

# Safety Investigation Report

Ref. AAIU-2012-08

**Classification:** Serious incident

**Level of investigation:** Standard

**Date and hour:** 15 April 2012 at 12:00 UTC

**Aircraft:** CESSNA F150M

**Accident location:** 15 NM South East of Sierra EBLG airport.

**Type of flight:** Training flight

**Phase:** Simulation of forced landing

**Persons on board:** 2 persons on board, a student pilot and an instructor.

## Abstract

At the end of a forced landing simulation exercise performed by the instructor the airplane collided with an electrical cable at a height estimated between 10 and 20 meters. The crew felt a shock and heard a bang, but did not see the obstacle. The airplane remained controllable and after having assessed that the damage was limited and the airplane behaviour was satisfactory, the instructor decided to fly back to his home base EBLG. The return flight was uneventful.

## Cause

The cause of the incident is the decision of the instructor to continue the exercise at a too low altitude at the end of a simulation of forced landing performed by a student pilot. The instructor took over to make a demonstration to the student pilot for didactical purpose.

## Contributing factors:

- The last part of the forced landing exercise was improvised.
- The area where the exercise was performed was not checked in advance neither by an inspection from the ground or by any other means to ensure the area was free of obstacle.
- The applicable regulations were not adhered to.

## Recommendations:

There is no recommendation, considering the adequate action of the flight school after the incident.

## Hazard identified during the investigation <sup>1</sup>:

Flying under the minimum safe altitude.

**Consequence <sup>2</sup>:** Controlled flight into terrain or obstacle (CFIT)

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<sup>1</sup> Hazard – Condition or object with the potential of causing injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function.

<sup>2</sup> Consequence – Potential outcome(s) of the hazard

## Factual Information

### History of the flight

A student pilot initiated a flight with an instructor to exercise simulation of forced landings before taking the PPL examination. After the flight preparation, the airplane took off from EBLG and flew in a South Easterly direction towards the "India" and the "Sierra" reporting points. The exercise was first fully demonstrated by the instructor starting at an altitude of 2000 ft, the candidate pilot was then requested to perform the exercise starting at an altitude of 2500ft. The initial part of the exercise went according to plan, beginning with the HACLL checklist<sup>3</sup> but when levelling the airplane, the pilot saw he was not able to reach the selected field. The instructor took over in order to demonstrate that even when failing to reach the selected field, they were able to select another one. The instructor turned the airplane losing further altitude and approached a second field. The instructor interrupted the approach, close to the ground, when satisfied he could show the candidate pilot they could actually land on the field. The instructor moved the throttle forward and a few seconds afterwards the airplane collided with a cable. The airplane was flying at a height of 10-25 m when impacting the cable. The crew heard more what happened than actually seeing it. After regaining safe altitude the instructor assessed the damage. He felt the engine was running smoothly and the airplane behaviour was normal and decided to go back to EBLG. They followed the same route, did not find it necessary to declare an emergency and landed in EBLG. The crew discovered the damage after stepping out of the airplane.

### Instructor Pilot information

Male, 27 years old.

Aeroplane Commercial Pilot Licence, first issued 27 October 2005, valid until 18 October 2015.

Rating: SEP (land) valid until 30 September 2012. FI(A) valid until 31 August 2014.

Medical Certificate: Class 1, valid until 2<sup>nd</sup> May 2012.

Total Flight Experience: 2798 FH, PIC: 2651 FH, SEP: 2757, MEP: 41

Most of the flying experience was established in the USA where it is current practice to fly down close to the ground to make the simulation of forced landing more realistic.

**Student Pilot:** Male, 30 years old. Total Flight Experience: around 55FH.

### Meteorological information

METAR EBLG at 11:20 UTC: Temperature: 8°C, Dew point 2°, Wind: 10° 14 knots, Visibility +10 km and QNH: 1012 HP, Ceiling: SCT 024 and BKN 040.

### Damage

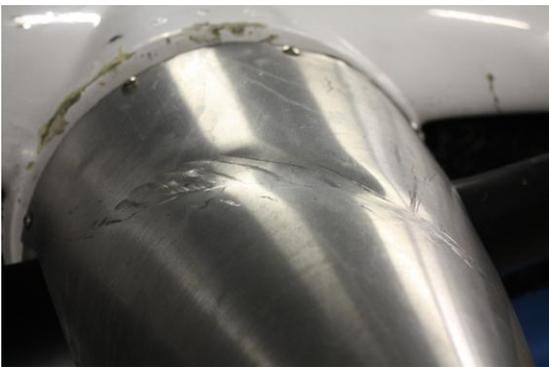
The damage was concentrated on the engine cowling and spinner. Minor cable impact damage was also visible on both the intrados and extrados of the propeller blades (scratches) and on the right hand wing leading edge (small recess).

