BEA

Activation of ballistic airframe parachute: cognitive, emotional and physical mechanisms

Appendix: Statements from pilots who activated a ballistic airframe parachute between 2015 and 2022

For all the accidents described below, the majority of the information is based on the statements made by the various pilots involved in the occurrence. None of these occurrences were investigated by the BEA. Apart from certain aspects linked to the use of the parachute mentioned in this study, these occurrences were not analysed by the BEA.

This is a courtesy translation of the study by the BEA. As accurate as the translation may be, the original text in French is the work of reference.

1 ACCIDENT TO THE AIRLONY SKYLANE IDENTIFIED 54AXD ON 9 JULY 2022 AT BOUEE

In-flight loss of control, activation of ballistic airframe parachute

1.1 History of the flight

The pilot, with two other microlights, was carrying out a flight departing from La Baule – Escoublac aerodrome, bound for Chambley aerodrome. After a flight time of 15 minutes, cruising at an altitude of 2,000 ft, he felt a few jolts when passing the Loire, close to Saint-Nazaire. He informed the other two pilots of this by radio.

A few seconds later, he described having been surprised by a violent impact and of having been catapulted. He stated that his head struck the ceiling, that the aircraft was thrown all over the place and that he saw the ground through the overhead canopy.

The pilot tried to regain control but the control wheel ruptured. He then tried to pilot with what remained of the tube and then with the wheel on the passenger's side. This wheel also ruptured (see **Figure 1**). He stated that at this point he was in a spin heading towards the ground at a nose-down angle of 45°. Below him, he saw that the field was very close and activated the ballistic airframe parachute.

He observed that the engine force and the parachute force were opposing each other and tried to reduce power without being successful in this. He cut off the magnetos and the propeller stopped. He explained that he then relaxed his body to prepare for the impact. He stated that the microlight touched the ground with a high nose-down attitude but that the impact was not violent.

The pilot cut off the fuel supply and exited the microlight without difficulty. The wind inflated the parachute and the microlight was dragged over about 400 m become coming to a stop against a fence. The engine separated from the airframe while it was being pulled along the ground.

1.2 Microlight information

Figure 1: wreckage of microlight: ruptured wheels, airframe with parachute, separated engine mount

The pilot had purchased the second-hand microlight in 2018 already equipped with a parachute. The safety belts were four-point harnesses. The microlight was insured against breakage.

1.3 Parachute information

The ballistic airframe parachute was a Galaxy GRS 6/473 SD Speedy DULV.

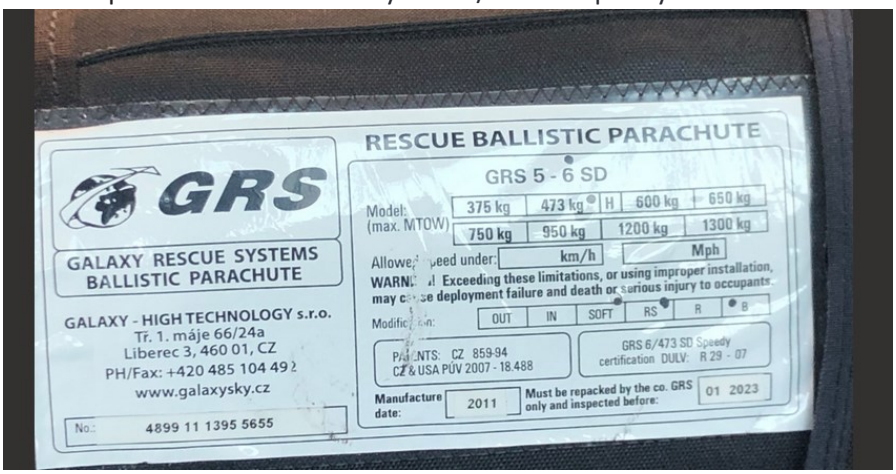

Figure 2: photograph of characteristics of ballistic airframe parachute (source: pilot)

1.4 Pilot information

The 59-year-old pilot at the time of the accident had totalled around 210 flight hours including 170 hours on his microlight. He had exclusively flown microlights equipped with a ballistic airframe parachute. He considered that he was physically fit and had not had the impression of having made a considerable effort. He stated that he had stayed calm and clear-headed. He had already carried out an aerobatic flight. The pilot had already had an accident with his microlight.

1.5 Training and habits with respect to the ballistic airframe parachute

The pilot stated that his training had raised his awareness about the use of the ballistic airframe parachute. He explained that he had taken an interest in the subject and tried to expand his knowledge about the parachute. In particular, he had viewed videos on YouTube in which the occupants escaped without injury. He had confidence in the parachute as most people make it, but the aircraft is destroyed. He had heard that a Shark pilot had activated the parachute at a very low height and had survived. The day before the accident flight, he had talked about the use of the parachute in the bar. He explained that he knew that the parachute has to be activated as soon as the aircraft is out of control. He added that in the case of an engine failure, he would have tried to land but would have used the parachute if this failure had occurred overhead a forest.

The removal of the safety pin is one of the actions of his Before take-off checklist. When he is alone on board, he regularly carries out the action as if he was going to pull the handle. When he has passengers, he mentions the parachute during the briefing and explains to them how to use it in the case of pilot incapacitation.

1.6 Feedback

The pilot indicated that during the accident flight, he had first tried to regain control of the microlight as he thought the problem was just an air pocket. He stated that when he understood that he was no longer in a position to pilot the aircraft when the second wheel broke, the choice was simple. It was at this point that he thought of the parachute as there was no longer any other option. The pilot thought that he had been very reactive, pulling the parachute handle as soon as he had thought of it. Although he does not have a precise recollection, he had to pull the handle over a certain distance. He thought that he pulled the handle after having lost a lot of altitude: he believed that he may have been at a height of 100 m.

In his opinion, he had not sufficiently tightened his harness as his head struck the ceiling of the microlight when he lost control. He believed that having a belt cutter or a knife within hand's reach would be useful if the pilot was unable to open the buckle as well as to cut the suspension lines of the parachute.

