

Collision with ground during final turn

Aircraft	Robin DR400-160 registered F-GGQF
Date and time	21 September 2014 at around 17 h 35 ⁽¹⁾
Operator	Club
Place	Vitry-en-Artois (62, France)
Type of flight	General Aviation, pleasure flight
Persons on board	Pilot and three passengers
Consequences and damage	Pilot and one passenger injured, aircraft destroyed

⁽¹⁾Except where otherwise stated, times in this report are local.

This is a courtesy translation by the BEA of the Final Report on the Safety Investigation. As accurate as the translation may be, the original text in French is the work of reference.

1 - HISTORY OF FLIGHT

The pilot took off at 15 h 25 from runway 03 from Lens Bénifontaine aerodrome (62) to go and pick up three friends at Vitry-en-Artois and make a leisure flight. After about ten minutes of flight, he landed on runway 30 at Vitry-en-Artois aerodrome. He took off again at about 16 h 00 from the same runway accompanied by the three passengers and planned to overfly the coast and land at Dieppe (76) for a break before returning to Vitry-en-Artois. During the flight, approaching Dieppe, he noticed a deterioration in the visibility conditions and returned directly to Vitry-en-Artois.

The pilot stated that on arrival, he overflew the windsock twice but had difficulties in judging the wind direction. He estimated that the wind strength was about 15 km/h (around 8 kt) from between 250° and 300°. He joined the left hand downwind leg for runway⁽²⁾ 12. He stated that on the final turn he felt *"a gust of wind pushing him down onto the ground"*. The aeroplane dropped, banked to the left and pitched nose-down. The pilot reduced the power, put the wings back into a horizontal position and pulled up strongly before the collision with the ground.

⁽²⁾Unpaved
900 x 100 m runway,
LDA 837 m.

2 - ADDITIONAL INFORMATION

2.1 Wreckage and Impact Information

The aeroplane struck the ground with the wings in a virtually horizontal position in a ploughed field that was obstacle-free. The three parts of the landing gear broke off when going over furrows that were dozens of centimetres deep. The aeroplane stopped about 250 m from the threshold of runway 12.

⁽³⁾The pilot stated that he had pushed the carburettor heater control after the accident.

⁽⁴⁾The pilot usually used the right throttle levers.

None of the examinations performed on the aeroplane brought to light any technical anomalies that might explain the event. Specifically, it was noted that:

- ☐ the altimeter was set at QFE;
- ☐ the flaps were extended to 10°;
- ☐ the carburettor heater control was pushed in⁽³⁾;
- ☐ the right throttle levers⁽⁴⁾ were bent and in the maximum idle position;
- ☐ the engine was correctly supplied with fuel.

2.2 Readout of GPS and Photos Taken in Flight

The pilot was using a portable GPS that recorded geographical positions. Readout enabled reconstitution of the horizontal flight path of the accident flight and previous flights.

