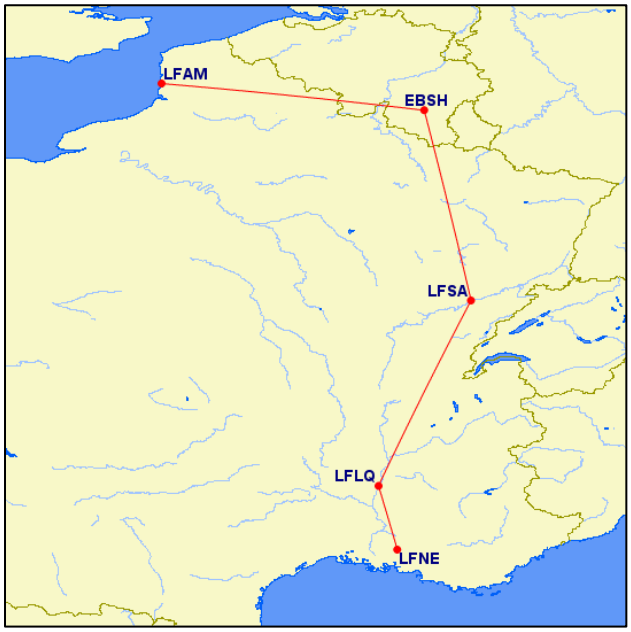


Figure 1 : Grass Cockpit journey

The group of aircraft started the tour in Berck sur Mer,France (LFAM) and arrived in Saint-Hubert (EBSH) between 09:00 and 10:30, all landing on Runway 05.

The runways condition of EBSH was influenced by the meteorological situation of the previous days (a NOTAM was published to notify this situation); a pilot stated that although he selected 3 notches of flaps and made a slow approach, the landing run of the airplane was quite long, owing to the wet grass and the downslope of Runway 05.

After lunch and aircraft refueling, the first airplanes of the group took off at about 12.00.

The wind conditions allowed to use both runways 32 and 05, however the taxiway for runway 32 was excessively wet although it did not rain during the last two days and the situation improved significantly. Nevertheless, in order to avoid a possible deterioration of the taxiway 32, it was decided to;

- Use Runway 05 (shorter than Runway 32) for the take-off of lighter airplane and those with sufficient power reserve.
- Use Runway 32R, the longest runway for the heavier airplane and those having few power reserve. The Runway 32R is 800 m long, with a supplementary 100 m of runway strip, making a 900 m-runway. Runway 32R was mown the day before.

- For the airplanes taking off from Runway 32R, a special taxi procedure was in place. A "follow-me" service car led the airplanes from the parking area, crossing Runway 05 up to a location for the engine power run, then the airplanes back-taxied on Runway 32 up to the take-off area.

The accident airplane was refueled with 74 liters of gasoline (Avgas 100 LL) up to 85 litres (as visually estimated by the pilot) and then was taxied using the special taxi procedure to proceed to the 100 m strip before the Runway 32R threshold.

The airplane, with 4 occupants on board, was the 50th aircraft (out of the group of 56) to take off from EBSH. The aircraft aligned for a take-off, at – according to the pilot – 50 m before the runway threshold.
The pilot selected 1 notch of flaps, applied full brakes, set full engine power and, when cleared for take-off, released the brakes to start the ground run. The pilot kept his hand on the throttle.

The pilot reported that all engine indicators were "in the green" when he initiated the take-off.

A witness in the tower saw the airplane moving in the runway axis and – at about the intersection of Runway 32R and Runway 05 – moving up, before falling back. Witnesses heard a change in the engine noise, as if the power was interrupted for a short period (few seconds), then the noise of the engine at full power came back. The airplane made a few rebounds after that and deviated to the left.

The pilot reported that at about half of the landing run, (crossing of the 2 runways 32 and 05), the aircraft bounced, became airborne, then fell down. The pilot stated that, as he had one hand on the throttle, the bounce surprised him and made him pull the throttle handle. The occupant sitting next to him took his hand and pushed it forward to increase power.
The first jump was followed by a series of similar jumps, whose intensity increased. The pilot stated: "the more the airplane gained speed, the more it jumped, and I lost control". One of the occupants of the airplane stated the pilot decided to abort the take-off after several jumps.

The airplane crossed the parallel runway 32L, the taxiways and went through the airfield perimeter fence. The tyre traces on the grass left by the nose wheel, the main wheels and the mooring hook indicate the airplane went several time airborne, then fell down.

Upon reaching the fence, witnesses saw the airplane pitch up. A witness stated seeing the airplane airborne at a very low height when it hit the perimeter fence. The airplane upturned a part of the fence and crashed 15 m further in a field neighboring the airfield, 1 meter below the airfield surface.

