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INVESTIGATION REPORT

Accident to the CENTRAIR – 101A PEGASE registered F-CHDJ

on 21 May 2020
at Barcelonnette (Alpes-de-Haute-Provence)

Time	Around 14:50[1]
Operator	Centre de Vol à Voile de l'Ubaye (CVVU)
Type of flight	Local
Persons on board	Pilot
Consequences and damage	Pilot severely injured, glider destroyed

This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in January 2021. As accurate as the translation may be, the original text in French is the work of reference.

[1] Except where otherwise indicated, the times in this report are in local time.

Partial deployment of speed brakes following a confusion between controls during approach, collision with a tree in last turn, collision with the ground

1 - HISTORY OF THE FLIGHT

Note: the following information is principally based on statements.

The pilot took off in towed flight from Barcelonnette aerodrome. He released the cable at 1,900 m of altitude to the north of the aerodrome[2] (Point ❶, Figure 1). He carried out several manoeuvres over "*Soleil-Bœuf*" ridge, retracted the landing gear then performed a 360° turn (Point ❷). As he could not find any uplift and with turbulence in the air mass, he decided to return to land at the aerodrome to carry out another towed take-off towards the south of the aerodrome. At 1,700 m of altitude, he joined the zone to lose altitude then configured the glider to land on runway 27. Shortly after, when crossing Ubaye River (Point ❸), as he was heading towards the start of the downwind leg, the pilot saw that the vertical speed indicator was at the instrument stop and displaying a rate of descent of at least 5 m/s for around one minute before observing a decrease in the rate of descent. The pilot joined the start of the downwind leg at approximately 1,400 m of altitude (Point ❹). He then observed a significant increase in the rate of descent. He aborted the downwind leg and made a U-shaped approach abeam the threshold of runway 27. At the end of the turn, he increased the glider's bank angle to avoid overshooting the runway centreline. The left wing hit the top of a tree, then the glider collided with the ground upside down, before the runway threshold.

[2] The aerodrome is located at 1,132 m of altitude.

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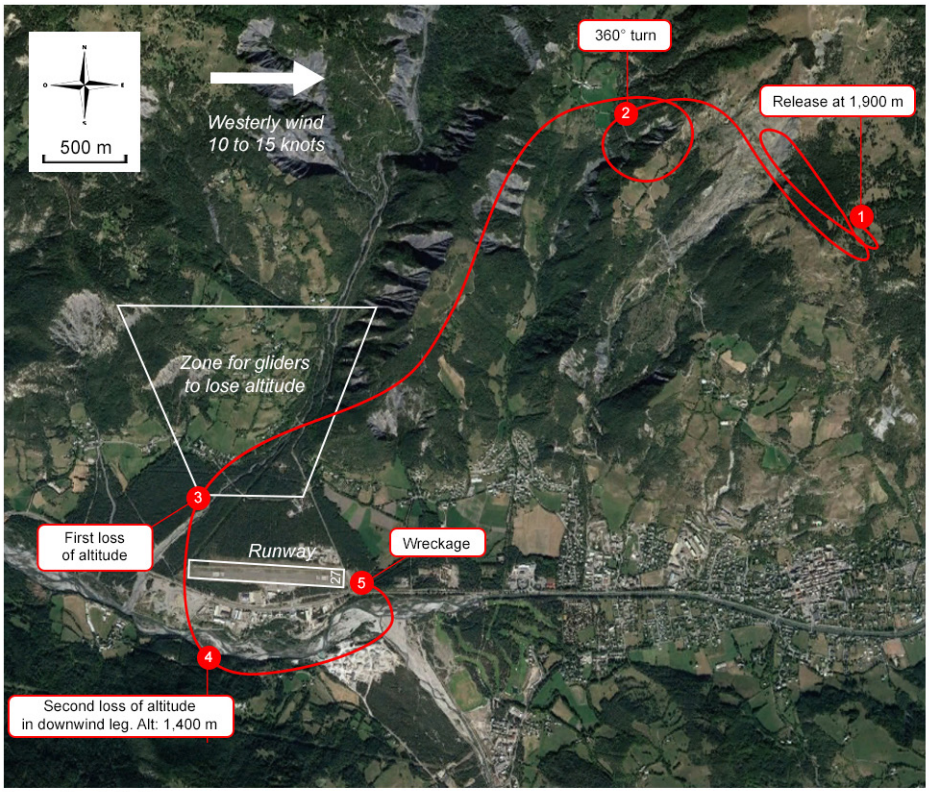