He also thought that securing objects in the airframe with Velcro fasteners would be useful. The pilot thought that the presence of a parachute does not encourage risky behaviour. He considered that it was like having an airbag in the car, it doesn't change how you drive, you forget about it.

The pilot underlined the importance of removing the pin before the flight as in the event of an in-flight loss of control, the stress would make this action difficult. He thought that pilots do not sufficiently visualize the use of the ballistic airframe parachute as they think they will have time to analyse the situation and take a decision, as for example in the case of an engine failure. In his case, he explained that everything happened very quickly and that he did not have time to think.

2 ACCIDENT TO THE ZENAIR CH650 IDENTIFIED 88RG ON 5 MARCH 2022 AT PIERRELATTE

Evasive action to avoid birds, loss of control, activation of ballistic airframe parachute

2.1 History of the flight

The pilot was carrying out a flight from Grenoble-Alpes-Isère airport bound for Pierrelatte aerodrome. When south of Montélimar, descending through 2,500 ft, the pilot encountered turbulence. He saw 30 to 40 storks in front of him and veered to the left to avoid them. The microlight banked to the left-hand side and experienced turbulence on the right-hand wing. The pilot explained that he wanted to straighten the wings so as not to lose control but the microlight entered a stall dive and started spinning.

The pilot thought that some of the storks must have struck the elevator as he felt an impact in flight. He sent a distress message and pulled on the stick to try and regain control. He explained that the stick was very stiff and that he remembered that you cannot exit a spin in a microlight[1]. He stated that everything happened very quickly, in a few seconds.

He cut off the magnetos. Once the engine had shut down, he pulled the parachute handle and the parachute then opened. The pilot took photos of the parachute just before touching the trees. To prepare for the impact, he took up the safety position and contracted his body. The microlight struck some trees and remained suspended from one of them. He believed that around 10 s elapsed between the activation of the parachute and contact with the tree tops.

After landing, the parachute remained inflated and pulled the microlight upwards.

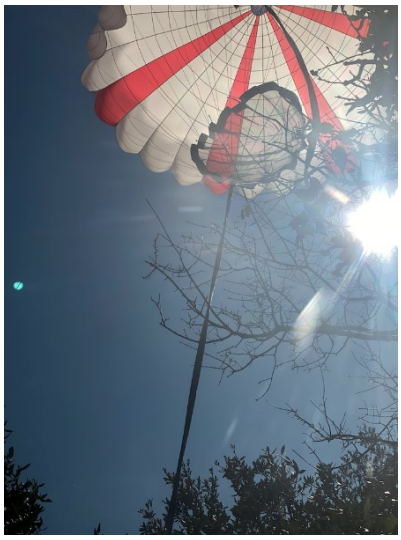

Figure 3: photo of parachute taken from microlight

2.2 Microlight and parachute information

The microlight was a Zenair CH650, with a Junkers 500 ballistic airframe parachute installed by the manufacturer. The parachute is situated forward of the canopy and the activation handle is in the

[1] Pilot's words which are not to be considered the BEA's opinion.

middle of the instrument panel. The microlight was substantially damaged and could not be repaired. The pilot did not find bird impact marks on the wreckage.

Figure 4: accident microlight in trees (source: pilot)

Figure 5: ballistic airframe parachute (on left-hand side: parachute canopy, on right-hand side: interfaces, harnesses)

2.3 Read-out of recorded data

The pilot used the NeuroSky flight tracking tool which recorded the flight path of the occurrence.

The video provided by the pilot seems to show that there was an interval of around 40 s between the manoeuvre to avoid the storks at a height of 1,800 ft and the collision with the ground.

		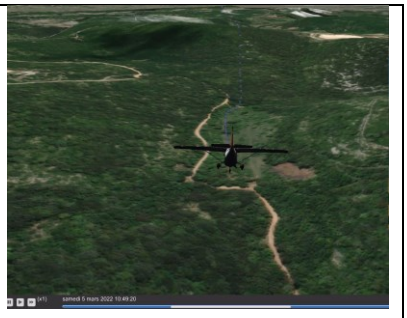
Flight before turbulence	Loss of control	Parachute activated

Figure 6: images of flight in NeuroSky

2.4 Pilot information

The pilot was not injured in the accident but he stated that it had had a psychological impact on him. He resumed flying one week after the accident after consulting a psychologist and four hours of instruction flight.

The pilot held a microlight pilot licence and the class 3 and 6 ratings. He had started flying with a class 6 microlight which was not equipped with a ballistic airframe parachute.

After obtaining his class 3 rating, he stopped flying class 6 microlights.

The pilot had been the owner of the microlight since 2021. It was already equipped with a ballistic airframe parachute.

The pilot currently owns a Tecnam P92 also equipped with a ballistic airframe parachute.

The pilot obtained passenger carrying privileges after the accident. He asked his friend to follow passenger flight training (https://ffplum.fr/pratiquer/formation2) so that she would have basic piloting skills and know how to activate the ballistic airframe parachute in the event of pilot incapacitation.

2.5 Training and habits with respect to the ballistic airframe parachute

The pilot explained that his instructor had repeated to him for each flight, if you see you can't do anything, activate the parachute, and that it was just a question of scrap metal and self-esteem. His instructor had also told him that it was impossible to exit a spin in a microlight.

He thought that the cases where "nothing can be done" especially apply to loss of control, and that for an engine failure, the pilot has more time.

He explained that he had worked in the nuclear sector and had been made very aware of human performance improvement tools of the importance of having reliable practices. He calls out his checklists and repeats the emergency procedures by voicing the actions and pointing to the various instruments and controls.

For the parachute activation procedure, he repeats to himself the sequence, left hand on the stick, right hand on the magnetos and then on the parachute handle. On the ground, he had already practised activating the ballistic airframe parachute handle without the cartridge, in his training centre.

He attaches the start-up key to the pin making it impossible to forget to remove the pin before the flight.

He indicated that he did not remember the minimum height for activating the parachute.

2.6 Feedback

The pilot indicated that his previous autorotation experience with class 6 microlights had helped him to evacuate the stress during the occurrence.