The airplane occupants quickly climbed out of the airplane.
When the airfield deputy commander arrived on the crash scene, the occupants were gathered on the right side of the airplane retrieving some luggage from the cargo hold (3 or 4 small bags of the sort used to hold maps and headsets). The deputy airfield commander saw flames around the left wing and urged everybody to move away from the airplane.

The airplane was totally consumed by fire.

1.2 Injuries to persons.

Injuries	Crew	Passenger	Others	Total
Fatal	0	0	0	0
Serious	0	0	0	0
Minor	0	0	0	0
None	1	3	0	4
Total	1	3	0	4

1.3 Damage to aircraft.

The airplane was totally destroyed.

1.4 Other damage.

The fence surrounding the EBSH airfield – a wire mesh supported by poles - was damaged over several meters.

Figure 2 : damaged fence

Figure 3

1.5 Personnel information

Pilot:
Male, 55 years, holder of a valid PPL license first issued by the French DGAC in March 2013.
Rating: SEP

Flight experience:
Total flight time as PIC: 183:19 FH
Total flight time on PA-28: 51:41 FH
Recent experience before the accident:
May 2016: 1:06 FH
June 2016: 2:16 FH

Experience with grass runways:
- during the PPL flight training in LFGB,
- several touch and goes on LFSE
- did participate to Grass Cockpit tour 2015.

It was the first time the pilot came to the airfield of Saint-Hubert.

1.6 Aircraft information.

General information

The Piper PA-28-181 Archer II is a four places, low wing, fixed landing gear landplane, developed from the Piper PA 28 Cherokee. It is equipped with a Lycoming O-360-A4M engine of 180 hp (134 kW) and a fixed pitch propeller.

It was first certificated on 1 July 1994 (as successor from the Warrior II) by the US FAA, and the Type Certificate N° 2A 13 was further validated by the EASA.

Characteristics (Normal Category)

Manufacturer:	Piper Aircraft, Inc.
Capacity:	4 seats
MTOW:	2550 lbs (1156 kg)
Fuel capacity:	50 US gallon
Useable fuel:	48 US gallon
Never exceed speed (V_{NE}):	148 KCAS, 154 KIAS
V_{NO}:	121 KCAS, 125 KIAS
V_A at MTOW:	108 KCAS,
V_{FE}:	100 KCAS, 102 KIAS
Stall speed V_S:	59 KCAS, 55 KIAS in clean configuration 53 KCAS, 49 KIAS with full flaps

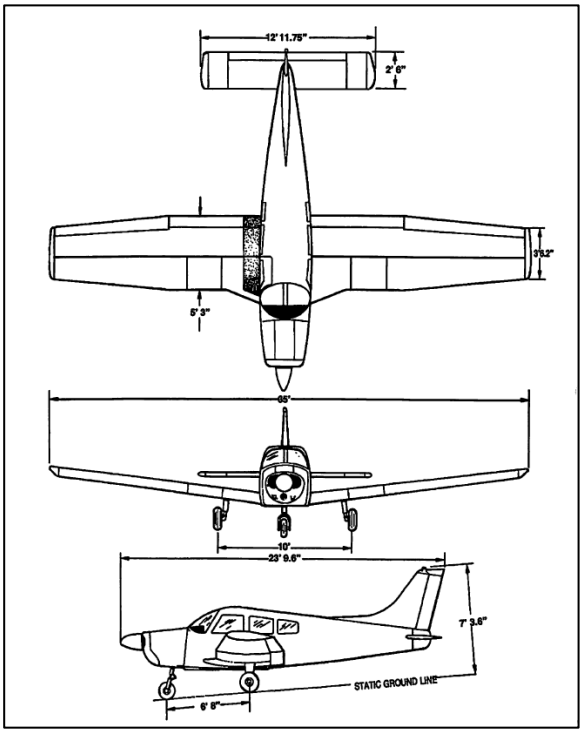


Figure 4 : Three-view with dimensions

Airframe:

Serial number:	28 - 7890345
Built year:	1978

Flight Manual

4.23 TAKEOFF

The procedure used for a short field takeoff with an obstacle clearance or a soft field takeoff differs slightly from the normal technique. The flaps should be lowered to 25° (second notch). Allow the aircraft to accelerate to 47 to 56 MPH IAS (41 to 49 KTS IAS) depending on the aircraft weight and rotate the aircraft to climb attitude. After breaking ground, accelerate to 52-62 MPH IAS (45 to 54 KTS IAS), depending on aircraft weight. Continue to climb while accelerating to the flaps-up rate of climb speed, 87 MPH IAS (76 KTS IAS) if no obstacle is present or 74 MPH IAS (64 KTS IAS) if obstacle clearance is a consideration. Slowly retract the flaps while climbing out.

