

## ACCIDENT

<b>Aircraft Type and Registration:</b>	Cessna 182T Skylane, G-LANS	
<b>No &amp; Type of Engines:</b>	1 Lycoming IO-540-AB1A5 piston engine	
<b>Year of Manufacture:</b>	2007 (Serial no: 18281910)	
<b>Date &amp; Time (UTC):</b>	9 December 2017 at 1215 hrs	
<b>Location:</b>	Bodmin Airfield, Cornwall	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - 2
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Damaged beyond economic repair.	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	61 years	
<b>Commander's Flying Experience:</b>	197 hours (of which 52 were on type) Last 90 days - 5 hours Last 28 days - 3 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

## Synopsis

The approach was high and fast, and an intermediate flap setting was used to land on a relatively short runway, with a wet grass surface and a net downhill gradient. After touching down, further along the runway than planned, the pilot was unable to halt the aircraft before it overran the prepared surface and overturned onto a roadway. The pilot and his passengers used the doors to exit the aircraft without injury.

The pilot's licence was issued in July 2015 and, although his Single Engine Piston (SEP) rating had not been re-validated since then, he had maintained regular flying currency.

## History of the flight

Before taking off from Oxford Airfield the pilot obtained information which indicated Runway 31 would be in use at Bodmin and that the grass surface was likely to be wet. The Landing Distance Available (LDA) on Runway 31 is 540 m and the pilot assessed this as sufficient (see *Aircraft performance*). He had visited Bodmin twice previously, the most recent of these visits being less than four months before the accident when he recorded three takeoffs and three landings on Runway 13, while accompanied by an instructor in a Cessna 172 aircraft.

In the vicinity of Bodmin, the pilot learnt that the surface wind was from 140° at 5 kt and that Runway 13 was in use. He was aware of a downhill gradient on Runway 13 but with an LDA

of 598 m, 54 m longer than that of Runway 31, he believed this was sufficient for a '*Short Field Landing*' (see *Aircraft information*), even though the aircraft was close to its maximum landing weight.

While joining the circuit for landing, the pilot orbited to make way for preceding traffic and in doing so he unintentionally allowed the aircraft to climb. Despite his best efforts to descend, he was aware of being higher than he should have been throughout the circuit, and was therefore above the ideal approach path when he established on final approach. He was also aware that the indicated airspeed of 75 kt was faster than intended and he noted afterwards that he only selected two stages of flap, so overlooked selecting the final stage of flap required for a '*Short Field Landing*'.

Prior to landing, the pilot realised that he would touchdown further along the runway than intended but he still thought there was adequate stopping distance. Following the accident he observed that, prior to the downhill gradient, the first section of the runway slopes up, creating a hump, and therefore the far end of the runway was not visible to him at this stage. His impression was that he touched down approximately one third of the way along the runway and he was surprised to learn afterwards that witnesses at the airfield assessed the point of touchdown as closer to three quarters of the available distance.

After touchdown, because of the wet grass, the pilot initially applied normal braking and by the time he realised there was only a short distance in which to stop, he judged that his speed was too slow to initiate a baulked landing and go-around. He then applied maximum braking, but felt the wheels skidding before the aircraft left the end of the runway at low speed. It overran down a grass bank and overturned onto a private road where it came to rest (Figure 1). The pilot secured the fuel and the electrics before he and his passengers opened the doors and escaped, without injury.



**Figure 1**

G-LANS inverted on the perimeter road following the accident.

## Airfield surface conditions

The airfield operator reported that the grass on the runway had been cut the previous month and that although the surface was wet it was not soft or assessed as slippery. Later that day, once the runway had been reopened, several other aircraft landed uneventfully.

## Aircraft information

The Pilot's Operating Handbook (POH) for the Cessna 182 suggests a final approach speed of 70-80 kt with flaps UP and 60-70 kt with flaps selected to FULL. Landings are permitted using any flap setting but no final approach speed is specified for landings with one of the two intermediate flap settings. The POH states that, for a '*Short Field Landing*' in smooth conditions, the approach speed should be 60 kt with flaps at FULL and that heavy braking is required immediately after the nosewheel has been lowered to the ground. To achieve maximum braking, the flaps must be retracted and the control wheel held fully back while applying maximum braking, without allowing the tyres to skid.

## Aircraft performance

The POH includes tabulated performance data for landing using the '*Short Field*' technique. A distance of 416 m is required to come to a halt using maximum braking, from a height of 50 ft above a paved, level runway which is dry; the ground roll for such a runway is 183 m. No data is provided for landings using two stages of flap but with flaps UP the approach speed is to be 70 kt and both landing distances are to be increased by 40% for such landings. The only other data provided in the table is that the distances can be adjusted for the prevailing wind, with a 10% reduction for every 9 kt of headwind.

