ACCIDENT

Aircraft Type and Registration:	Reims Cessna F152, G-BHNA
No & Type of Engines:	1 Lycoming O-235-L2C piston engine
Year of Manufacture:	1980 (Serial no: 1683)
Date & Time (UTC):	14 May 2017 at 1214 hrs
Location:	Retford Gamston Airfield, Nottinghamshire
Type of Flight:	Training
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - 1 (Serious) Passengers - N/A
Nature of Damage:	Beyond economic repair
Commander's Licence:	Student
Commander's Age:	61 years
Commander's Flying Experience:	62 hours (all on type) Last 90 days - 16 hours Last 28 days - 7 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB

Synopsis

During the landing approach the aircraft was seen to pitch up, roll left and descend rapidly to the ground. The pilot could not recall what happened and differences between eyewitness accounts prevented a clear determination of what happened during the final approach, whether the final manoeuvre was initiated by a gust lifting the right wing, or by an initial pitch-up as part of an attempted go-around.

History of the flight

The student pilot had planned a solo navigation exercise which was to be his last before his qualifying cross country exercise. His instructor was happy with the plan and wanted to fly some circuits with him before sending him solo. The wind was 10 to 12 kt from 240° and some pilots had reported turbulence on final approach for Runway 21.

The pilot stated that on the first approach to Runway 21, they experienced "some lively turbulence which took a fair amount of control input to land safely." The instructor thought this turbulence was coming from a small wooded area on final approach so he asked the pilot to make a higher final approach and aim to 'land longer' on the next one. The pilot aimed to land beyond the '21' numbers; this time he did not encounter turbulence and made a good landing. He did one more circuit, again approaching higher and landing longer, and did not experience turbulence. His instructor was satisfied with his performance and sent him solo.

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The navigation exercise to Grimsby and back was uneventful. About an hour after departure, the pilot re-entered the circuit at Gamston using a 'deadside' overhead join. He was mindful to make a high final approach and land long as he had done earlier. On final, he felt that his approach and height were good. He had the flaps set to 20° which was his normal flap setting for landing[1]. The wind reported by the tower did not cause him concern and he was not experiencing turbulence or crosswind. He remembered seeing an aircraft holding short at holding point 'Bravo' (Figure 1). From then onwards he had a poor recollection of events. However, he did later have recollections of a "tremendous force" hitting the side of the plane and tipping it over, and that with all his strength and full yoke and rudder input he was unable to control the aircraft, followed by a sense of cartwheeling.

The aircraft struck the ground and came to rest close to the final recorded GPS point from the pilot's SkyDemon track log, to the left side of the runway (Figure 1). The pilot was seriously injured and transported to hospital by air ambulance.

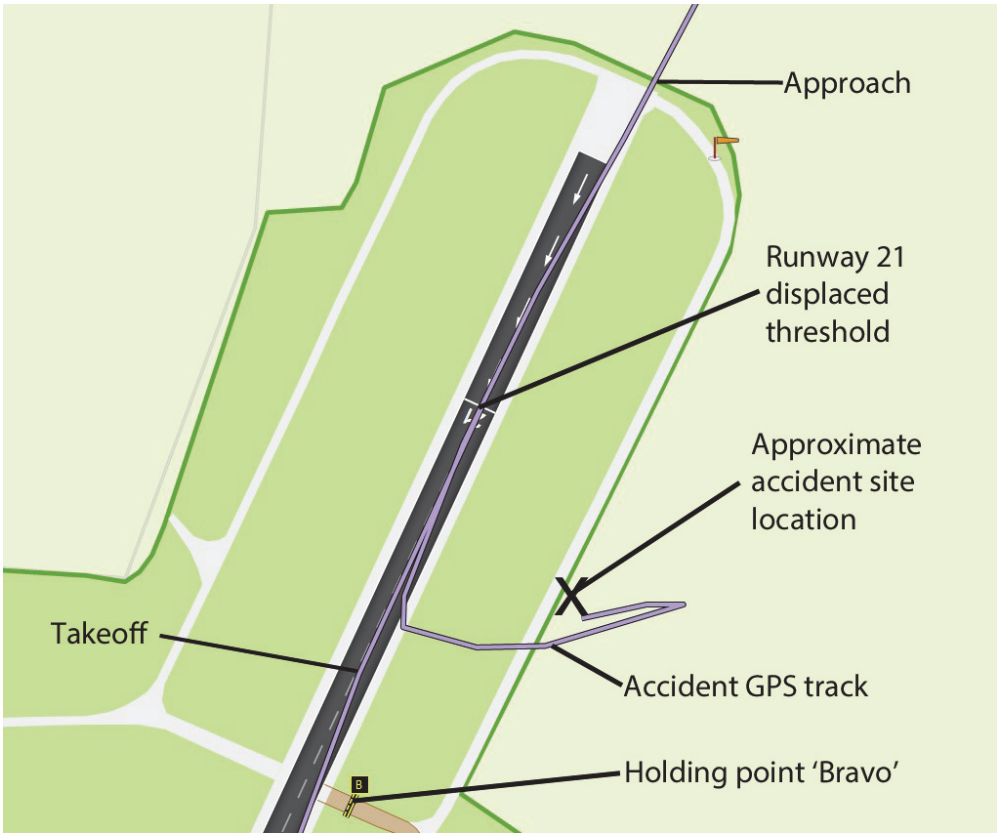

Figure 1

Recorded GPS ground track from SkyDemon log showing the takeoff and the final accident track
(underlying image ©SkyDemon)

Footnote

[1] He had not landed with full (30°) flap while flying solo before. He had only landed with full flap on a few occasions with his instructor while practising short-field landings.