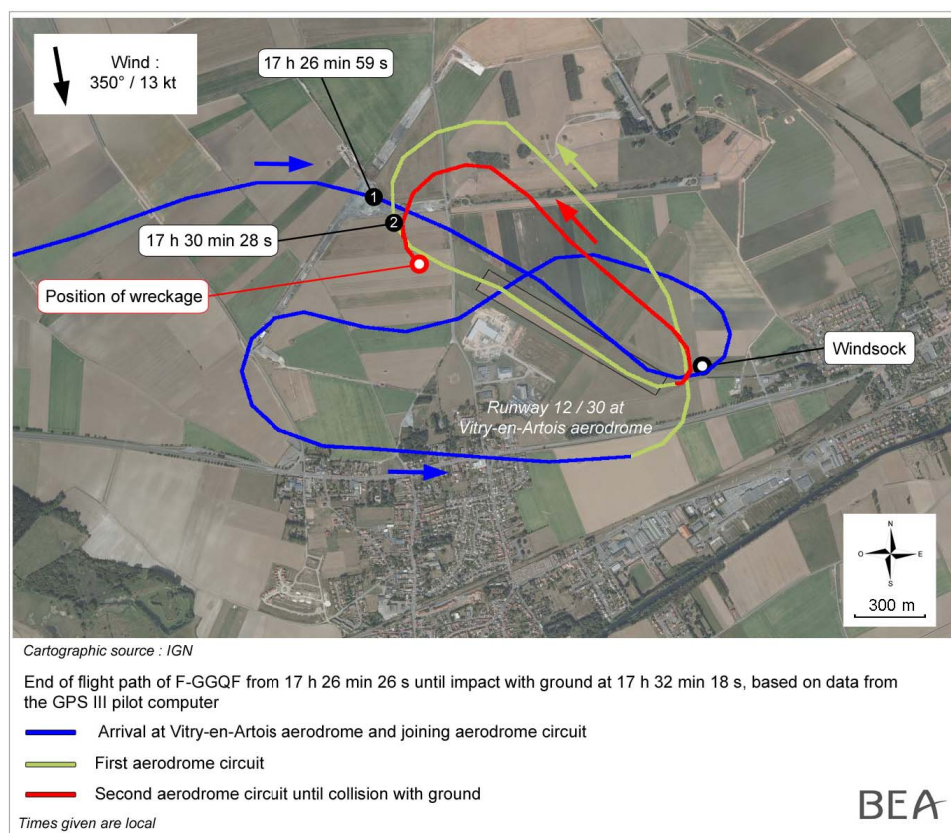


Figure 1: accident flight

The flight path of the accident flight showed that the pilot flew over the windsock to the right the first time. He then flew away before joining the left hand downwind leg for runway 12. He then made two circuit patterns. The accident occurred on the final turn.

The average calibrated airspeed on the left hand downwind leg was 140 km/h during the first circuit and 120 km/h on the second circuit. During the two circuits, the pilot turned to the left at the end of the downwind leg 10 seconds after overflying the runway threshold, taking him about 0.2 NM from the displaced threshold at the end of the final turn.

⁽⁵⁾The height of the published aerodrome circuit is 800 ft.

The passenger in the rear left seat took several photos during the flight. Analysing these made it possible to establish that:

- ❑ the arrival at the aerodrome was done at a height of about 500 ft⁽⁵⁾ (point❶);
- ❑ at point❷, the aeroplane was on final about 500 metres from the displaced runway threshold at a height of about 330 ft and the aeroplane had a bank angle of at least 35°.

Readout of the GPS also made it possible to reconstitute the flight paths of two flights performed by the pilot at the start of September on a DR360 from the club as well as the flight that preceded the accident. During these flights the pilot made complete landings at Vitry-en-Artois and at Lens. The integration and the aerodrome circuits were not standard.