Advice on the calculation of takeoff and landing distances is provided in the UK Aeronautical Information Circular (AIC) 127/2006 '*Take Off, Climb and Landing Performance of Light Aeroplanes*'<sup>1</sup> and information from this is also included in the CAA's '*Skyway Code*' and in Safety Sense Leaflet 7c '*Aeroplane Performance*'. It is recommended that when certain variables are not available from the POH, then specific factors should be used, before applying a further '*General Safety Factor*' of 43% when landing. The AIC states:

*'When a pilot planning a private flight chooses to accept aerodrome distances or climb performance less than that required for a public transport flight, he should recognise that the level of safety is lowered accordingly.'*

The pilot of this aircraft considered only the ground roll requirement (183 m) in his pre-flight calculations for Runway 31 and he applied the CAA's factor of 35% for wet grass and then the CAA's additional safety factor of 43%. As a result he decided that he required a landing distance of 353 m and was satisfied because this was less than the available LDA of 540 m. When the runway changed to Runway 13 he was aware that he should allow an extra 10% to account for the downhill slope and was satisfied that the LDA of 598 m was sufficient.

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### Footnote

<sup>1</sup> UK AICs can be found on the NATS Aeronautical Information Service website.

After the accident, the pilot realised that by applying the ground roll figure as he did, he was assuming he would touch down at the beginning of the runway and that, even though he knew of no significant obstacles on the approach, it was unlikely he could achieve this. If he had assumed he would cross the runway threshold at 50 ft, then the required landing distance would have been 416 m, with an increase of 10% for the downhill slope and 35% for wet grass; thus his required landing distance for these circumstances was 618 m and this exceeded the LDA of 598 m, even before he applied the recommended general safety factor of 43%. In any case, the figures in the POH assume an approach speed of 60 kt and the use of FULL flap, whereas the approach was flown at 75 kt using only the second intermediate stage of flap.

### **Pilot information**

The pilot's PPL included an SEP rating that was valid from the date he passed his skills test until 31 July 2017 but had not been revalidated. In order to revalidate his SEP rating the requirements of the EASA's Part-FCL.740.A have to be adhered to, meaning the pilot had to pass a proficiency check or meet certain currency criteria and have his licence signed accordingly, prior to the expiry date. The currency criteria are that he should have flown at least 12 hours in SEP aircraft in the 12 months preceding the expiry date (including at least 6 hours as pilot in command), to have performed 12 takeoffs and 12 landings and to have undertaken refresher training of at least one hour with a qualified instructor.

This pilot met the relevant currency criteria prior to the expiry of his rating and he had flown regularly with an instructor but he had not undertaken a refresher training detail and his licence had not been signed. According to the pilot this was an oversight because he had not studied the rating page of his licence and no reminders are sent concerning rating expiry. He noted that he had continued to maintain regular flying currency from the expiry of his rating until the date of the accident and he had even flown three circuits to Runway 13 at Bodmin with an instructor.

Following the accident, when he discovered the oversight with his licence, the pilot undertook refresher training before passing a proficiency check and renewing his SEP rating.

### **Pilot's assessment**

The pilot reviewed his performance calculations and realised that if he had compared the landing distance required from 50 ft against the LDA, he would have found that Runway 13 was not suitable for his aircraft. In any case, the POH tables are primarily aimed at the '*Short Field Landing*' procedure which requires the use of FULL flap and then application of the prescribed maximum braking technique. In future he intends to revise such procedures regularly and to practise them with an instructor during refresher training, which he now views as being of great value, whether mandated or not.

Once he arrived overhead Bodmin he should have circled if necessary and taken time to evaluate the runway he planned to land on. In future, when visiting an airfield where he has little recent experience, he plans to acquaint himself with it by initially flying a "dummy" approach and go-around. Certainly when he realised he was too high on the approach and

that the airspeed was faster than intended, he should have gone around and flown a further circuit. He could have done this at any time before touchdown, but he continued because he believed he could stop before the end of the runway.

### AAIB comment

In addition to recommending that, for planning purposes, light aircraft pilots apply the general landing safety factor of 43%, the CAA's Safety Sense Leaflet 7c includes the following 'Points to Note' in regard to landing:

*'Landing distances quoted in the Pilot's Operating Handbook / Flight Manual assume the correct approach speed and technique is flown – a higher speed will add significantly to the distance required whilst a lower speed will erode stall margins.'*

And:

*'When landing at places where the length is not generous, make sure that you touch down on or very close to your aiming point (beware of displaced thresholds). If you've misjudged it, make an early decision to go-around – don't float halfway along the runway before deciding.'*

Further advice is provided in Safety Sense Leaflet 1 'Good Airmanship' which states:

*'Go-around if not solidly 'on' in the first third of the runway, or the first quarter if the surface is wet grass.'*

The same leaflet recommends that private pilots undertake refresher flying at least once per year and suggests a number of exercises that should be practised during such a refresher flight.