Source : Google Earth

Figure 1: Approximate path of the glider based on the pilot's statement

2 - ADDITIONAL INFORMATION

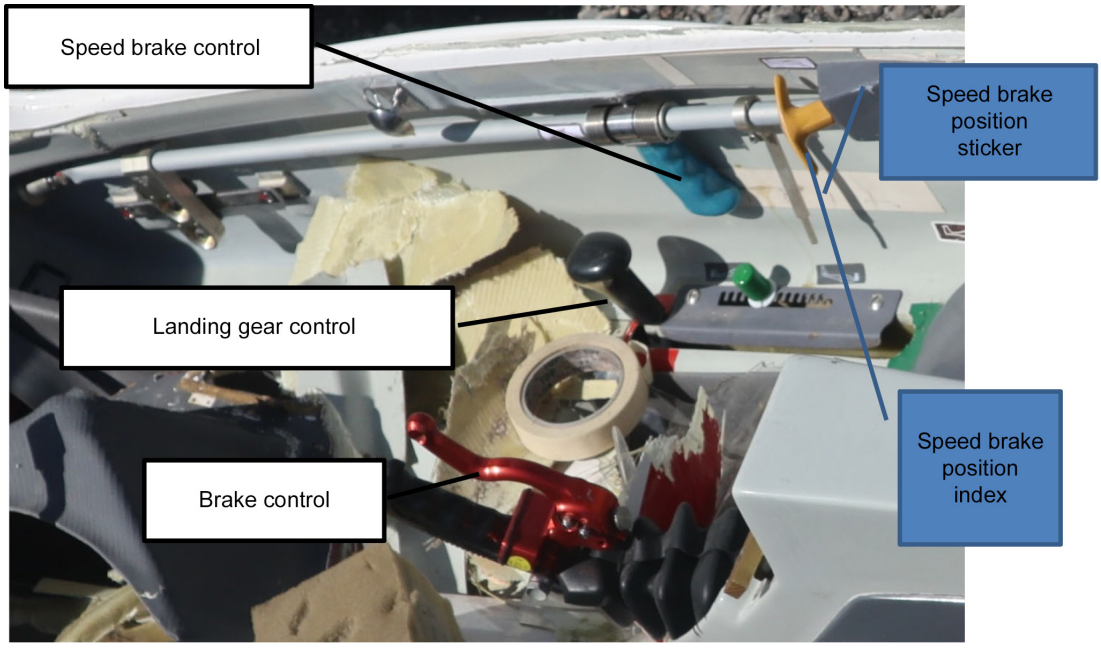
2.1 Site and wreckage information

The wreckage was found approximately 130 m before the threshold of runway 27. It was not dispersed and was complete. The glider hit a tree located approximately 50 m before the position of the wreckage.

Due to the wreckage partly lying on a public road, it had to be moved quickly after the initial observations were made by the air transport police and before the arrival of the BEA investigators. The former mechanic of the gliding centre present when the wreckage was turned up the right way stated that the speed brake control was locked in intermediate position, that the speed brakes were partially extended and that the landing gear was retracted.

The wreckage was examined further by the BEA several days after it was moved. During this examination, the following observations were made:

- The damage was consistent with the accident.
- The flight control linkages were continuous and operational.
- The landing gear control was locked in retracted position (Figure 2).
- The speed brake control was notched in the first intermediate position (Figure 2).
- The speed brakes were operational. The different positions of the speed brakes were consistent with the positions of the control in the cockpit.
- The landing gear was retracted and operational; the extension/retraction sequences were nominal without friction points.