SOFT FIELD

Flaps .....25° (second notch)
Accelerate to 47-56 MPH IAS (41 to 49 KTS IAS) depending on aircraft weight
Control wheel.....back pressure to rotate to climb attitude
After breaking ground, accelerate to 52-62 MPH IAS (45 to 54 KTS IAS) depending on aircraft weight
Accelerate to best flaps up rate of climb speed 87 MPH IAS (76 KTS IAS)
Flaps .....retract slowly

1.7 Meteorological conditions.

CAVOK

Wind: 2 to 6 kt variable between 330 and 050 degrees
Temperature: 18,8 °C
QNH: 1013 hPa

1.8 Aids to navigation

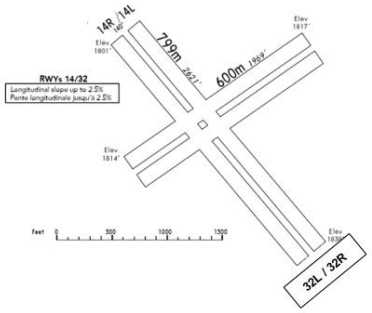
Not applicable

1.9 Communication.

Not applicable

1.10 Airfield information.

The EBSH Saint-Hubert airfield is an airfield located at 2,5 km NE of the city of Saint-Hubert.
Coordinates: 50°02'09"N - 005°24'15"E. Elevation: 563m (1847 ft).



It is equipped with four grass runways:

- 05L/23R and 05R/23L: 600 m long x 42 m wide
- 14L/32R and 14R/32L: 799 m long x 42 m wide

Figure 5 : EBSH Airfield

The runway surface is uneven as are many grass runways and with a noticeable slope.

The first half of the runway is relatively flat, and the slope increases (2.5%) shortly before the crossing with runways 05/23.

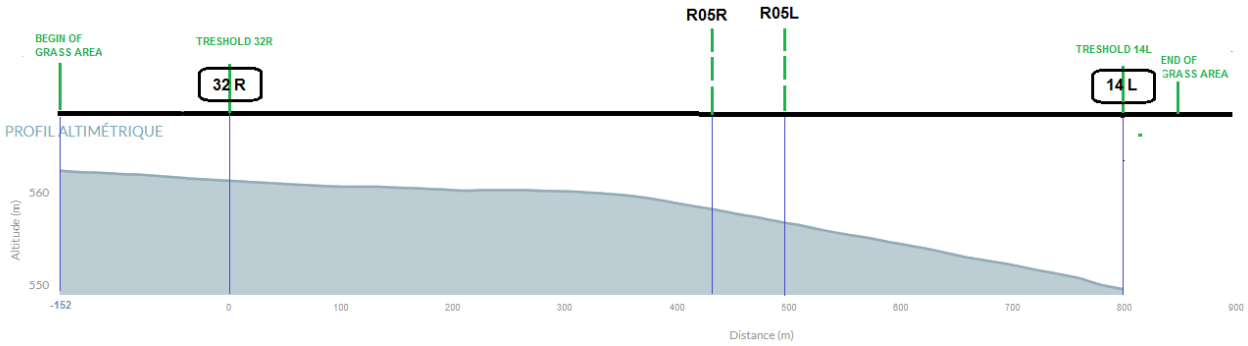


Figure 6 : Elevation profile

1.11 Flight recorders.

There was no flight recorder installed, nor was it required.