He had the impression that there was very little time between the start of the loss of control and the activation of the parachute.

He indicated that he cut off the magnetos as he thought that this would avoid the parachute harnesses from being severed. When he pulled the activation handle, he thought he would have to pull it 50 to 80 cm, but the cartridge activated after 20 cm.

Repeating the actions on the ground meant that he did not have to think about it in flight and was a great help in taking the decision.

His microlight was not insured against breakage. During the occurrence, he did not have time to think about the financial aspects, he only thought about these aspects afterwards.

The pilot would have liked to have been able to detach the ballistic airframe parachute to avoid the parachute pulled by the wind, dragging him along the ground. He would welcome the manufacturers of ballistic airframe parachutes including the possibility of detaching or releasing it.

3 ACCIDENT TO THE AVID FLYER LITE IDENTIFIED 24QI ON 7 AUGUST 2017 AT CÉNAC-ET-SAINT-JULIEN

Engine shutdown in cruise, activation of ballistic airframe parachute, collision with a tree

3.1 History of the flight

The pilot was carrying out a local flight from Sarlat-Domme aerodrome. After a flight time of around one hour, at an altitude of 2,500 ft, the engine shut down due to a problem on one of the fuel tanks. The pilot calculated his gliding distance and realised that he would not be able to return to the aerodrome. The pilot stated that he already had in mind the ballistic airframe parachute. He looked for a field but the ground was very hilly and there were a lot of houses. Seeing no option for landing, he decided to activate the ballistic airframe parachute at a height of 1,700 ft. He stated that just over one minute elapsed between the engine failure and the decision to activate the parachute.

He heard the ejection of the rocket and then smoke filled the canopy. The canopy broke when the parachute interfaces tightened. The microlight then took a nose-down attitude which he estimated as 40°. He switched off all the systems except for the radio. The microlight finished in trees close to a village, Domme. The pilot was uninjured.

3.2 Microlight and parachute information

24QI was an Avid Flyer Lite, bought second-hand in 2008 in Germany where ballistic airframe parachutes are mandatory for microlights. The microlight was therefore already equipped with a BRS ballistic airframe parachute. The activation handle is located between the seats, at the height of the pilot's ear. The handle has to be pushed forward to activate the parachute.

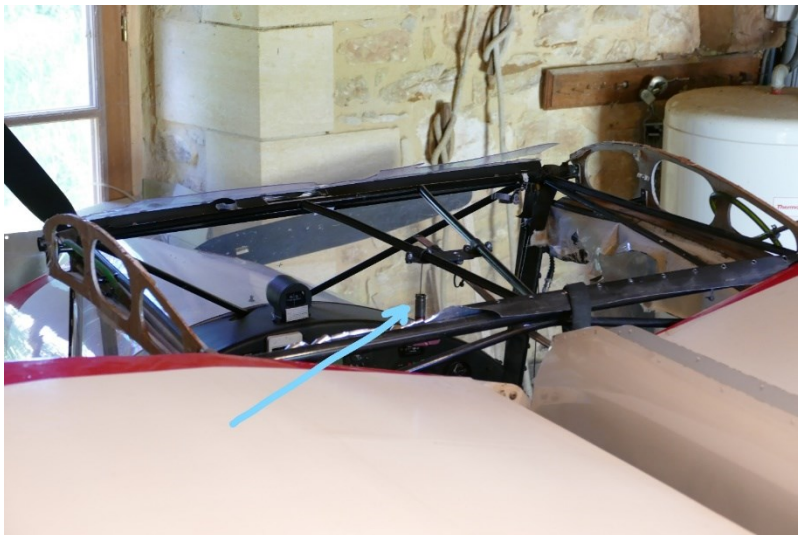

Figure 7: photo of handle (source: pilot)

3.3 Pilot information

The pilot explained that he had taken an interest in ballistic airframe parachutes before learning to fly and when this system was less widely in use than today. He stated that he had only flown microlights on which ballistic airframe parachutes were installed: the Guepy and then the Avid Flyer.

He had already had the parachute overhauled twice. On these occasions, he had talked with the mechanic who was servicing the parachute. The latter had boosted his confidence in the effectiveness and reliability of the system. The pilot indicated that this had helped him a lot.

He stated that he had carried out one flight on the Flight Design CT and in his opinion, it was impossible for him to activate the ballistic airframe parachute.

3.4 Training and habits with respect to the ballistic airframe parachute

The pilot stated that he had not had ballistic airframe parachute training in his flying club. The microlight that he flew in the club was equipped with a parachute but the safety pin remained in place during the flight. The pilot indicated that he had an instructor friend in Germany who taught pilots to activate the parachute as early as possible in the event of a problem.

Before each flight, the pilot pictures the ballistic airframe parachute and enacts the action. The safety pin and starter key are attached together. When he transports passengers, he briefs them on the parachute, teaching them to shut down the engine and then push the handle.

3.5 Feedback

The pilot believed that it is very important to know that the parachute is reliable. He also explained that it is important to picture that you have a parachute, making the decision to activate the parachute and the activation of the parachute itself. He thought that this could help to see the handle.

With respect to in-flight loss of control, he thought that pilots are too optimistic about their ability to regain control. He recommended a handle that is very easy to access, as close as possible to the body and within the pilot's view, for example between the legs.

4 ACCIDENT TO THE BLÉRIOT XI IDENTIFIED 65QU ON 12 JULY 2020 AT SARRIAC-BIGORRE

Severe turbulence, loss of control, activation of ballistic airframe parachute

4.1 History of the flight

The pilot was carrying out a triangular cross-country flight in the south of France. He took off from Sadournin private aerodrome bound for Tarbes. As he was informed of the presence of storms over Tarbes, he decided to divert to Sarriac-Bigorre private aerodrome. The pilot indicated that during the approach to this aerodrome, he was surrounded by storms and the aerology was complicated. He explained that his microlight, the Blériot XI, was not very flexible with respect to speed and bank. The pilot decided to carry out a go-around. He noticed a 90° difference in wind direction between the two windsocks on the aerodrome. The pilot understood that this indicated windshear that it would be very difficult for him to avoid as his microlight had a small rate of turn. At around 30 m from the ground, the microlight banked to the right-hand side and descended towards the ground. The pilot's reflex was to exit this loss of control situation and apply full power. He tried to counter with a left-hand input on the stick, but the microlight did not respond. He battled to regain control and checked that the controls were correctly deflected. The microlight had a slight nose-up attitude and it was as if it was being carried in the air mass. The pilot then saw that he was approaching the corn field below him and not seeing any other solution, he pulled the activation handle of the ballistic airframe parachute at a height that he estimated at around 10 m. He considered that the activation was like a reflex action. He thought that around 2 to 3 minutes elapsed between the start of the loss of control and the activation.