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Pilot's comments

The pilot later stated that he felt that he was a safe and competent pilot and he had had every confidence in his ability to undertake the flight. He commented that because of his lack of recall of the accident, he could only speculate as to the cause, but he thought that wake turbulence from a helicopter might have been a possible cause as the airfield was used for helicopter training. His partner who was waiting for him at the airfield commented on how busy the helicopter operation was that day.

The pilot commented that he had last practised go-arounds around the time of his first solo flight in September 2016. He believed he had not performed a "low-level go-around" before. He said he had made a mental note to request some more go-around practice but had not acted on it.

Eyewitness accounts

The pilot who was in the aircraft holding short at 'Bravo' recalled seeing G-BHNA on short final and a "mighty gust of wind lift the right wing". He recalled that the pilot then added full power with flap extended, the aircraft turned left 180° in a very tight space and stalled.

The A/G radio operator at the time of the accident reported that he saw G-BHNA on a normal approach and then at about 60 to 70 ft agl the left wing stalled and the aircraft entered a spin. He was too far away in a triple-glazed control tower to hear anything. Gamston is used for helicopter training but the radio operator could not recall whether any helicopters had been on approach shortly beforehand. In the 14 years he had been working there he had not seen any issues with helicopter wake turbulence.

The pilot's instructor, who had sent him solo, heard the pilot on the radio as he was returning so he went outside to watch. He said that the approach looked stable to 100 ft agl but then as the aircraft rounded out, it pitched up "violently" to a nose-high attitude before banking "violently to the left" and enter a steep spiral descent or spin. He was confident that the nose had pitched up first before the wing dropped. He did not recall seeing a helicopter shortly beforehand and he was not aware of any issues with helicopter wake turbulence in the two years he had worked at Gamston.

The instructor said that the pilot was proficient in go-arounds and that they might have practised one the day before the accident, but if not, he believed it was at least within the previous two weeks. He said he was instructing about 20 students at this time.

Accident site

A loss adjustor attended the accident site (Figure 2). He reported that the aircraft appeared to have hit the ground vertically in a steep nose-down attitude. He checked the flight controls and did not find any defects. The left flap was down, the right flap was up, the flap selector was up but the flap indicator showed 30°. However, the flap lever could have easily moved in the impact sequence and the mismatch between the flap indicator and the right flap showed that the flap mechanism was disrupted and therefore this indication could not be relied upon as a valid pre-impact position. If the flaps had been asymmetric

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as found it would have caused a right roll instead of the left roll that occurred. Therefore it is highly likely that the flap mechanism was damaged in the impact.

Figure 2
G-BHNA accident site

Meteorological information

Wind information was not recorded at Gamston. The nearest airfields, Waddington and Scampton, were reporting respectively 12 kt from 240° and 13 kt from 250° around the time of the accident. The reports did not include a value for gust which meant that any gusts were less than 10 kt above the mean speed.

The air ambulance pilot who transported the pilot to hospital described the conditions as a "challenging day". He landed about 100 m from the accident site about 6 minutes after the accident. He said that conditions were "bouncy and blustery" with "turbulence across the runway" due to the trees on the western side. He estimated the wind at 15 kt, gusting to 20 or 25 kt on the approach end of Runway 21.

Recorded data

The GPS data recovered from the SkyDemon track log revealed that the approach groundspeed from about 500 ft agl until crossing the beginning of the paved surface varied between 56 and 61 kt. With a headwind component of 10 kt this would equate to an airspeed between 66 and 71 kt. The normal approach speed in a Cessna 152 with full flap is 55 to 65 KIAS. The pilot recalled his instructor telling him to use 70 KIAS on final approach due to the turbulent conditions.

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The GPS groundspeed and altitude where the aircraft crossed the beginning of the paved surface were 60 kt and 190 ft amsl, with a displaced runway threshold elevation of 82 ft amsl. Over the runway numbers, the groundspeed was recorded as 59 kt and the altitude 83 ft amsl but the GPS altitude is not accurate enough to show whether the aircraft touched down; it could still have been at 50 ft agl or more. As the aircraft veered left from the runway, the GPS data showed a brief climb and reducing groundspeed, consistent with the eyewitness accounts.

Flying training record

The flying school provided a copy of the student pilot's flying training record. In the remarks section, it stated that go-arounds were practised on 10 September 2016, the day before the pilot's first solo flight, and then practised again on 30 September 2016. In the subsequent 31 dual flights and 8 solo flights, over a period of seven months, there were no remarks of go-around practice. For the entry on 13 May 2017 (the day before the accident) it stated: '*Lesson spent revising circuits including flapless and go around.*'

Go-arounds are performed at the end of practice forced landings away from an airfield. According to the pilot's flying training record, practise forced landings (Exercise 16, '*Forced landing without power'*) had been performed on one flight, on 14 October 2016.