1.12 Wreckage and impact information

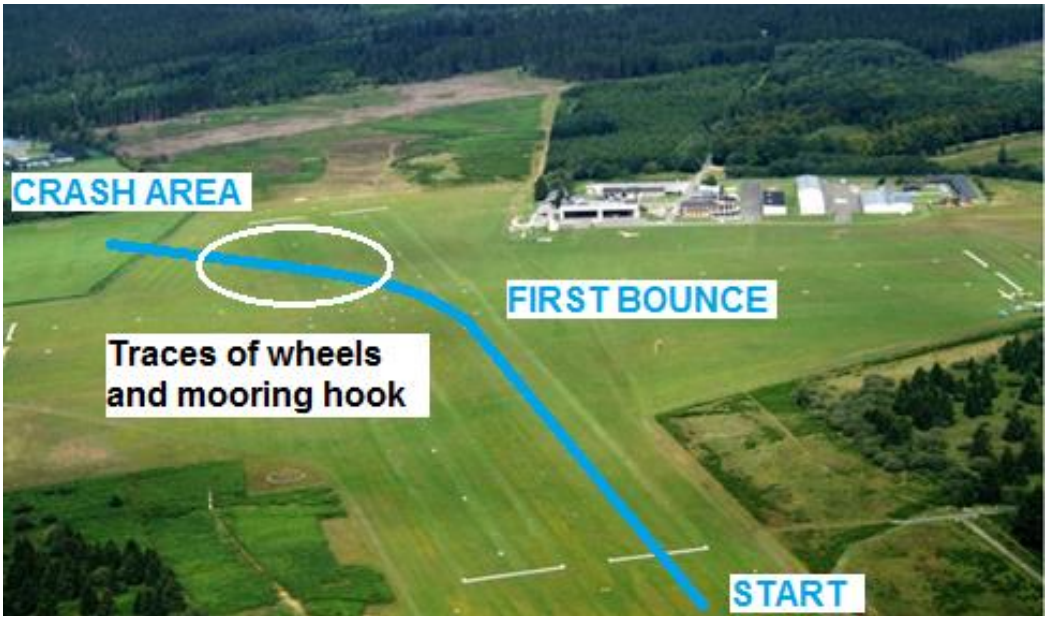


Figure 7 : Flight track

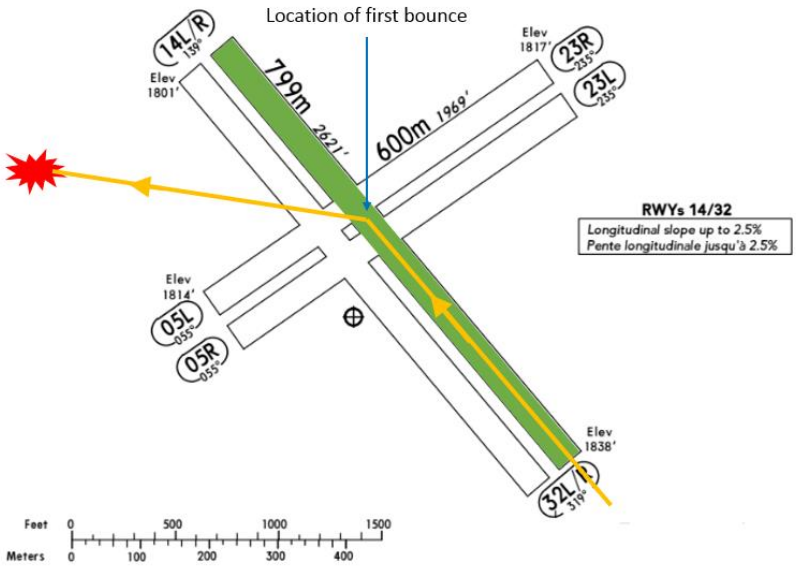


Figure 8 : Flight track

1.13 Medical and pathological information.

Not applicable

1.14 Fire.

Fire totally consumed the airplane.

The occupants climbed out the airplane after the crash, then one of them returned to the aircraft in order to turn off the electric pump, the alternator, the ignition and to remove the key, but he did not touch to the mixture, nor the fuel tank selector. He was asked to leave the airplane by the other occupants because they saw smoke coming out of the wreckage.

According to the witnesses who arrived slightly later, the fire started on the left wing. The actual cause of the fire was not found, but is believed to be the result of an electrical short-circuit caused by damage to the airplane during impact.

As all occupants of the airplane were safe, the airfield local fire-fighting service, did not intervene. The purpose of the local fire-fighting services is limited to support the rescue the aircraft occupants.

The airfield commander called the 100 immediately after the crash, at 15:07, the city fire brigade was alerted at 15:09. The first fire-fighting vehicles left the station at 15:14 and arrived at the crash scene at 15:20 to extinguish the fire.

1.15 Survival aspects.

All 4 occupants wore safety belts.

The evacuation of the airplane was done quickly, although some of the occupants came back to the cockpit to secure the electrical system (see 1.14. above) and to retrieve some items out of the cargo hold (3 to 4 small sport bags, according to a witness) .

The local airfield authorities took all necessary measures and arrived quickly at the crash scene to provide support to the occupants.

1.16. Additional information

FAA Airplane handbook – Chapter 05

Soft/Rough-Field Takeoff and Climb

Takeoffs and climbs from soft fields require the use of operational techniques for getting the airplane airborne as quickly as possible to eliminate the drag caused by tall grass, soft sand, mud, and snow and may require climbing over an obstacle. The technique makes judicious use of ground effect to reduce landing gear drag and requires an understanding of the airplane's slow speed characteristics and responses. These same techniques are also useful on a rough field where the pilot should get the airplane off the ground as soon as possible to avoid damaging the landing gear.