He heard the explosion of the ejection rocket. He explained that he had hardly had the time to raise his head to look at the parachute before the microlight was on the ground. He had not had time to cut off the engine. He struck his nose on the instrument panel. On the ground, the microlight turned over and was dragged over several dozen metres by the effect of the wind on the parachute. The pilot managed to exit the microlight.

Figure 8: microlight dragged through the field by the parachute

4.2 Microlight and parachute information

65QU was a copy of a Blériot XI, made out of wood and canvas. The GRS parachute and harnesses were installed by the pilot.

Figure 9: microlight on its back

4.3 Pilot information

The pilot indicated that he started flying at the age of 16 and then had a career as a commercial pilot. He indicated that he had been a helicopter pilot in the army where he had logged around 7,000 flight hours and then an airline pilot where he had logged around 4,000 flight hours on the Dash 8. He had thus totalled 11,000 flight hours on aircraft not equipped with a parachute before starting his microlight training.

4.4 Training and habits with respect to the ballistic airframe parachute

The pilot had promised himself only to fly on microlights with a parachute. His instructors had taken into account his vast experience on other aircraft. They told him to activate the parachute if you really need to do so, and if you realise that you no longer have control. They carried out engine failure training in which the parachute was mentioned.

The pilot had watched YouTube videos about the ballistic airframe parachute. He did not know exactly how far out you had to pull the handle and with what force in order to activate the parachute, but he knew that the handle had to be pulled for a certain distance for the activation.

Before each flight, the pilot verbalizes his briefing, particularly mentioning an engine failure and the ballistic airframe parachute. He does not have a written checklist but a mental "flow"[2] which ensures that he does not forget to remove the pin which he stows in the cabin. He does not enact the activation of the parachute out of fear of an untimely activation.

4.5 Feedback

The pilot thought that too much experience on aircraft without a parachute could have a negative impact on the decision to activate it. He thought that training played a key role in the decision to activate the ballistic airframe parachute.

He wished to point out that an accident can happen at any time: in his case, he had flown 11,000 hours before having this accident. He thought that the parachute might have saved his life. He advises pilots to invest in a ballistic airframe parachute.

[2] Ordered mental repetition of all the items to be checked.

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5 ACCIDENT TO THE HUMBERT AVIATION TÉTRAS IDENTIFIED 74AJA ON 2 AUGUST 2017 AT ANNECY

Engine shutdown, activation of ballistic airframe parachute

5.1 History of the flight

The pilot was carrying out a round trip between Annecy-Meythet airport and Alpe d'Huez mountain airfield. The pilot stated that he left Annecy with full tanks. On the return flight, close to Annecy, at an altitude of 7,000 ft, the engine shut down and the propeller stopped rotating. He identified a field in the distance to land in. He tried to restart the engine but without success. At this point, he was at an altitude of around 3,000 ft. He saw that he would not be able to reach the field and cut off the fuel in order to activate the ballistic airframe parachute subsequently. He positioned himself overhead a road which was his aiming point and pulled the parachute activation handle. He then heard the explosion and experienced the violent blow of the parachute opening. He thought that he was going to be able to manoeuvre the microlight under the parachute but he realised that this was not possible. The wind moved his aiming point from the road to a private garden.

During the fall, the microlight adopted a steep nose-down attitude. The impact was less violent than the opening of the parachute. The left-hand wing struck a tree and the right-hand landing gear ruptured.

Figure 10: accident Tetras 74-AJA in the garden (source: pilot)

5.2 Microlight and parachute information

74AJA was a Humbert Aviation Tetras 912 CS microlight. The parachute was a JUNKERS. The parachute activation handle is situated in the middle, above the head and must be pulled.

5.3 Pilot information

The pilot had totalled 5,000 flight hours on aeroplanes and 1,000 flight hours on microlights. He was an aeroplane instructor before starting to fly microlights.

5.4 Training and habits with respect to the ballistic airframe parachute

His microlight training took place on an aircraft without a ballistic airframe parachute, he had not received any training with respect to the latter. However, he wanted a ballistic airframe parachute for his microlight.

Before his flights, the pilot uses a mental flow to prepare his microlight and removes the parachute safety pin. During his flights, the pilot is conscious that he has a ballistic airframe parachute which reassures him.

5.5 Feedback

The pilot started to prepare himself for the activation of the ballistic airframe parachute when he saw that he would not reach the field. He stated that he didn't think twice and activated the parachute without qualms. He had not been afraid, he had done what had to be done.

He explained that his experience with the ballistic airframe parachute only confirmed his already positive opinion of the parachute. He wants to tell pilots not to be afraid and that the parachute is genuinely useful. After his accident, he strongly advises installing a ballistic airframe parachute if this is possible.

Figure 11: Tetras activation handle (source: baptemedelair.fr)

6 ACCIDENT TO THE SHARK AERO IDENTIFIED 83ANX ON 12 JULY 2015 AT GUILLOS

In-flight loss of a propeller blade, activation of ballistic airframe parachute

6.1 History of the flight

The pilot was ferrying his Shark in the south of France. En route, overhead the Landes forest, at an altitude of 9,000 ft, one of the propeller blades broke in line with the spinner. The occurrence was both unexpected and extremely violent. The engine mount pivoted upwards; the canopy started to open and the pilot held onto it with one hand. The microlight pitched down; the pilot deflected the stick to the pitch-up limit. The microlight slightly righted itself but still had a negative pitch attitude and was losing height. The pilot was unable to stabilize the flight path.