Radar data for the day before the accident flight

There was no recorded GPS data for the dual flight on 13 May 2017, but the radar data was obtained. This data revealed that five circuits were carried out to Runway 21 and the approach and climb-out profiles were almost identical for the first four, with the last one ending in a full-stop landing. The lowest recorded altitudes on each of the first four approaches was 47 ± 50 ft (corrected for QNH) and the runway elevation was between 72 and 87 ft. This data indicated that the first four were probably normal touch-and-go landings but it is possible that at least one was actually a very low go-around, from almost touchdown height, although a higher and earlier initial rate of climb would be expected from a go-around than a touch-and-go.

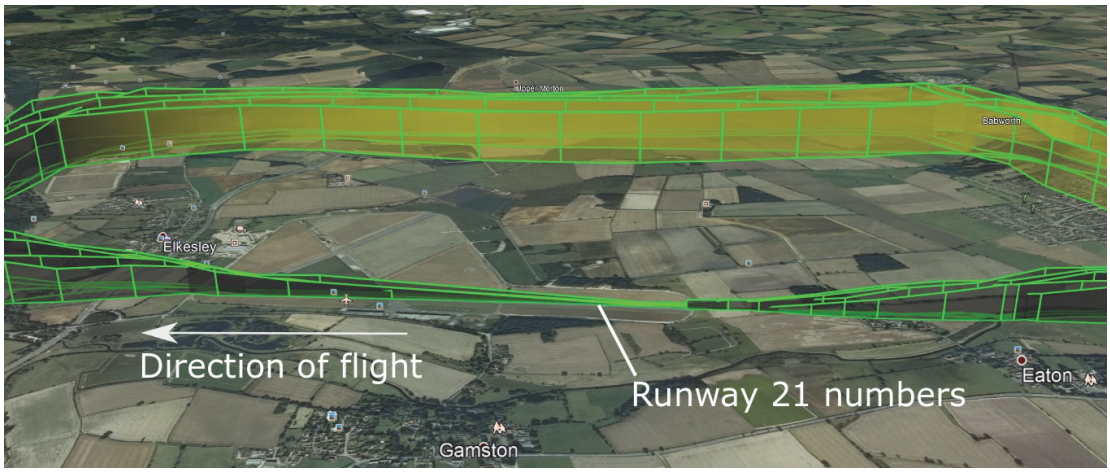

Figure 3

Radar data from G-BHNA's flight on the day before the accident, 13 May 2017

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Additional information

The Cessna 152 flight manual states that:

> *'in a balked landing (go-around) climb, the wing flap setting should be reduced to 20° immediately after full power is applied.'*

20° corresponds to two stages of flap. In this instance, the pilot's recollection was that he was landing with flaps 20°.

Analysis

There were differences in the reports of the three eyewitnesses to this accident. The pilot at 'Bravo' and the A/G operator thought that the aircraft's left wing had dropped first, while the instructor thought that the aircraft had pitched up first before the left wing dropped. The GPS data showed that the aircraft likely rolled left after passing the runway numbers but the altitude data was not sufficiently accurate to determine at what height this occurred or whether it had climbed first before rolling.

If the instructor's account is correct then it would suggest that a go-around was initiated and that the aircraft pitched excessively nose-up. In this aircraft type, applying full power when the aircraft is trimmed with 20° of flap can cause a significant pitch-up if the pilot does not react quickly by pushing the yoke forwards. Applying full power will also cause a yaw and roll to the left if it is not countered with right rudder. It is thus possible that the pilot allowed the pitch-up to continue until the aircraft stalled, causing the left wing to drop and a rotation to the left.

Alternatively, it is possible that the aircraft encountered a strong gust first which caused the left wing to drop, as described by the pilot at 'Bravo'. The air ambulance pilot stated that the conditions were challenging with turbulence near the approach end of Runway 21. A sudden wing drop, low to the ground, may have startled the pilot and caused him to execute a go-around which he was unable to complete that close to the ground.

Helicopter wake turbulence was also considered as a trigger for the upset but none of the eyewitnesses could recall a helicopter operating ahead.

The pilot did not recall having practised go-arounds since around his first solo, seven months previously. The flying training record supported his recollection, apart from the entry of go-around practice on the day before the accident. The radar data showed that if a go-around had been practised on the day before the accident, it was very close to touchdown height, followed by a delayed or shallow climb-out. However, the pilot was confident that he had never performed a "low-level go-around" before.

Conclusion

In this accident, the differences between the eyewitness accounts prevented a clear determination of what happened during the final approach, whether the final manoeuvre was initiated by a gust lifting the right wing, or by an initial pitch-up as part of an attempted

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go-around. In either case, this accident is a reminder of the value of well-taught go-around manoeuvres during pilot training as the low-level go-around can be a challenging manoeuvre to perform, especially for a low-time solo pilot who may not be expecting to do one and who has not practised it many times.

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