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Aircraft Type and Registration:	Cessna FR 172 J Reims Rocket; G-IRLS
No. and Type of Engines:	One Continental IO-360H
Aircraft Serial Number:	0477
Year of Manufacture:	1973
Date and Time (UTC):	6th April 1997; 11.48 hours.
Location:	near Kilrush Airfield, Co. Kildare
Type of Flight:	Private
Persons on Board:	Crew - 1 Pax - 1
Injuries:	Crew - Minor Pax - Minor
Nature of Damage:	Substantial damage to aircraft
Commanders Licence:	UK Private Pilot's Licence
Commanders Age:	39 years
Commanders Flying Experience:	80 hours (of which 14 were on type) Last 90 days 15 hours Last 28 days 6 hours
Information Source:	AAIU Field Investigation.

SYNOPSIS

While landing on Runway 29 at Kilrush Airfield, the Pilot elected to initiate a late go-around, as he believed that the braking action was insufficient to stop the aircraft before the boundary hedge. Shortly after becoming airborne, the aircraft struck the boundary hedge with its undercarriage and continued on into the adjacent field, where it impacted heavily on its main wheels. The aircraft then bounced twice before it penetrated a second hedge. The aircraft yawed 90° to the right as it crossed to the far side of the main Athy to Kilcullen road (N78), where it finally came to rest. The aircraft was extensively damaged.

1. Factual information

1.1 History of the Flight

1.1.1 Positioning flight

G-IRLS departed Haverfordwest Airfield in the UK at 12.35 hours on the 5 April 1997 with one POB. The purpose of the flight was to ferry back home, from Ireland to the UK, three pilot's who were involved in the delivery of two Chipmunk aircraft to Kilrush Airfield the following day. After a flight time of 1 hour and 30 minutes, G-IRLS landed on Runway 29 at Kilrush Airfield, without incident. Weather conditions at the time of landing were good, with 20 kts of head-wind down the runway. The pilot overnighted in an apartment at the airfield.

1.1.2 Accident flight

On the morning of the accident, G-IRLS departed Kilrush airfield (using short field take-off technique) at approximately 10.20 hours with two POB and flew to nearby Clonbullogue Airfield for fuel and oil. The passenger, (who is the holder of a UK PPL (A) with approximately 400 hours), had arrived at Kilrush earlier that morning in the back seat of one of the Chipmunks, and took up the offer of accompanying the pilot of G-IRLS to Clonbullogue. At approximately 10.35 hours, G-IRLS landed on Runway 27 at Clonbullogue without incident. Clonbullogue has a grass surface with a usable runway length of 775 metres. During the one hour stay at Clonbullogue, the aircraft was refuelled with 40 litres of Avgas, the engine was topped up with 2 litres of oil, and both occupants had a cup of coffee, before departing back for Kilrush at 11.35 hours approximately.

On arrival overhead Kilrush, the pilot assessed the wind as calm and planned for a landing on Runway 29. Joining a wide left-hand circuit at approximately 700 ft, the pilot completed his downwind checks which included setting flaps to 10°. On base-leg, 20° of flap was selected, followed by a turn onto finals, which was executed at a height of between 500 ft and 600 ft, approximately 3 to 4 miles out from Runway 29. On final approach, a further 5° of flap was selected (25° in total). The pilot in his submitted report stated that, " *the flap position indicator on G-IRLS is slow to react to changes in flap settings and tends to lag behind, it showed 20 degrees prior to this final adjustment* ".

Continuing the approach, the pilot re-affirmed his landing checks and maintained a speed of approximately 80 mph for the remainder of the approach. It is estimated that the aircraft crossed the boundary hedge at a height of between 30 and 40 feet. Accounts as to how the landing was actually performed, varied between the pilot and the passenger (see additional information, para. 1.18.1). However, evidence suggests that the initial landing took place well into the first third of the runway. The landing was a firm two point landing, followed by a bounce of between 5 and 10 feet. The aircraft floated for a distance before settling back down on the runway with a three point landing.

Braking commenced at a point 250 metres out from the end of the runway. The Pilot stated in his post accident interview that initial braking was gentle, as he was concerned about skidding on the grass. He confirmed that deceleration did occur with the application of brakes, however as he believed that the braking action was insufficient to stop the aircraft before the boundary hedge, he elected to apply full power and initiate a go-around. The Pilot estimated that the go-around commenced at a speed of approximately 45 mph and at a point approximately 100 metres out from the boundary hedge.