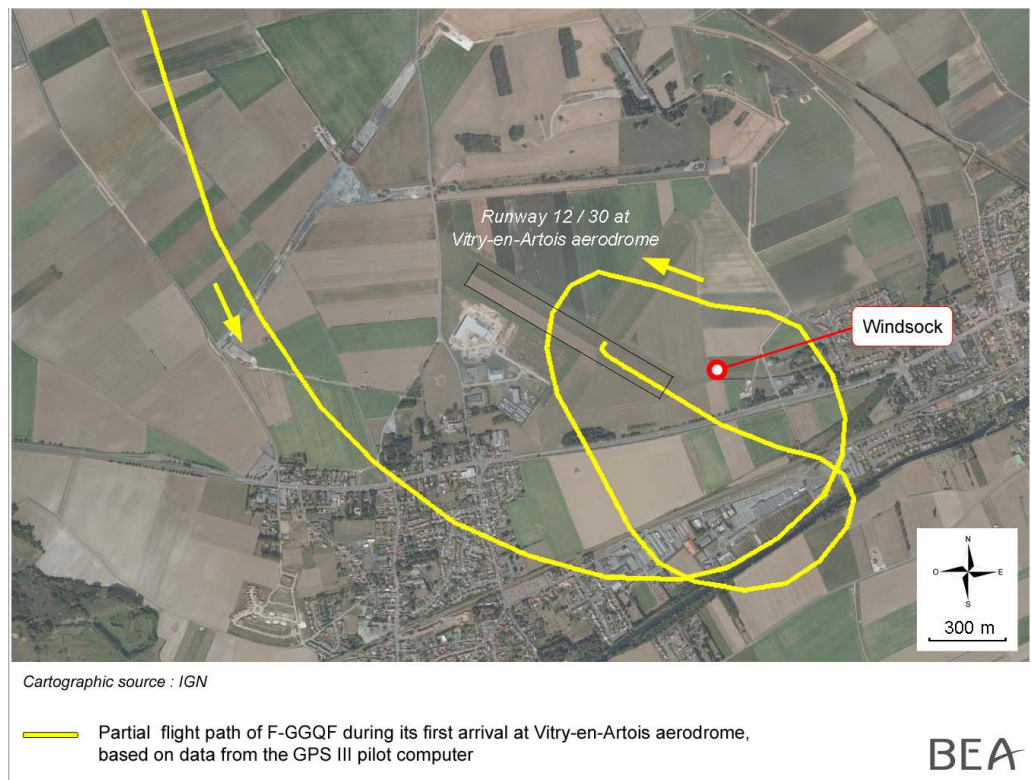


Figure 2: Flight preceding the accident, landing on runway 30 at Vitry-en-Artois

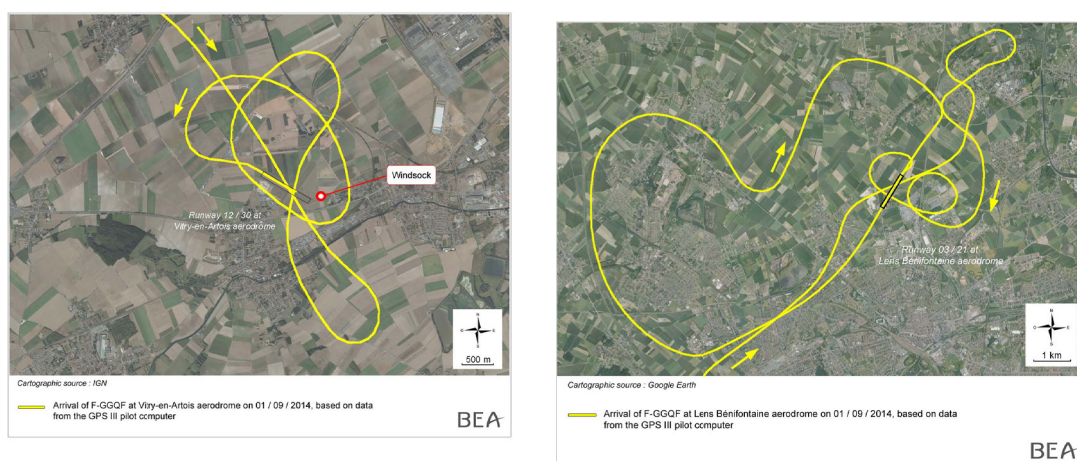


Figure 3: landings made in September 2014 based on GPS data

2.3 Pilot information

The 60-year-old pilot held a private aeroplane pilot's licence issued in 1997. He had a total of about 650 flying hours including six during the month of September. He had not flown between August 2013 and September 2014. His last flight with an instructor was in November 2012 to extend his SEP rating. He added that after a break of more than a year of no flights he did not feel the need to do a flight with an instructor and that he was *"very sure of himself"*.

The pilot stated that the day before the accident he had reserved the aeroplane for the following afternoon. On the morning of the accident he had decided to cancel the flight because of meteorological conditions. At midday he had a meal with a friend during which he drank alcohol. At about 14 h 30 he noted that the meteorological conditions were improving and decided to undertake the flight. He added that he had also had some alcohol before taking off from Vitry-en-Artois. He nevertheless specified that he felt *"very sure of himself"* and that this had not affected his flight.

The pilot indicated that he was not used to doing standard circuit patterns at non-controlled aerodromes when there was no other traffic. He followed flight paths similar to that of an engine failure procedure approach (U-shaped path) and performed his approaches at a speed between 170 and 180 km/h⁽⁶⁾ with flaps extended to 10°. He specified that he always checked his speed and that it was important to *"maintain speed"*. He added that given his experience he did not feel the need to perform standard patterns and preferred to shorten flight paths.

The pilot's testimony showed that the latter had difficulty in judging the wind direction in relation to the direction of the runway.

2.4 Information on the Club

The club rules state that a pilot that has not flown for more than three months must undertake a dual instruction flight before making a flight as a captain. The club had set up a system for issuing aeroplane keys that specifically took this restriction into account. In August 2014 the club had been forced to change premises. Following the move, the key delivery system no longer worked.

⁽⁶⁾The approach speed recommended in the flight manual is 120 km/h with flaps in landing position. The VFE is 170 km/h.