Source: BEA

Figure 2: Positions of controls after the accident

2.2 Glider information

2.2.1 General information about PEGASE gliders modified for disabled pilots

The Centrair C101 Pegase is a single-seat glider with retractable landing gear.

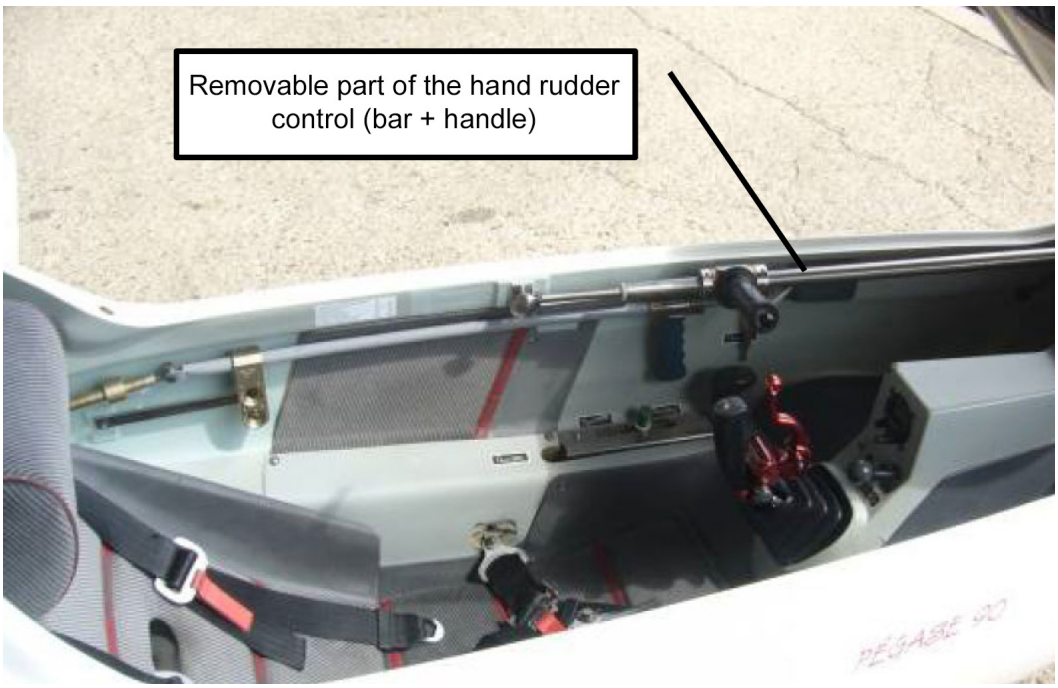
In 2014, the Pegase C101-1000 kit was developed in partnership with the French Gliding Federation (FFVP)[3] to enable persons with lower limb disabilities to be able to fly by manoeuvring the pedals using a manual control known as a "*hand rudder control*" (Figure 3). Since the kit was certified by the European Aviation Safety Agency (EASA) through the issuance of a STC[4], eight PEGASE type gliders have been modified in France. The glider registered F-CHDJ was equipped with this kit in May 2014.

These modified PEGASE gliders can be used by non-disabled and disabled pilots. The hand rudder control is a removable device. Pilots with lower limb disabilities must have received appropriate training in a two-seat glider equipped with the same device. Other pilots are only authorised to use the glider if the hand rudder control is removed. This was the case at the time of the accident.

The supplement to the glider flight manual specifies that a 'restrictions on use' plate must be added in the cockpit to signal that the glider is equipped with the hand rudder control option. This plate was not found in the wreckage.

[3] The system is presented in issue 46 of Planeur INFO magazine published by the French Gliding Federation in the 3rd quarter of 2014.