The aircraft became airborne at approximately 65 mph, however shortly after becoming airborne, the aircraft struck the top of the 1.5 metre high hedge with its undercarriage. The resultant strike, (which was estimated by the Pilot to be at speed of approximately 70 mph), caused the nose of the aircraft to dip below the horizon as it entered the adjacent field, where it impacted heavily on its main undercarriage. Becoming airborne again, the aircraft passed under a set of electricity supply wires, which were running at right angles across the middle of the field, bounced a further two times, before penetrating a 2 metres high hedge, located 200 metres out from the airfield boundary hedge. Impact speed with this hedge was estimated by the pilot to be approximately 50 mph. The starboard wing struck a substantial tree stump in this hedge. Once through the hedge, the aircraft crossed to the far side of the main Athy/Kilcullen road, yawing 90° to the right in the process. The aircraft finally came to rest in the ditch on the far (West) side of the road, with its nose pointing in a northerly direction. Both POB, who were wearing lap type harnesses at the time, evacuated the aircraft without injury.

1.2 Injuries to persons

Injuries	Crew	Passengers	Other
Fatal	Nil	Nil	Nil
Serious	Nil	Nil	Nil
Minor/None	1	1	

1.3 Damage to aircraft

The three undercarriage legs collapsed, the windscreen was shattered and there was substantial damage to both wings. The starboard fuel tank was ruptured. The starboard wing was forced rearwards and partially collapsed, thereby rendering the starboard cabin door unopenable.

1.4 Other damage

The airfield boundary hedge at the threshold of Runway 11 was slightly damaged.

A five metre long section of hedge row which was running at right angles to the runway heading and positioned 200 metres out from the extended centreline of Runway 29 was also damaged due to aircraft penetration and subsequent recovery of the wreckage back to the airfield.

1.5 Personnel information

Commander: Male, aged 39 years.

Licence: UK Private Pilot's Licence

Aircraft ratings: Single engine land planes with piston engines

Medical certificate: 3 October 1996, Class 3.

Flying experience:

Total all types:	80 hours(includes 20 hours on micro lights)
Total on type:	14 hours
Last 90 days:	15 hours
Last 28 days:	6 hours

Note: The Pilot confirmed that he had only completed a total of 4 aircraft landings on grass runways prior to this accident.

1.6 Aircraft information

1.6.1 General

The Reims Rocket FR 172H is an all metal, high wing, four seater aircraft with a fixed undercarriage. It was constructed by Reims Aviation, France in 1973 (S/N 0477) and had a valid Certificate of Airworthiness (C of A), which was issued on the 4th of April 1997, two days before the accident, and was due to expire on the 25th July 1998.

1.6.2 Airframe

The airframe had been maintained in accordance with the approved maintenance schedule. The last inspection (62 day check) was completed on the 22 March 1997 at 2653 hours. Total time on the airframe up to the 6 April 1997 was 2675 hours.

1.6.3 Engine

The aircraft was fitted with a Continental engine I0-360-H (S/N 72JAA-H-2B), which was manufactured on the 20 November 1978. The last inspection (62 day check) was completed on the 22 March 1997 at 1071.10 hours. Total time on the engine up to the 6 April 1997 was 1097 hours.

1.6.4 Variable -pitch Propeller

The variable-pitch propeller, type 2A34C209, was manufactured by McCauley. The original propeller hub (S/N 727761) was found cracked on the 21 June 1995 and was replaced with an overhauled hub from another aircraft, G-BARC (S/N 725169). Total time on the propeller up to the 6 April 1997 was 1399 hours.

1.7 Meteorological Information

The local actual conditions were as follows;

Wind:	Calm, 270°
Visibility:	10 + Km
Significant Wx:	Nil
Cloud:	BKN 1500 ft
Temperature:	+ 12° C.

1.8 Aids to navigation

Not applicable

1.9 Communications

Not applicable

1.10 Aerodrome information

Kilrush Airfield (260 feet AMSL) is a privately owned airfield, located 7 nm SW of Kilcullen, Co. Kildare. Runway 29/11 is a level grass runway which measures 557.5 metres in length and 30 metres in width. The usable runway length is approximately 500 metres. The surface condition on the day of the accident was firm, as there had been little rain in previous days. The grass was mown to 2 inches and may have been covered with a light morning dew earlier in the day. When the runway was inspected after the accident, the grass was dry. The runway was in good condition, with a firm smooth surface and an absence of skid marks or ruts.

Facilities at the airfield include a control tower, a hangar and a number of apartments which are available for use by visiting Pilots.