⁽⁷⁾A BAC of about 0.02% is reached between half an hour and an hour after absorption of a «standard» drink containing 10 grams of pure alcohol (a 10 cl glass of champagne, 25 cl beer or 3 cl whiskey).

⁽⁸⁾A. M. Williamson, Anne-Marie Feyer - Moderate sleep deprivation produces impairments in cognitive and motor performance equivalent to legally prescribed levels of alcohol intoxication - Occup Environ Med 2000;57:649–655.

⁽⁹⁾Article R234-1 of the French highway code.

⁽¹⁰⁾AMC1 CAT.GEN. MPA.100(c)(1) Crew responsibilities – Alcohol consumption; www.easa.europa.eu/system/files/dfu/Annex%20to%20ED%20Decision%202012-018-R.pdf

⁽¹¹⁾Accident on 18 April 2003 to the aeroplane registered F-GANE; <http://www.bea.aero/docspa/2003/f-ne030418/pdf/f-ne030418.pdf>

The club rules also specify that “pilots must only undertake a flight when in complete control, both mentally and physically”.

The last flight to extend the pilot’s SEP rating was carried out by the club’s chief pilot. The latter had no specific memory of this flight.

2.5 Meteorological Conditions

At the time of the accident, the surrounding Météo France automatic weather stations recorded a 350° wind of between 12 kt and 19 kt.

The 17 h 30 Lille Lesquin observation message (about 25 km from the site of the accident) mentioned a 350° wind variable between 320° and 020° at 13 kt and CAVOK conditions.

2.6 Alcohol Consumption and Flying

The pilot stated that he had consumed alcohol during lunch and between the two afternoon flights. About one hour after the accident, his blood alcohol concentration (BAC) was 0.048%. Models of the fall over time of the BAC made it possible to deduce that the pilot’s BAC at the time of the accident was about 0.06%. This implies that the pilot’s blood alcohol content had never been less than 0.06% throughout the flight.

A BAC equal to or greater than 0.025-0.030%⁽⁷⁾ is traditionally associated with euphoria, disinhibition and psychomotor coordination problems likely to affect performance. For information, correlations have been observed between the level of performance corresponding to a BAC of 0.05% and one assessed after a period of 17 to 19 hours awake⁽⁸⁾.

The pilot was therefore physiologically under the influence of alcohol during the flight. However, the legal meaning of “influence” remains variable in various areas of life and in different countries. Thus for example in France, a public transport driver⁽⁹⁾ (land) or a commercial airline pilot⁽¹⁰⁾ should not perform their duties with a BAC higher than 0.02%. However for a driver of a land vehicle (apart from public transport), current legislation tolerates a maximum BAC of 0.05%.

There is therefore a difference between the BAC affecting human performance (from 0.025-0.03%, see the report on the accident of the F-GANE⁽¹¹⁾) and the 0.05% for which sanctions are provided in the French highway code.

The decree of 24 July 1991 relating to conditions of use of civil aircraft in general aviation states in paragraph 4.1.4 that “All crew members must abstain from performing their duties as soon as [...] they are under the influence of alcoholic beverages, narcotics or drugs”.

European Regulation No. 923/2012 establishing the common rules of air and operational provisions for air navigation services and procedures came into force in December 2012. These provisions should be applied in France since 4 December 2014. It is specified here that “No person whose function is critical to the safety of aviation shall undertake that function while under the influence of any psychoactive substance, by reason of which human performance is impaired. No such person shall engage in any kind of problematic use of substances (SERA.2020)”. Alcohol is listed as a psychoactive substance. No limit is defined in this regulation or in the corresponding AMC (Acceptable Means of Compliance).

European Regulation 965/2012 relating to aviation operations specifies in the sections on specialised operations (SPO section), non-commercial flights on complex (NCC section) non-complex (NCO section) aircraft, that the captain should not undertake a flight if he is under the influence of a substance with psychotropic effects (alcohol is included in these substances). A limit of 0.02% has been recommended in the AMC relating to non-commercial flights on complex aircraft and specialised operations.

For the pilot of a non-commercial flight on a non-complex aircraft no BAC limit is defined. The pilot generally uses road traffic legislation as a reference. Aviation regulations thus prohibit flying under the influence of alcohol, though without defining it.

3 - LESSONS LEARNED AND CONCLUSION

3.1 Scenario

From the windsock the pilot estimated a wind from the west-north-west sector and decided to use runway 12. This choice can be explained by an error in mental representation and led the pilot to perform an approach with a tailwind component without being aware of it.