[4] Supplemental Type Certificate.



Source: Kit installation manual

Figure 3: Removable part of the hand rudder control when this is installed

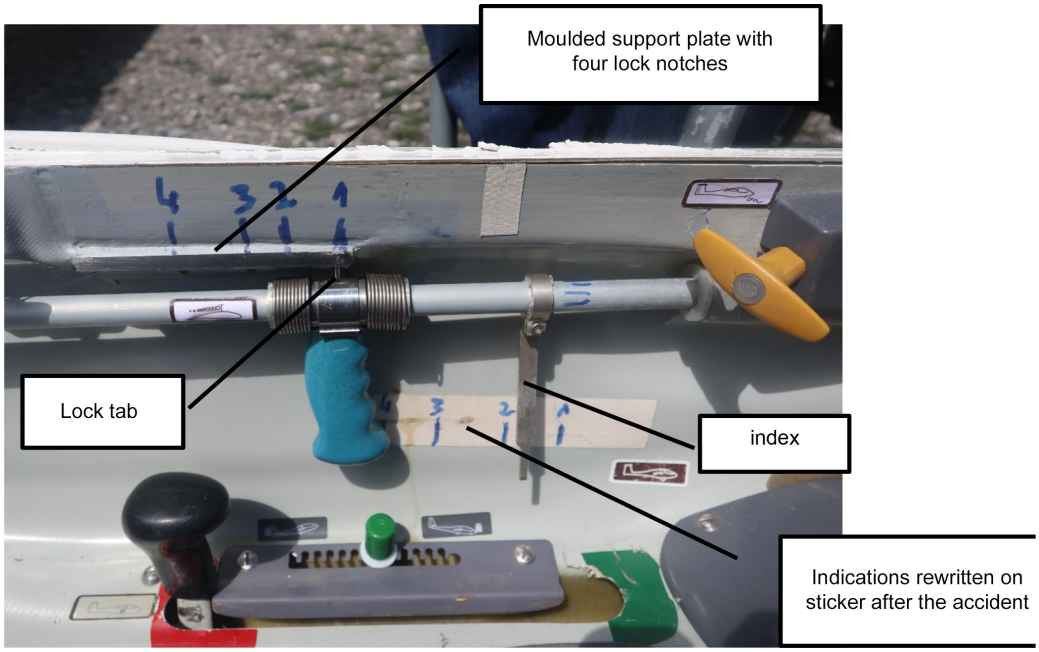
2.2.2 Modification of the speed brake control

Moreover, the hand rudder control installation kit specifies modification of the speed brake control (Figure 4) to enable the latter to be released in flight: in addition to the "*speed brakes retracted and locked*" position (in forward stop) that already exists on unmodified PEGASE gliders, four position notches are added corresponding to the varying degrees of extension of the speed brakes.

This modification notably consists in adding a metal plate including the lock notches and moulded inside the fuselage (Figure 4). Unlike the hand rudder control, this device cannot be removed. The speed brake control can be used exactly as it would be in an unmodified glider or using the lock notches.

To lock the speed brakes in a given position, the lever must be positioned vertically downwards so that the pin added to the lever goes into one of the notches of the plate located above the lever. To be able to change the position of the speed brakes, the lever must be positioned horizontally.

An index (vertical metal rod) and a sticker (not provided in the kit) with wording corresponding to the different positions must be added to show the positions in relation to the index as the lock notches are not visible to the pilot. The index and the sticker were present but the wording was partially faded (Figure 2).



Source: BEA

Figure 4: Flight controls and labels[5] in F-CHDJ

[5] The numbering of positions 1 to 4 on the sticker and the lock notches support plate were highlighted in blue marker after the accident to make them more visible in the photograph.