1.11 Flight recorders

Not fitted and not required

1.12 Wreckage and impact information

The inboard trailing edge of the wing flaps left witness marks on the sides of the fuselage which indicated a flap setting of 25º at impact. The hydraulic brake lines to both main wheels had been ruptured in the accidents. Both main wheel assemblies suffered considerable impact when the aircraft bounced in the adjacent field and again when the undercarriage legs impacted the earth bank at the base of the hedge which bordered the road. This impact was sufficient to rip the undercarriage legs off the aircraft.

The runway was inspected and no indications of recent skid marks could be found.

1.13 Medical and pathological information

Not applicable

1.14 Fire

There was no fire. However the ruptured fuel tank did pose a major fire hazard and the local Fire Brigade laid a foam blanket on the spilt fuel, and endeavoured to contain the fuel to prevent contamination of the surrounding area.

1.15 Survival aspects

Not applicable

1.16 Tests and research

Tests were conducted on the brake cylinders and brake units which indicated that there were no defects in these units. The brake pads were in good condition. The brake disks were slightly out of true, with a maximum reading, measured at the rim, of .022 inches on the right disk and .014 inches on the left disk.

1.17 Organisational and management information

Not applicable

1.18 Additional information

1.18.1 The Landing

Conflicting accounts materialised between the pilot and the passenger about how the landing was actually performed.

During the post accident interview, the pilot stated that the final approach and landing was completed without any problem, the aircraft quickly landed and continued its landing roll.

In the opinion of the passenger, he indicated that the landing speed appeared slightly fast. The aircraft touched down firmly on its main wheels, bounced between 5 and 10 feet back up into the air and floated a distance, before it re-landed on all three wheels.

1.18.2 Application of brakes

During the post accident interview, the pilot stated that as he was concerned about skidding on the grass, he initially applied a gentle braking action. He confirmed that the aircraft did decelerate, however, as he considered that the rate of deceleration was insufficient to stop the aircraft, he elected to initiate the go-around. The pilot acknowledged that he had experienced no braking problems at Clonbullogue earlier in the day or while landing at Kilrush the previous day.

In a supplementary report attached to the Accident Report Form submitted by the pilot, he stated that, *" The brakes were initially gently applied, then moderate braking force was applied to the brake pedals. As soon as I realised the aircraft was not decelerating I immediately released and re-applied the brakes. There was no discernible change in the aircraft's speed during this action or at any position of the brake pedals. The aircraft continued in a straight line heading for the boundary hedge at approximately 45 mph. Without brakes there was insufficient runway ahead of the aircraft to turn or attempt to initiate a ground loop. In order to avoid colliding with the boundary hedge I attempted a go-around, applying full power, then elevator".*

In subsequent discussions the passenger stated that the pilot commenced braking abeam the airfield hanger, which is located approximately 250 metres out from the boundary hedge. He confirmed that he had experienced the aircraft decelerating, when the brakes were initially applied by the pilot.

1.18.3 Braking Action

The runway surface condition was inspected approximately 3 hours after the accident. The surface was such that it should have allowed for heavy braking without any major concern for skidding. No braking skid marks could be found for the accident aircraft during the runway inspection.

1.18.4 The go-around.

The pilot initiated the go-around at a speed of approximately 45 mph, with 100 metres to run to the boundary hedge. As he applied full power, he heard a shout of "No" from the passenger, followed by what he thought was a hand movement towards the throttle lever. When asked if the passenger had made contact with the throttle lever or if he had interfered in any way with the controls during the initial go-around, the pilot responded that, *" he was not sure ".*

The passenger confirmed that he did shout "No", when the Pilot applied full engine power for the go-around and that he had made an attempt to get to the throttle, but failed. This response he felt was a reflex action, as he believed that the remaining runway available was insufficient to initiate the go-around.

1.18.4 Short Field Landings

On page 4.13 of the FR 172H Flight Manual, it describes in brief the procedures for performing a short field landing. It states, " For short field landings, make a power-off approach at approximately 117 km/h - 63 kts - 73 mph with 40° flap and land on the main wheels first. Immediately after touchdown, lower the nose gear to the ground and apply heavy braking as required ".

1.18.4 Field Performance- Landing distance.

Page 5.10 (Fig 5.5) of the F 172H Flight Manual provides performance figures for ground roll and total distance required to clear a 15 metre obstacle in the landing phase.