On arrival at the aerodrome the aeroplane was at a height of about 500 ft. It is therefore unlikely that the pilot performed two circuit patterns at a greater height. The pilot had made a habit of shortening his flight paths and carrying out continuous descending turns between the downwind leg and the endpoint. Given his proximity to the runway at the tailwind end and the wind direction, the pilot performed the final turns with a high bank leading him very close to the runway threshold at the end of the turn. At the same time he had to configure the aeroplane, stabilise speed, and manage the flight path and the endpoint.

The pilot was thus placed in an unusual situation, combining a narrow safety margin and a heavy workload. However, his level of performance had been altered by his level of blood alcohol.

During his first circuit pattern, the photograph taken by the passenger showed that the aeroplane on final had a bank angle of more than 35° at a height of about 330 ft. The final was not stabilised which may explain the pilot's decision to perform a second circuit.

On the final turn of the second circuit, the pilot had probably focused on the speed and endpoint at the expense of overseeing the aeroplane's flight attitude. Examination of the GPS flight paths showed that the radius of the final turn of the second circuit pattern was tighter than during the previous one. At the end of the turn the aeroplane probably had a significant pitch-down attitude and bank angle. During the turn, the aeroplane changed from a headwind situation to a tailwind situation. This development may have been interpreted by the pilot as a vertical gust of wind. Given the height, the pilot estimated that he could not avoid a collision with the ground. He decreased engine power, put the wings virtually flat and commanded a pitch-up attitude before impact.

3.2 Circuit pattern

The circuit pattern is a set of manoeuvres that a pilot carries out to land in satisfactory safety conditions. In principal this path allows the pilot to sequence and prioritise his actions in order to have a sufficiently long final (from 1.5 to 2 NM) to stabilise the approach before descending to a height of less than 300 ft.

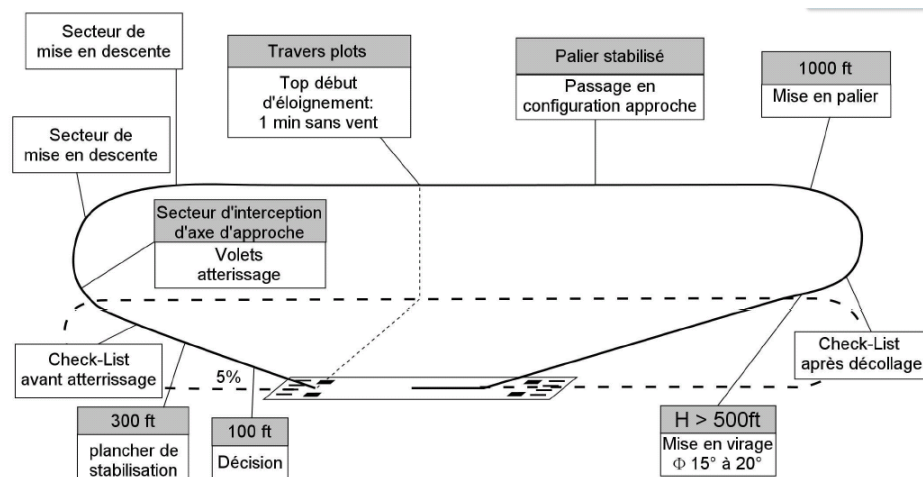


Figure 4: illustration of a typical (or standard) left hand circuit pattern⁽¹²⁾

3.3 Development and detection of deviations

The deviation in the pilot's practices could only be demonstrated via analysis of the data recorded by the latter's GPS. The investigation showed that the pilot was unaware of the level of impairment of his practices and that the club was not aware of it.

To extend the SEP rating, the current regulation requires an instructor flight every two years. A pilot with some experience may feel sufficiently sure of himself to perform instructor flights only during renewals. However, with experience, deviations in relation to standards taught may gradually set in. Pilots may end up by becoming accustomed to them and then perceive a marginal situation as being normal⁽¹³⁾. In this way flight safety levels may deteriorate and be conducive to accidents without pilots realising. More frequent flights with an instructor may raise awareness of this, particularly after a period of inactivity as provided for under the club rules.

This event illustrates the difficulty for club supervision of knowing the safety level on which its aeroplanes are operated.

⁽¹²⁾Extract from the ENAC VFR instructor's guide.