Taking off from a soft surface or through soft surfaces or long, wet grass reduces the airplane's ability to accelerate during the take-off roll and may prevent the airplane from reaching adequate take-off speed if the pilot applies normal take-off techniques. The pilot must be aware that the correct take-off procedure for soft fields is quite different from the

take-off procedures used for short fields with firm, smooth surfaces. To minimize the hazards associated with take-offs from soft or rough fields, the pilot should transfer the support of the airplane's weight as rapidly as possible from the wheels to the wings as the take-off roll proceeds by establishing and maintaining a relatively high AOA or nose-high pitch attitude as early as possible. The pilot should lower the wing flaps prior to starting the take-off (if recommended by the manufacturer) to provide additional lift and to transfer the airplane's weight from the wheels to the wings as early as possible. The pilot should maintain a continuous motion with sufficient power while lining up for the take-off roll as stopping on a soft surface, such as mud or snow, might bog the airplane down.

Takeoff Roll

As the airplane is aligned with the takeoff path, the pilot should apply take-off power smoothly and as rapidly as the power plant can accept without faltering. As the airplane accelerates, the pilot should apply enough back-elevator pressure to establish a positive AOA and to reduce the weight supported by the nose-wheel.
When the airplane is held at a nose-high attitude throughout the take-off run, the wings increasingly relieve the wheels of the airplane's weight as speed increases and lift develops, thereby minimizing the drag caused by surface irregularities or adhesion. If this attitude is accurately maintained, the airplane virtually flies itself off the ground, becoming airborne but at an airspeed slower than a safe climb speed because of ground effect.

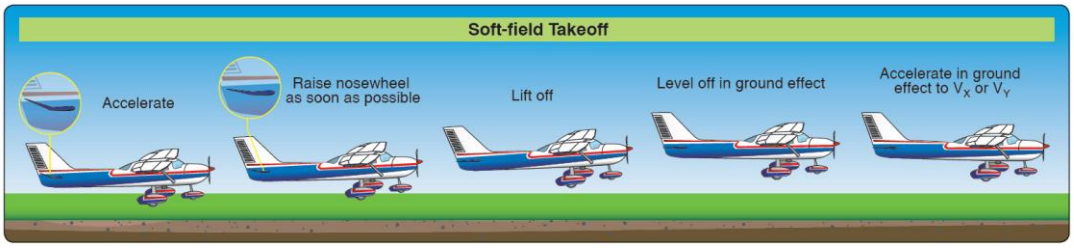


Figure 9

Lift-Off

After the airplane becomes airborne, the pilot should gently lower the nose with the wheels clear of the surface to allow the airplane to accelerate to V_Y, or V_X if obstacles must be cleared. Immediately after the airplane becomes airborne and while it accelerates, the pilot should be aware that, while transitioning out of the ground effect area, the airplane will have a tendency to settle back onto the surface. An attempt to climb prematurely or too steeply may cause the airplane to settle back to the surface as a result of the loss of ground effect. During the transition out of the ground effect area, the pilot should not attempt to climb out of ground effect before reaching the sufficient climb airspeed, as this may result in the airplane being unable to climb further, even with full power applied. Therefore, it is essential that the airplane remain in ground effect until at least V_X is reached. This requires a good understanding of the control pressures, aircraft responses, visual clues, and acceleration characteristics of that particular airplane.

Initial Climb

After a positive rate of climb is established, and the airplane has accelerated to V_Y, the pilot should retract the landing gear and flaps, if equipped. If departing from an airstrip with wet snow or slush on the take-off surface, the gear should not be retracted immediately so that any wet snow or slush to be air-dried. In the event an obstacle must be cleared after a soft-field takeoff, the pilot should perform the climb-out at V_X until the obstacle has been cleared. The pilot should then adjust the pitch attitude to V_Y and retract the gear and flaps. The power can then be reduced to the normal climb setting. The pilot may then reduce power to normal climb setting.

Common errors in the performance of soft/rough field takeoff and climbs are:

- Failure to review AFM/POH and performance charts prior to takeoff.
- Failure to adequately clear the area.
- Insufficient back-elevator pressure during initial takeoff roll resulting in inadequate AOA.
- Failure to cross-check engine instruments for indications of proper operation after applying power.
- Poor directional control.
- Climbing too high after lift-off and not leveling off low enough to maintain ground effect altitude.
- Abrupt and/or excessive elevator control while attempting to level off and accelerate after liftoff.
- Allowing the airplane to “mush” or settle resulting in an inadvertent touchdown after lift-off.
- Attempting to climb out of ground effect area before attaining sufficient climb speed.
- Failure to anticipate an increase in pitch attitude as the airplane climbs out of ground effect.