Under the conditions of 40° Flap, power-off, zero wind and hard surface runway, the figure carries a foot note, which states that for operation on a dry grass runway, increase distance (both "ground roll" and "total to clear obstacle") by 20% of the "total to clear 15 metre obstacle" figure. Thus, the calculation for "Ground Roll" and "Total to Clear a 15 metres obstacle" is 266 metres and 481 metres respectively.

In communications with the Cessna Aircraft Company, during the course of this investigation, Cessna stated that," *Other than the Notes on Landing Distance Charts that reference operation from dry grass runways, no other data or published adjustments are available."*

1.9 New investigation techniques

None

2 ANALYSIS

2.1 The Pilot had limited experience in operating to and from grass airfields. In fact much of his flying was from Haverfordwest Airfield, which has long hard-surface runways. It is widely recognised that different techniques are required for short grass airstrips as opposed to those used on long hard-surfaces runways. Operating into short grass airfields requires a good control of approach and landing speeds, a close clearance over the boundary hedge, a positive touchdown early into the runway, followed by appropriate heavy braking. Full flap selection is also recommended for most aircraft.

2.2 The accident approach and landing was flown with a flap setting of 25°. However the aircraft's Flight Manual recommends that for short field landings, flaps should be set at 40°. This flap setting will generally provide for a lower touch-on speed, and will significantly reduce the effect of aircraft float in the round out. Evidence suggests that the approach was flown at the higher end of the recommended approach speed scale of 70 to 80 MPH. The initial touch down was fast, firm and well into the first third of the runway. The combined effects of the calm day, the flap setting, and the bounce on the initial touchdown, contributed to the aircraft floating a considerable distance, until it finally settled back down on its three wheels.

2.3 The pilot braking commenced at 250 metres from the boundary hedge, which was beyond the halfway point of the total runway length available. The absence of skid marks indicated that vigorous braking action was not initiated before the landing was abandoned.

The general condition of the airfield clearly indicated that runway was dry and firm and would provide a good braking surface, for a grass runway.

The pilot's decision to apply gentle braking on landing was related to his concern for the possibility of skidding. However, in this particular case, his concern was unfounded.

2.4 The initiation of the go-around was taken in the belief that the braking applied by the pilot was generating insufficient braking action to decelerate and stop the aircraft within the remaining distance available. Tests carried out on the aircraft's braking system indicate that the brakes were serviceable and operating satisfactorily prior to the decision to go-around. Even though the application of braking commenced late into the landing run, a more aggressive input of braking should have been sufficient to stop the aircraft before the boundary hedge. The decision by the pilot to initiate the go-around at such a late stage, did not allow for a sufficient margin of safety to clear the boundary hedge.

2.5 While it is accepted that exchanges did take place between the pilot and the passenger during the go-around, it is considered that these exchanges had no bearing on the eventual outcome of the go-around.

3 CONCLUSIONS

3.1 Findings

3.1.1 The pilot was properly licensed, medically fit and adequately rested to conduct the flight. However he was inexperienced in operating to and from short airfields with grass surfaces.

3.1.2 The aircraft had a valid UK Certificate of Airworthiness.

3.1.3 The aircraft had been properly maintained and its documentation was in order.

3.1.4 The aircraft weight and centre of gravity was within the authorised limits.

3.1.5 The approach and landing was flown with 25° of flap. The aircraft's Flight Manual recommends a setting of 40° for short field operations.

3.1.6 The aircraft initially landed fast, then bounced and floated a distance before settling back down on all three wheels.

3.1.7 Braking did not commence until the aircraft had used over half the available runway during its landing run.

3.1.8 The braking applied by the Pilot was insufficient to stop the aircraft in the remaining distance.

3.1.9 The runway surface condition was such that heavy braking could have been applied without concern of skidding.

3.1.10 Tests completed on the aircraft braking system indicate that no fault existed prior to the application of the brakes or during the braking sequence.

3.1.11 The point at which the Pilot decided to initiate the go-around was approximately 100 metres from the boundary hedge.

3.2 Causes

The following causal factors were identified:

3.2.1 The pilot did not fly the short field landing procedure as recommended in the aircraft's Flight Manual.

3.2.2 Adequate heavy braking, which was available to the pilot prior to his decision to initiate the go-around, was not applied during the landing roll.

3.2.3 The decision to go-around was taken at a point that did not allow for an adequate margin to clear the boundary hedge.

3.2.4 The pilot's lack of experience on grass airfields, especially short airstrips, was a significant factor

4 SAFETY RECOMMENDATIONS

This report does not sustain any safety recommendations