The transponder was alternately switching off and on and had a substantial lag. The pilot encountered difficulties in entering code 7700. He envisaged landing on the motorway which was situated behind him but rejected this option as he did not want to kill anyone.

The pilot managed to stabilize his flight path, he reduced power so as to minimize vibrations. The pilot stated that he kept the engine in idle so as to have power if required. He then headed to Cabanac microlight strip situated nearby to land or at least to activate his ballistic airframe parachute overhead the runway. The pilot indicated that he wanted to preserve his microlight and avoid activating his ballistic airframe parachute overhead a clearing as there were tree stumps which could damage the wings.

Then the canopy completely opened creating a surge of air. The pilot was pulled upwards but his harness held him in the airframe. The microlight was three-quarters inverted and the rate of sink increasing. The pilot tried to close the canopy but the aerodynamic loads were too great. According to the pilot, he was able to reduce these loads using the rudder and managed to close the canopy and return the microlight to an upright position.

The pilot realised that he had lost a lot of altitude and that it was no longer possible for him to reach Cabanac. He smelt burning and planned to shut down the engine. He identified a country road on which he wanted to carry out a forced landing, shut down the engine and cut off the fuel supply. The pilot identified a clearing situated close to the road and planned to activate the parachute over it at the end of the downwind leg if the forced landing pattern failed. The pilot was still above 1,000 ft agl, the limit which he had set himself for activating the parachute.

The pilot pulled on the landing gear manual extension cables, only one side extended. The pilot indicated that he did not envisage landing on the road with a single landing gear as it would have been too dangerous, the microlight could have caught fire. The pilot tried to extend the landing gear several times. He realised that he had spent too much time on the landing gear and perceived that he had lost altitude on seeing the trees were getting dangerously close.

The pilot indicated that at this point he was at a height of around 40 to 50 m above Landes forest. He activated the ballistic airframe parachute just above the tree tops. The pilot indicated that around 10 minutes had elapsed between the rupture of the propeller and the activation of the parachute.

The pilot explained that when the parachute opened, the microlight was thrown forward and then rocked backwards. When the microlight rocked forward again, it struck the trees. The microlight came to a stop in the trees with a nose-down attitude.

6.2 Microlight and parachute information

83ANX was a Shark equipped with a retractable landing gear and an autopilot. The pilot had purchased it second-hand, the propeller had been modified to break a speed record. The pilot indicated that the rupture of the propeller blade had damaged the electrical systems which notably affected the transponder and the landing gear.

The parachute was a JUNKERS. The activation handle is situated in front of the pilot, below the instrument panel, practically between the pilot's legs and has to be pulled.

The pilot indicated that he had purchased the microlight to then equip it with infrared, thermal and visible-light cameras with a view to creating a security company. He had notably chosen this microlight due to the presence of a parachute.

6.3 Pilot information

The pilot indicated that he was a commercial pilot on the Falcon jet. He had previously been a fighter pilot on the Mirage 2000 and thus had experience with the ejection seat. He estimated that he had totalled 5,000 flight hours and 10 flight hours on 83ANX before the accident. He indicated that he had also carried out paragliding and skydiving.

The pilot explained that when he was in the army, he regularly read the flight safety bulletins to inform himself about recurring errors and to not reproduce them.

He indicated that he had had an accident during an aerial spraying flight in the 2000s, in which he had collided with a power line pole. He had been tired but decided to continue the flight due to financial constraints.

6.4 Training and habits with respect to the ballistic airframe parachute

The pilot explained that his past experience had been taken into account and that he had not had to carry out all the microlight pilot training. The microlight training that he had followed did not cover the ballistic airframe parachute.

He explained that he was nevertheless, aware of the existence of such a system, knew that microlights are not certified and wanted a microlight equipped with a parachute. He had no technical information concerning his parachute, in particular the time required for the parachute to open and the pitch attitude of the aircraft under the canopy.

He had fixed a limit himself, below 1,000 ft agl, if he did not have control of the microlight or if it was not possible to land, he would activate the parachute. The 1,000 ft limit was arbitrary as he had no information about the speed at which the parachute could deploy, the microlight speed or attitude to be adopted or the height lost.

The other pilots with whom he had discussions told him that he wouldn't need it.

The pilot explained that before each flight, he removes the parachute safety pin, checks that he can reach the activation handle and inspects its condition, in particular that there is no play. He also checks that the cables are taut. Lastly, he enacts the activation action. He calls to mind a mental image of its use. It is a routine. As soon as he gets into the microlight, he has the ballistic airframe parachute in mind.

6.5 Feedback

With respect to taking the decision to activate the parachute, the pilot reported that as the minutes passed, he wanted to use it less and less. He explained that he had in mind the use of the parachute on starting the flight preparation. As soon as the blade ruptured, he had thought about it. The first possibility was to land on the motorway, which he eliminated as a solution. Once the aeroplane was stabilized, he thought he would be able to reach a microlight strip to use the parachute overhead its runway. He told himself that he was certainly going to use it but as the minutes passed, he increasingly looked for an alternative solution. When the canopy opened, he thought about righting the microlight before activating the parachute. Then, when he started the forced landing pattern, he also looked for a suitable area for activating the parachute. His goal was to “save” the aircraft. Although he had the 1,000 ft limit in mind, focusing on the landing gear extension problem resulted in him descending below this limit. It was the sight of an external reference, the tree tops, that acted as a trigger and led him to activate the parachute. He explained that when he saw that he was too low, it was a reflex action.

He indicated that he wanted to save the microlight and that he also wanted to save his company. He thinks that the ballistic airframe parachute is essential. Knowing the technical aspects and having procedures could help with taking decisions. He thinks that the parachute should not be looked at as something diabolical.