2 ANALYSIS

2.1 Ground run theoretical distance.

To determine the expected ground run of the airplane, we consider

- The airplane take-off weight based on the empty weight of the airplane (weighing report) and the loading of the airplane, based upon the statements of the occupants,
- The condition of the runway (wet), based upon the statement of the pilot upon landing (grass was "greasy", difficult to stop the airplane during the landing run).
- The meteorological condition, the variable wind orientation and speed.
- The runway slope. Note: no factorization allowed for downslope.
- The flaps position (1 notch). The graph "flapless" will be used because no performance data is available for 1 notch position in the flight manual.

Airplane take-off weight based on the pilot's statement

	Fuel qty (liters)	Weight (kg)	Arm (m)	Moment
Basic empty		733	2,132	1562,756
Pilot 1		85	2,045	173,825
Pilot 2		80	2,045	163,6
Pax1		88	3	264
Pax2		85	3	255
Fuel	80	57,6	2,413	138,9888
Bags		15	3,62712	54,4068
Total		1143,6	2,28451959	2612,5766

The weight of the fuel (57,6 kg) could have been slightly underestimated;

- the fuel consumption for the taxi and the engine run on the ground is likely overestimated (5 liters).

- the pilot stated that he refueled each tank up to 2 fingers below the finger neck tab according to him corresponding with 42,5 liters (or 11 US gallon) each tank. However, as the filler neck tab indicates 17 US gallon and one finger below the finger neck is about 15 US gallon, 13 US gallon (49 liters) or 98 liters in total will be a better estimation.

Taking into account the weight of the objects retrieved in the luggage compartment (Few heavy books, tow bar, wheel blocs and personal luggage) and the luggage saved by the occupants before the fire, it is possible that the 15 kg estimated weight is underestimated.

Correction factor for runway condition (CAP 698[2])

c) If the runway surface is other than dry and paved the following factors must be used when determining the take-off distance in a) or b) above:

Surface Type	Condition	Factor
Grass (on firm soil) up to 20 cm Long	Dry	x 1.2
	Wet	x 1.3
Paved	Wet	x 1.0

d) Take-off distance should be increased by 5% for each 1% upslope. No factorisation is permitted for downslope.

Figure 10

Meteorological conditions

Field elevation; 1847 ft
QNH: 1013 hPa
Wind: 2 to 6 kts – between 330 and 050 degrees
Temperature: 18.8 °C

Flight Manual take-off ground roll graph

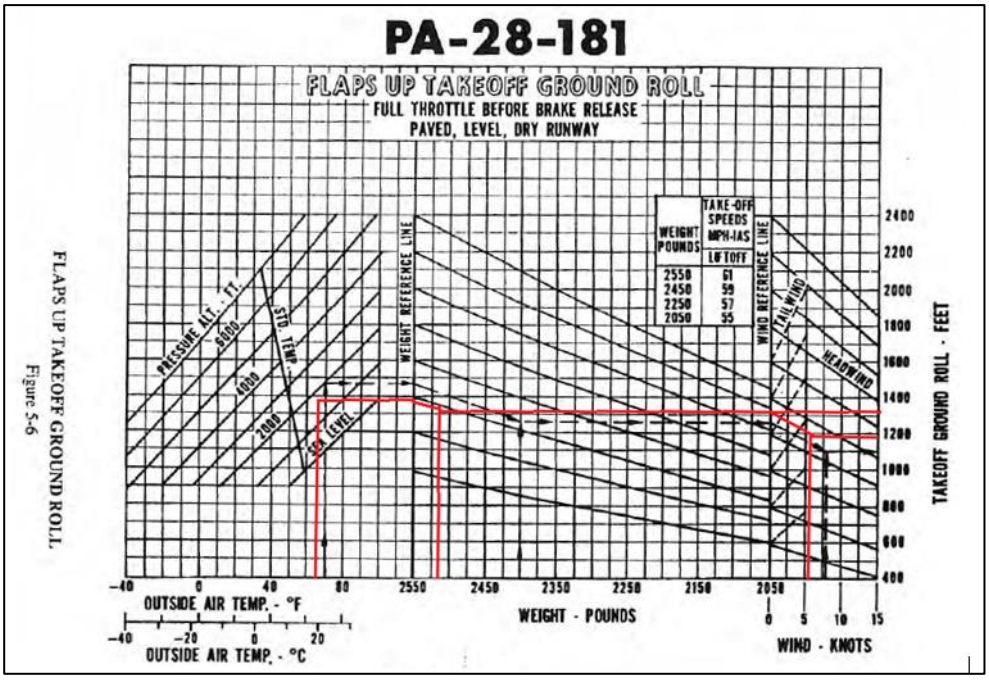


Figure 11

[2] CAP 698 is produced by the UK Civil Aviation Authority to support training and examinations for JAR-FCL.