⁽¹³⁾REC Info 4/2003 covers this process of safety deterioration. <https://www.bea.aero/fileadmin/documents/recinfo/pdf/recinfo.2003.04.pdf>

⁽¹⁴⁾http://www.faa.gov/regulations_policies/handbooks_manuals/aviation/risk_management_handbook/media/risk_management_handbook.pdf
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3.4 Alcohol and flight preparation

Each person’s relations with alcohol, combined with current road legislation, limit the absolute nature of the prohibition to fly under the influence of alcohol for general aviation pilots.

The pilot, if he has drunk alcohol, may wonder about his own consumption. Professor Jean-Pierre Crance of the French civil aviation medical board suggested “MA FORME” as the translation of a checklist adopted by the FAA⁽¹⁴⁾. This check carried out before undertaking a flight questions the intake of medication as well as alcohol. Its effectiveness depends heavily on the way in which the dangerousness of alcohol and the regulation are stated in the pilot’s personal educational and aviation framework.



Figure 3-3. IMSAFE checklist.

Figure 5: IMSAFE personal check-list

The pilot can also assess his alcohol level before undertaking a flight. Some electronic breathalysers that are easily accessible to the general public can measure the level of 0.02% with sufficient accuracy. Nevertheless there is no threshold defining the influence of alcohol for a general aviation pilot.

The flight preparation phase is crucial for preventing risks associated with alcohol consumption or the consumption of other psycho-active substances. As a pilot who is under the influence cannot assess himself easily, outside intervention may therefore be necessary to help him defer the flight. His entourage or an association (club) have a role to play in prevention.

3.5 Causes

The accident resulted from a combination of the following factors:

- ☐ the decision to undertake the flight after consuming alcohol;
- ☐ completion of non-standard circuit patterns with narrow safety margins;
- ☐ the habit of shortening flight paths;
- ☐ incorrect representation of the wind direction in relation to the direction of the runway which caused the pilot to land with a tailwind component without his being aware of it;
- ☐ the inadequate representativeness of the renewal flights, which meant that the club could not discover the build-up of the pilot's degraded performances;
- ☐ the club's inability, at the time of the event, to enforce its own rule regarding pilots' recent experience.

4 - RECOMMENDATIONS

Note: In accordance with Article 17.3 of European Regulation (EU) 996/2010 of the European Parliament and Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation, a safety recommendation shall in no case create a presumption of blame or liability for an accident, a serious incident or an incident. The addressee of a safety recommendation shall inform the safety investigation authority which issued the recommendation of the actions taken or under consideration, under the conditions described in Article 18 of the aforementioned Regulation.

Taking into account the risk related to alcohol consumption in general aviation

As an everyday consumer product, alcohol does not rouse enough mistrust in terms of the impaired judgement and performance that it produces, especially for alcohol blood levels considered low and which may be reached with the first glass drunk.

In thirteen investigations into general aviation accidents⁽¹⁵⁾ that occurred after 1st January 2000, the BEA established that pilots' alcohol consumption contributed to the event. In four of these accidents the pilot's blood alcohol level was within the limits for the driver of a land vehicle. In one case, the level remained unknown.

European regulation (EU) n°923/2012 prohibits flying under the influence of alcohol without actually defining this notion. The provisions relating to European regulation (EU) n°965/2012 set the blood alcohol limit at 0.02% for public transport, specialised operations and also for non-commercial flights on complex aircraft. This threshold takes into account physiological data to guarantee a nominal level of performance. Pilots can easily assess their alcohol level by using an electronic breathalyser. However for a pilot making a non-commercial flight on a non-complex aircraft, the lack of an alcohol limit confers an interpretative and subjective nature to the notion of "being under the influence" of alcohol.

⁽¹⁵⁾These accidents caused the death of four people.

Consequently, the BEA recommends that:

- **EASA complete the provisions of EU regulation n°965/2012 concerning non-commercial operations on non-complex aircraft (NCO) through an AMC/GA stating the blood alcohol level beyond which impaired judgement, and the performance that it produces, risks affecting flight safety. [Recommendation FRAN-2015-055]**
- **In the meantime, that the DGAC carry out an awareness campaign for general aviation pilots on the risks of imbibing alcoholic drinks even if the resulting blood alcohol level seems minimal and inconsequential in everyday life. [Recommandation FRAN-2015-056]**