7 ACCIDENT TO THE EKOLOT JK-05L JUNIOR IDENTIFIED 57APJ ON 9 MAY 2022 AT ZOUFFTGEN

Blocking of rudder pedals, difficulties with controlling microlight, activation of ballistic airframe parachute, collision with ground

7.1 History of the flight

The pilot, unaccompanied, took off at 19:15 from Sedan Douz aerodrome for a flight bound for Zoufftgen microlight strip. On arriving at Zoufftgen, the pilot flew over the strip and then flew outbound on the LH downwind leg to land on runway 33[3]. On short final at Zoufftgen, during the flare, the pilot encountered alignment problems, with the nose of the microlight veering to the left-hand side. Not satisfied with his flare, he carried out a go-around. He realised that the rudder pedals were blocked with the rudder deflected to the left. The pilot tried to stabilize the microlight with the ailerons by carrying out a sideslip but his actions were only partially effective and the microlight had difficulty gaining height. The pilot carried out a long left-hand loop before arriving overhead the runway. Considering that the microlight was no longer controllable, the pilot switched off the magnetos and activated the ballistic airframe parachute. Due to the low height, there was not sufficient time for the parachute to completely open. The microlight collided with the ground and the pilot was seriously injured.

Figure 12: approach path to Zoufftgen on SkyDemon (source: pilot)

7.2 Microlight and parachute information

The 57APJ was a Ekolot JK-05L Junior purchased second-hand, equipped with a GRS 5/450 ballistic airframe parachute. The handle is situated overhead, in the middle, near the pilot's ear. To activate it, the handle has to be pushed forward and out of its housing. The microlight was substantially damaged and was not repairable.

[3] Grass runway measuring 400 m x 20 m.

7.3 Pilot information

The pilot had totalled around 150 flight hours exclusively on microlights equipped with a ballistic airframe parachute. The pilot held passenger carrying privileges.

7.4 Training and habits with respect to the ballistic airframe parachute

The pilot had followed microlight training in Luxembourg. During his theoretical training, he learnt to shut down the engine before activating the parachute which is chiefly used in the event of technical problems. He could no longer remember if the use of the parachute had been covered in his practical training, notably in the recovery from spin exercises.

The pilot explained that he follows the aviation news and regularly sees articles talking about the ballistic airframe parachute in magazines. He had also watched videos about the parachute, some of these had been sent to him by friends. He knew pilots who had activated the parachute.

The pilot has a paper checklist which mentions the parachute safety pin. When he carries passengers, the pilot gives them a briefing in which he explains that should he be incapacitated, the magnetos are to be cut off and the parachute activated.

He does not enact the activation action before the flight. However, he thought that the pilot must be fully aware of the position of the handle in order to find it quickly.

7.5 Feedback

The pilot explained that he had been taught to always carry out a go-around when the approach is not stabilized. However, he described what happened as being completely different. Seeing that he was unable to regain control of the microlight, he was seized with a sort of panic. Stressed, he focused on manoeuvring and did not monitor his speed nor was he aware of his height. He indicated that he was worried about stalling, that there was only one decision to take and as a reflex action, he cut off the magnetos and activated the ballistic airframe parachute.

He specified that everything happened very quickly and that there are never exercises in doing it. He indicated that he had thought about the ballistic airframe parachute only a few moments before activating it. He said he was surprised that he had taken such a quick decision to activate it as he is someone who is prudent by nature and that it is not easy, it’s a last-resort definitive decision. He was also surprised that he had thought about shutting down the engine and that he had found the activation handle so easily and quickly. At no time had he thought about the financial aspects. The parachute had always been an option for him.

7.6 Activation video

A security camera filmed the approach of 57APJ.

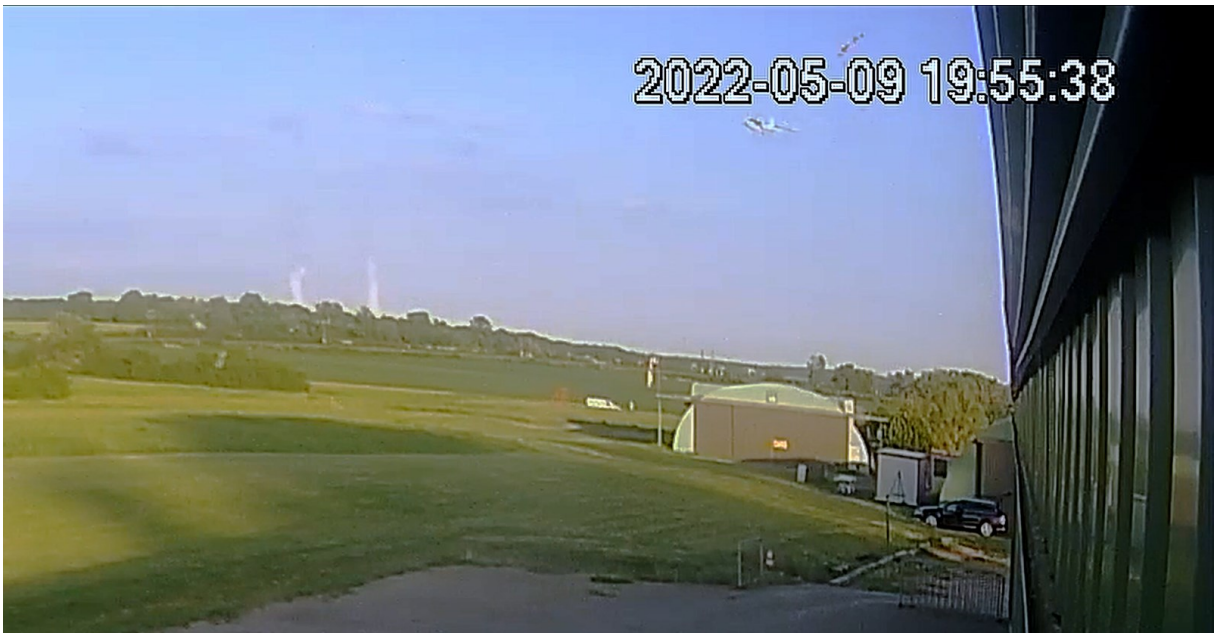

Figure 13: activation of ballistic airframe parachute

Figure 14: collision with ground

The parachute was activated at 19:55:38, and the impact with the ground was at 19:55:43, i.e. approximately five seconds later.