Calculation of the ground run based on the following data:

- Take-off weight: 1143,6 Kg (2521 Lbs)
- Field elevation; 1847 ft and QNH: 1013 hPa
- Wind: 2 to 6 kts – between 330 and 050 degrees
- Temperature: 18.8 °C
- Runway downslope: => no factorization allowed
- Wet grass less than 20 cm => factor x 1.3

Based on the above take-off ground roll graph the airplane would have normally required a ground run between 1190 ft and 1310 ft (363 m – 399 m) taking into account the variable wind orientation and speed between no wind (= 1310 ft) and 6 kt headwind (1190 ft).

These values must be further corrected by factor X1.3 due to the wet grass surface of the runway.

Graph result	Correction factor X 1.3	Final result (Meters)
1190 ft (with 6 kt headwind)	1.547 ft	471 m
1310 ft (with no wind)	1.703 ft	519 m

Theoretically the airplane should have reached the minimum lift off airspeed (V_R 53 kt) after a takeoff run distance between 471 and 519 meters which approximately corresponds to the place where the pilot and witnesses reported the first bounce occurred.

Full weight simulation

The same computation was made with the aircraft Maximum Take-off weight.

Graph result	Correction factor X 1.3	Final result (Meters)
1300 ft (with 6 kt headwind)	1690 ft	515 m
1400 ft (with no wind)	1820 ft	554 m

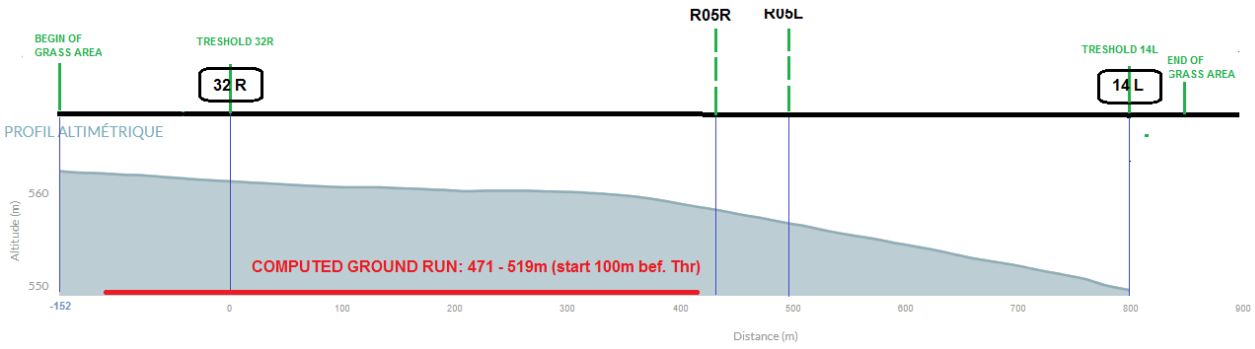


Figure 12

2.2 The event

Further to the statement of the occupants, we can assume that there was no disruption in the ground run up to the point the airplane first bounced up. According to the computation of the ground run, the airplane would have then normally reached the rotation speed.

The airplane never reached the rotation speed.

The pilot stated that the airspeed reached by the aircraft at the moment of the first bounce – at the crossing of the runways - was around 45 kt. He further stated "the airspeed remained below 50kt, while 65 kt was needed to rotate".

There is no record of the airplane airspeed available. However, the actual airspeed reached by the airplane might not have been high enough due to different reasons, such as:

- Too heavy (unaccounted weight)
- Effect of the soft field, slowing down the airplane more than expected.
- Inadvertent action on the brakes.
- Inadequate power setting…

The effect of the soft field is already included in the computation, and the examination of the runway surface did not conclude that an extra-ordinary situation was present (the field was not soggy or swampy).

With respect to the determination of the weight, there are indications that the actual weight of the aircraft could be higher than stated later by the crew to the investigators.

The crew did not report any problem related to the engine. A possible inadvertent action of the pilot on the brakes is possible, but unlikely.

During the bounce, the throttle was pulled back, then after a few seconds, pushed forward again. The airplane fell down. The two phenomenon slowed down the airplane.

From that point of the airplane trajectory, although the pilot re-applied full power, a series of additional bounces occurred, slowing down the airplane further. The airplane deviated from the planned trajectory and crossed the runway, running on surfaces with high grass.