The damage seemed consecutive to a collision with an electrical power line, owing to the cable strand indications on the propeller blades and spinner and the burning traces around the engine air intake.

As the crew did not notice the exact location of where the incident occurred and no complaint was filed by the owner of the power cable, the exact location of the cables could not be retrieved. Therefore the damage and the type of the cables could not be determined. However it is assumed that the cable(s) was (were) relatively small and were cut by the impact

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<sup>3</sup> HACLL checklist: Height above ground, Area below, Cockpit check including seat belts, instruments checked, no unsecured items in the cabin and Look out + Location.



## Rules of the air

The Belgian Royal Decree dated 15 September 1994 sets up the minimum safe heights for VFR flights.

Article 74 of Royal Decree inspires from ICAO Annex 2 § 4.6 except:

- The applicable settlements which cannot be overflown are precisely described in the Royal Decree.
- It introduces an additional condition to fly under 1000 ft AGL: “Elsewhere at a height less than 150 m (500 ft) **above the highest obstacle within a radius of 150 m from the aircraft**”

Hereunder the applicable extract of ICAO Annex 2 § 4.6, Royal Decree dated 15 September 1994 and USA CFR 14 § 91.119.

### ICAO Annex 2 § 4.6

*Except when necessary for take-off or landing, or except by permission from the appropriate authority, a VFR flight shall not be flown:*

- a) Over the congested areas of cities, towns or settlements or over an open-air assembly of persons at a height less than 300 m (1 000 ft) above the highest obstacle within a radius of 600 m from the aircraft;*
- b) Elsewhere than as specified in 4.6 a), at a height less than 150 m (500 ft) above the ground or water.*

### 15 SEPTEMBRE 1994. - Arrêté royal fixant les règles de l'air - Art. 74. (Extract)

*Sauf pour les besoins du décollage et de l'atterrissage ou sauf autorisation du Ministre chargé de l'administration de l'aéronautique ou du directeur général de l'Administration de l'Aéronautique, il est interdit de faire évoluer un aéronef selon les règles de vol à vue :*

- a) Au-dessus des villes et des parties agglomérées de communes, des zones d'habitation, des complexes industriels, du terminal LNG de Zeebrugge, des centrales nucléaires, les prisons, des établissements pénitentiaires ou des rassemblements de personnes en plein air à une hauteur inférieure à 300 m (1 000 pieds) au-dessus de l'obstacle le plus élevé, situé dans un rayon de 600 m autour de l'aéronef.*
- b) Ailleurs, à une hauteur inférieure à 150 m (500 pieds) au-dessus du sol ou de l'eau et à une distance inférieure à 150 m de tout obstacle artificiel fixe ou mobile.*

### 15 SEPTEMBER 1994. - Koninklijk besluit tot vaststelling van de vliegverkeersregelen Art. 74. (Extract)

*Behalve wanneer dit nodig is om op te stijgen of te landen, of behalve toestemming van de Minister belast met het bestuur van de luchtvaart of van de directeur-generaal van het Bestuur van de Luchtvaart, is het verboden te vliegen overeenkomstig de zichtvliegvoorschriften :*

- a) Boven steden en bebouwde kommen van gemeenten, industriële complexen, de LNG-terminal te Zeebrugge, woonzones, nucleaire centrales [1 , gevangenissen, strafinrichtingen]1 of mensverzamelingen in open lucht op een hoogte lager dan 300 m (1 000 voet) boven de hoogste hindernis binnen een straal van 600 m rond het luchtvaartuig.*
- b) Elders, op een hoogte lager dan 150 m (500 voet) boven de grond of het water en op minder dan 150 m van elke vaste of verplaatsbare kunstmatige hindernis.*

### USA CFR Title 14 § 91.119 Minimum safe altitudes: General (Extract)

*Except when necessary for take-off or landing, no person may operate an aircraft below the following altitudes:*

- a) Over congested areas. Over any congested area of a city, town, or settlement, or over any open air assembly of persons, an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.*
- b) Over other than congested areas. An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.*

No permission from the appropriate authority (BCAA) is granted to any flight school to fly below 500 ft AGL.

## Guidance manual for examiner.

A "Flight Examiners Manual" (FEM) was published by the Joint aviation Authorities (JAA) to provide guidance for National Authorities in their training and management of examiners. The FEM was also intended to be the main reference manual for the training and subsequent reference of examiners.