The height at which the pilot activated the parachute was very probably below the height recommended by the manufacturer. For a stabilized flight with the aircraft upright, the manufacturer specifies a deployment height of around 40 m[4].

[4] Test at 45 km/h, the opening of the parachute will be quicker if the speed of the aircraft is higher. GRS adds 20 m if the aircraft is inverted and indicates on its website a height of 60 m. In our case, the microlight was upright and the height was therefore 40 m.

BEA

8 ACCIDENT TO THE FLIGHT DESIGN CTSL IDENTIFIED 31RM ON 1 NOVEMBER 2016 AT FAY-AUX-LOGES

Loss of visual references, activation of ballistic airframe parachute

8.1 History of the flight

The pilot and his passenger were carrying out a cross-country flight from Ajaccio (Corsica), bound for Orléans. The pilot was used to carrying out this flight. However, it was his first flight in November, with the clocks set to winter time. That day, the aeronautical night started at 18:06 at Orléans.

After departing from Ajaccio, the pilot observed that the mistral wind was very strong. As his route was in a north-westerly direction, the pilot realised that the wind blowing towards the south was going to reduce his ground speed and as a consequence, increase his fuel consumption. The pilot was forced to stop at Montélimar for an hour to refuel. He realised that this stop would mean that he would be arriving in Orléans close to nightfall.

When he arrived on the outskirts of Vierzon, he noticed blankets of fog below him. He wondered if Orléans was in fog and envisaged diverting to Vierzon. The pilot decided to continue his route to Orléans due to logistic drawbacks if he diverted to Vierzon.

Arriving overhead Orléans-Saint Denis de l'Hôtel airport, the pilot observed that the airport was in fog. The lights were extinguished.

He tried to contact the aerodromes nearby in the hope that the weather situation would be better there but obtained no reply. He contacted Seine Info and the controller informed him that the weather situation was deteriorating at the Paris airports. The controller proposed that he divert to Orly but the pilot rejected this option. The pilot explained that he was worried that there would be administrative consequences and that his licence would be withdrawn.

The pilot also tried to contact a military aerodrome which had powerful lights but without success. Meanwhile, the sun had set and the luminosity was gradually decreasing.

The pilot started an approach using his GPS[5]. Worried about the accuracy of the latter and seeing that the fog was very dense, he became very concerned and carried out a missed approach.

The pilot said to himself that he was going to activate the ballistic airframe parachute, thinking initially that he would do it overhead the runway. He then thought about the wind which would make him drift and was worried about landing on the roof of a hanger. He thus positioned himself next to the aerodrome, at 1,000 ft agl[6] overhead what he thought was flat ground. He shut down the engine, cut off the fuel and then pulled the activation handle.

[5] The pilot was not qualified for IFR flights.
[6] 1,400 ft QNH.

Nothing happened. He pulled a second time, this time to the full extent. He felt the click, heard the rocket leave and saw the parachute open.

The pilot indicated that the contact with the ground was not particularly rough. The microlight came to a stop close to a high-voltage power line and a dual carriageway (D2060). The occupants were uninjured.

8.2 Microlight and parachute information

The microlight, owned by the pilot, was a Flight Design CTSL. The BRS parachute had been installed by the manufacturer, Flight Design. The handle is situated between the seat backs. To activate the parachute, the handle has to be pulled forward and out of its housing. According to the pilot, the handle has to be pulled around 25 cm. The microlight was substantially damaged by the accident, with damage to the propeller and the rupture of the landing gear.

Figure 15: activation handle

8.3 Pilot information

The pilot started flying aeroplanes before undertaking microlight training. He indicated that he had totalled 1,800 flight hours at the time of the occurrence. He did not hold an instrument flight rating.

8.4 Training and habits with respect to the ballistic airframe parachute

The pilot reported that he had been given no training or information about the ballistic airframe parachute. On the contrary, he indicated that his instructor preferred flying with the safety pin in position. He specified that he had watched videos about the ballistic airframe parachute, and in particular Cirrus videos. A pilot friend had told him that you have to pull quite hard on the handle.

When he flies over the Mediterranean, the pilot always says to himself that if there is an engine failure at this point, he will use the ballistic airframe parachute. He also indicated that in a spin, he would not hesitate activating the parachute, being aware of the difficulties of recovering from a spin and having a friend who had experienced a spin and had pulled the parachute.

When he transports passengers, he informs them of the presence of the ballistic airframe parachute. He systematically removes the pin before departure. This action is one of his checklist items.

8.5 Feedback

The pilot regretted a lack of training with respect to the ballistic airframe parachute and the use of the emergency frequency 121.5 MHz. He added that many pilots consider that the parachute is only an accessory and that no-one will need to use it in flight.

The pilot indicated that he was accompanied by a passenger but the latter did not participate in his decisions. In particular, the passenger did not suggest using the ballistic airframe parachute.

The pilot had thought about the parachute after the go-around in the fog and activated it in the minute that followed. At no time had he thought about the possible material consequences for his microlight.

9 ACCIDENT TO THE AVIASUD ALBATROS IDENTIFIED 39KD ON 8 OCTOBER 2015 AT DOUCIER

Folding of right-hand wing in flight, loss of control, activation of ballistic airframe parachute

9.1 History of the flight

The pilot was carrying out a local flight from Doucier microlight strip. At a height of around 1,300 ft, he started a sideslip manoeuvre. He heard a noise and stopped this manoeuvre. He tried a more pronounced sideslip and the microlight suddenly pitched down and entered a spin. The pilot activated the ballistic airframe parachute and was uninjured in the occurrence.

9.2 Microlight and parachute information

The microlight was an Aviasud Albatros, already equipped with a parachute when the pilot purchased it. The pilot installed another parachute manufactured by Junkers as he was not satisfied with the original one. The handle was near the instrument panel. The pilot had to pull it towards him to activate the parachute. The Albatros has foldable wings with pins to keep the wings open in flight.

9.3 Pilot information

The pilot indicated that he had totalled around 1,000 flight hours at the time of the occurrence. He reported that he was happy, even euphoric, during his flight manoeuvres.