The traces on the ground of the mooring hook indicates the airplane took a too high pitch at times, maybe at that time due to an excessive elevator back pressure. This would also lead to a premature lift-off below the rotation speed, as described in the figure below.

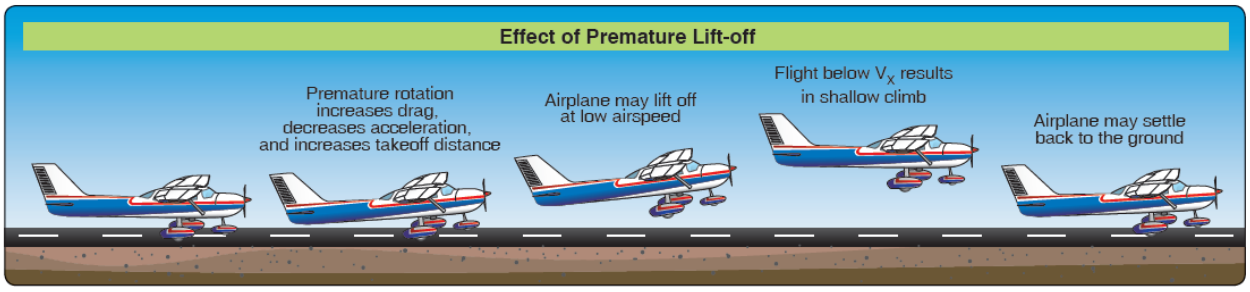


Figure 13

2.3 Decisions in the cockpit

The pilot stated he was reasonably familiar with grass runways, but it was his first time in EBSH. Next to him was sitting a pilot with more experience on grass runways and who landed the airplane in EBSH on the morning.

The pilot did not say whether he had planned or discussed a possible scenario for rejecting the take-off (such as, for example, the application of the 50/70 rule of thumb[3]).

During the first bounce, the pilot stated that, as he had one hand on the throttle, the first jump surprised him and made him pull the throttle handle. This hand movement is difficult to understand as the position of the hand on the throttle is supposed to avoid an unwanted backwards movement, or to be ready for a possible rejected take-off.
The pilot sitting next to the PIC intervened and pushed the pilot's hand towards full throttle. This was done without a proper transfer of controls and may have influenced the PIC to continue the take-off or delay the decision to abort the take-off.

Later, the pilot stated it was not his intention to interrupt the take-off at that time. He explained that he considered that the terrain was really wet and greasy and the runway was very inclined, so the interruption of the flight at this stage of the takeoff was, to him, very risky because of the few remaining runway length (estimated to less than 300 meters), and the difficult experience of the slippery landing sooner in the afternoon. In his opinion, if he had set idle throttle and braked, the damages could have been more important.

The pilot stated he did abort the take-off shortly after the second bounce, that came soon after the first one. However, from that point, the aircraft deviated to the left, a possible consequence of a high angle of attack (as shown by traces of the mooring hook in the runway grass) combined with the engine high power (the effect of the P-factor). The pilot stated he tried unsuccessfully to compensate by applying full right rudder pedal. The aircraft rolled another 500m until it reached the airfield fence, overthrowing it, taking the wire mesh along and ending 15m further. Witnesses reported the airplane was shortly airborne when reaching the fence.
These inconsistencies cannot be explained other than considering that the actions to abort the take-off came much later than recalled by the pilot.

[3] Rule of thumb for GA aircraft prescribing to abort the take-off in the event the aircraft has not reached 70% of the takeoff speed by the time it has reached 50% of the length of the runway.

3 CONCLUSIONS

3.1 Findings

- The pilot was qualified and licensed to pilot Piper PA-28-181 Archer II aircraft.
- The airplane was issued a valid airworthiness certificate and a valid Airworthiness Review Certificate.
- The computed airplane take-off weight was close to the maximum take-off weight although the fuel quantity and the weight of the luggage taken into account for the computation were likely underestimated.
- The pilot lowered the flaps to the first notch although the second notch is recommended by Piper for soft field take-off.
- During the take-off roll, the airspeed went never above 50 KIAS,.
- The aircraft, having about 45 KIAS, bounced at the crossing of runway 32 and runway 05, became airborne, then fell down. based on the computed take off run, the airplane should have reached the lift off airspeed (V_R 53 KIAS) at that place.

3.2 Cause

The accident was caused by the loss of control of the airplane during the ground run.

3.3 Contributing factors

- The late decision to abort the take-off.
- Aircraft weight most probably heavier than calculated
- No correct handover of flight controls (co-pilot intervenes to push the throttle forward).

4 SAFETY ACTIONS AND RECOMMENDATIONS

None.

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