Hereunder an extract of this manual concerning the simulation of forced landing.

### *6.3.1.15 Simulated Forced Landing*

*The engine failure will be simulated in accordance with the method recommended by the manufacturer. Engine failure should be simulated from sufficient height to permit the applicant time to clearly demonstrate his knowledge of procedures and skill. The practise should be given without advance warning from the examiner, however, the examiner should ensure that some choice of landing area exists within the field of vision of the applicant and within gliding range of the aircraft. Provided the aim of the exercise is accomplished in an organised manner, the examiner should not be adversely influenced if the procedure used varies slightly from the examiner's own procedure.*

## Post incident Flight school action

The day after the incident the chief instructor of the flight school sent the following message to all the instructors and student pilots and other concerned persons.

*Yesterday, a C150 collided with a cable during a forced landing simulation performed at very low height. Fortunately nobody was hurt while the airplane is seriously damaged. However I remind you that this exercise must be interrupted at least down to 500ft AGL. It is strictly forbidden in our flight school to make this exercise under this height unless if it is above an airfield. I hope all of us will learn a lesson from this accident and ask you to continue considering the safety as being the highest priority for all our flights.*

## Analysis

### Difference between Belgian and FAA regulation

The instructor stated it was common practice to do this type of exercise down to a few meters from the ground when he was instructor in the USA. As seen in the "Rules of the Air" chapter, the regulation applicable in the USA (§ 91.119 ) allows flying under 500 ft over other than congested areas provided the aircraft is not be operated closer than 500 feet to any person, vessel, vehicle, or structure. It is thus the pilot responsibility to ensure no person, vessel, vehicle, or structure are present. By contrast, the Belgian regulation does not allow flights under 500 ft AGL over other than congested areas unless special authorization is granted by the authority, owing the high density of population and the numerous obstacles generally present above the ground surface in Belgium. The American rule of the air trust and incite the pilot to be responsible of his low flight safety while the Belgian rule of the air is more restrictive and "protective".

### Choice of the area where the exercise had to be done

The place where the airplane hit the cable was not retrieved and could not be precisely described by both the instructor and the pilot, proving that this area had not been evaluated in advance neither by an inspection from the ground or by any other means to ensure the area was free of obstacle. Actually, the area was only inspected in flight when starting the forced landing exercise at 2500ft, as per the HACLL checklist ("A" meaning "Area below").

It is no surprise that neither instructor or student were able to detect in time the electrical cables which are known to be almost invisible in flight.

## **Engine forced landing simulation during PPL training and student pilot examination**

The instructor explained that during the PPL examination some examiners simulate an engine failure only above an airfield while other examiners simulate engine failures during the cross country flight. As seen in the "Guidance manual for examiner" the examiner has the authority to decide which type of exercise is more appropriate. No guidance is provided regarding the minimum safe altitude AGL when performing this type of exercise.

### **Violation of the flight rules**

When the incident occurred, the instructor seeing the student had failed the exercise, decided to show him how to remedy a (simulated) bad situation. He took over in order to demonstrate that other possibilities to land did exist.

The instructor did not plan to fly the airplane almost down to ground level. Although he took over because he was concerned about doing things well, believing this type of demonstration was worthwhile to the student if he had to face a real engine failure in the future. The instructor, being influenced by his experience flying in the USA, had probably not realised he made a violation.

### **Post incident Flight school action**

The message to all the instructors and student pilots and other concerned persons reminding the minimum safe height, including during simulation of engine failure is satisfactory.

Moreover, the chief instructor emphasized the lessons to be learned from this incident and reminded everybody that safety is the priority number one. Therefore the reaction of the flight school is considered as being adequate.

## **Conclusion**

The cause of the incident is the decision of the instructor to continue the exercise at a too low altitude at the end of a simulation of forced landing performed by a student pilot. The instructor took over to make a demonstration to the student pilot for didactical purpose.

## **About this report**

*As per Annex 13 and EU regulation EU 996/2010, it is only obliged to perform a full investigation of accidents and serious incidents involving aircraft other than specified in Annex II to Regulation (EC) No 216/2008. For this occurrence, a limited-scope, fact-gathering investigation and analysis was conducted in order to produce a short summary report.*

*It is not the purpose of the Air Accident Investigation Unit to apportion blame or liability. The sole objective of the investigation and the reports produced is the determination of the causes, and, where appropriate define recommendations in order to prevent future accidents and incidents.*