9.4 Training and habits with respect to the ballistic airframe parachute

The pilot indicated that he had not really followed any ballistic airframe parachute training. He had taken an interest in the parachute on reading an aviation magazine and decided to fly with a microlight equipped with one.

9.5 Feedback

During the loss of control, the pilot described feeling the microlight sinking as if it was no longer flying. He very quickly realised that the loads on the stick were unfamiliar. He did not try to regain control, immediately reduced power and thought about activating the ballistic airframe parachute. He explained that it was an instinctive decision. Due to the movements of the microlight, his right hand swung around the handle so he held it with his left hand and managed to activate the parachute. He indicated that two seconds later, he was on the ground, in a field not far from buildings. He estimated that around five minutes elapsed between the loss of control and the impact with the ground.

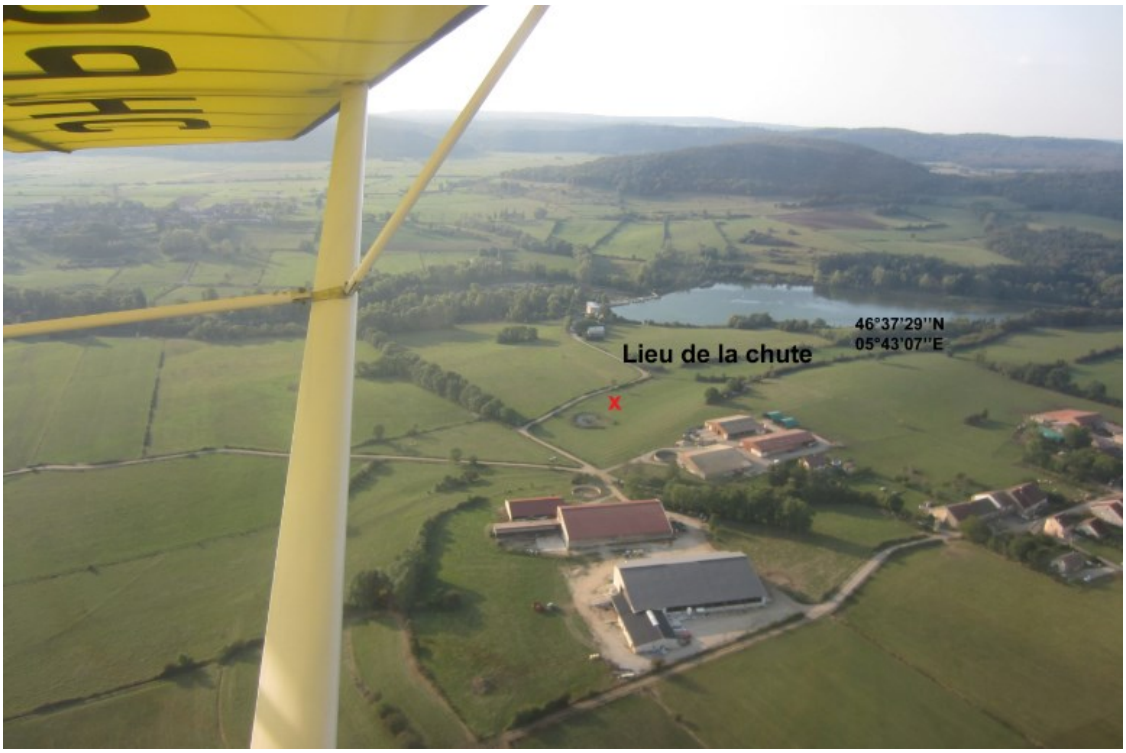

Figure 16: area of impact (source: photo taken by pilot)

After the accident, the pilot noticed that the pin was missing from the right-hand wing. He explained that during the walk-around inspection, he first unfolded the left-hand wing and inserted the pin. Then after unfolding the right-hand wing, he received a message on his telephone and broke off the inspection to go into the hangar. When he came back to the microlight, he saw the right-hand wing unfolded and forgot he had not inserted the pin. He explained that in flight, during a sideslip manoeuvre, the right-hand wing folded and the microlight pitched down in a spin towards the ground.

10 ACCIDENT TO THE TECNAM P92 IDENTIFIED 2BDK ON 6 DECEMBER 2019 AT LÉZIGNAN-CORBIÈRES

Engine failure, emergency landing, activation of ballistic airframe parachute

10.1 History of the flight

The pilot was carrying out a local flight from Lézignan-Corbières aerodrome. Observing that the weather conditions were deteriorating, he returned to the departure aerodrome. He stated that between the downwind leg and the base leg, he experienced a downdraft which tipped the microlight by 90° to the right-hand side. The microlight stabilized. Just after this, the engine spluttered and shut down and the propeller stopped. The pilot managed to restart the engine but it shut down again. He noticed that while he was trying to restart the engine, he had extended the downwind leg and exceeded the base leg. He understood that he would not be able to reach the aerodrome and chose a field to land in. He explained that he arrived too fast and too high, he pitched up to slow down but this was not sufficient. He indicated that he activated the parachute at a height of 30 ft. He explained that the deployment of the parachute slowed down the microlight and gave it a nose-down attitude. The nose rose before the microlight struck the ground. The microlight struck a sign and came to a stop on the shoulder of a road.

Figure 17: 2BDK after activation of the parachute (source: Raynald Cornart, L'indépendant)

10.2 Training and habits with respect to the ballistic airframe parachute

The pilot knew of the existence of ballistic airframe parachutes before starting his microlight training. His parachute training had been succinct: he learnt that he had to activate it in the event of a loss of control, spin or structural failure.

He indicated that he prefers flying microlights equipped with a parachute. His checklist mentions the parachute pin.

10.3 Feedback

As soon as the engine shut down, the pilot looked at the activation handle but said to himself, not just yet. He first wanted to land the microlight in a field. When he saw that he was arriving too quickly, he activated the parachute to decelerate, at around ten metres above the ground. His decision to activate it was a last chance survival reflex. He encountered no difficulty with activating it, he pulled the handle sharply. He had not learnt this scenario with his instructor.