2.2.3 Brake system modification

To make PEGASE gliders that are not equipped with a brake lever on the stick compatible with the hand rudder control, a specific BERINGER brake lever needs to be added (Figure 3)[6]. The lever was installed on F-CHDJ (Figure 2). This was not present on the CVVU's unmodified PEGASE for which the brake was coupled with complete extension of the speed brakes through the speed brake control.

[6] Also the subject of a STC.

2.2.4 Landing gear control

The landing gear retraction/extension control is identical to that on unmodified PEGASE gliders. It is located immediately below the speed brake control. In rearward position ("*red*" side), the landing gear is locked by a notch in "*retracted*" position. In forward position ("*green*" side), the landing gear is locked by a notch in "*extended*" position. To change the position, the control firstly needs to be moved towards the inside of the cockpit, then pushed or pulled and finally moved towards the outside of the cockpit (Figure 4).

2.3 Pilot information

The pilot held a glider pilot licence since 2013. He had logged 423 flight hours in a glider including 78 hours on this type. He had last flown in a glider (on the unmodified PEGASE owned by the CCVU) on 2 September 2019.

He had flown six times for a total of approximately 13 hours on F-CHDJ since its modification in 2014. His last flight on F-CHDJ had been on 13 April 2017. Since this date, he had flown six hours and 30 minutes on the other unmodified glider.

On the day of the accident, he made his resumption flight after the winter period of inactivity and the 55-day lockdown due to the COVID-19 pandemic[7]. This flight was a solo flight supervised by an instructor on the ground at the aerodrome.

[7] See § 2.6.

2.4 Read-out of onboard computer

Analysis of the flight files saved in the FLARM showed that this one had not been operational since the last flight recorded on 11 September 2019. Since this date, six flights had been made without the anti-collision system on this glider being operational[8]. There was no mention of this malfunction in the logbook.

In the absence of FLARM recorded data, it was not possible to reconstruct the path of the accident flight and correlate the vertical profile with the abnormal rate of descent described by the pilot.

[8] The newsflash published by the French Gliding Federation on 29 May 2017 stated that the FLARM must be updated annually with a gap of no longer than one year between two updates. The French Gliding Federation specifies the procedure to be followed and recommends that pilots make this update during the glider's annual inspection. If this update is not made within the specified time frame, the FLARM may fail. Source: https://www.calameo.com/read/00472161078e1a7730e43

2.5 Meteorological information

The meteorological conditions estimated by Météo-France at the time of the accident were as follows: moderate valley breeze blowing from the west-south-west, visibility greater than 10 km, mostly clear sky, quite strong turbulence of thermodynamic origin with the possibility of localised rotors in the low layers in the valley downwind of the terrain.

Witnesses stated that the wind was blowing from the west at 10 to 15 kt.

2.6 Resumption of glider activity within the COVID-19 context

On 8 May 2020, taking into account the exceptional situation in France, the DGAC granted a waiver to extend up to 31 December 2020 the validity of the licence of glider pilots who, on 16 March 2020 (start of lockdown), had completed the recent experience required in the two years and eight months preceding the planned flight. The pilot met the conditions to benefit from the provisions of the waiver.

On 11 May 2020, the date on which the lockdown restrictions started to be lifted, the health measures of the Health and Solidarity Ministry, described in the government decree, prevailed for all activity and the DSAC issued no specific instruction for aviation activities. On the same day, the Sports Ministry published a guide to support the resumption of sports activities post-lockdown, specifying in particular that the practice of solo glider flights was authorised.

On 14 May 2020, the French Gliding Federation (FFVP), not wanting to degrade the level of safety by restricting the activity to solo flights only, published a bulletin specifying the conditions for resuming flights in single-seat gliders. The Federation invited clubs to implement flights with an instructor when necessary, in particular for resumption flights following this long period of inactivity.

This recommendation was accompanied by advice for pilots to help them to self-assess their level of currency. According to the document published to this effect (Figure 5), with eight flights and 22 flight hours in the last 12 months, the pilot's level of safety was in the amber zone (blue point Figure 5). A check flight was therefore required.

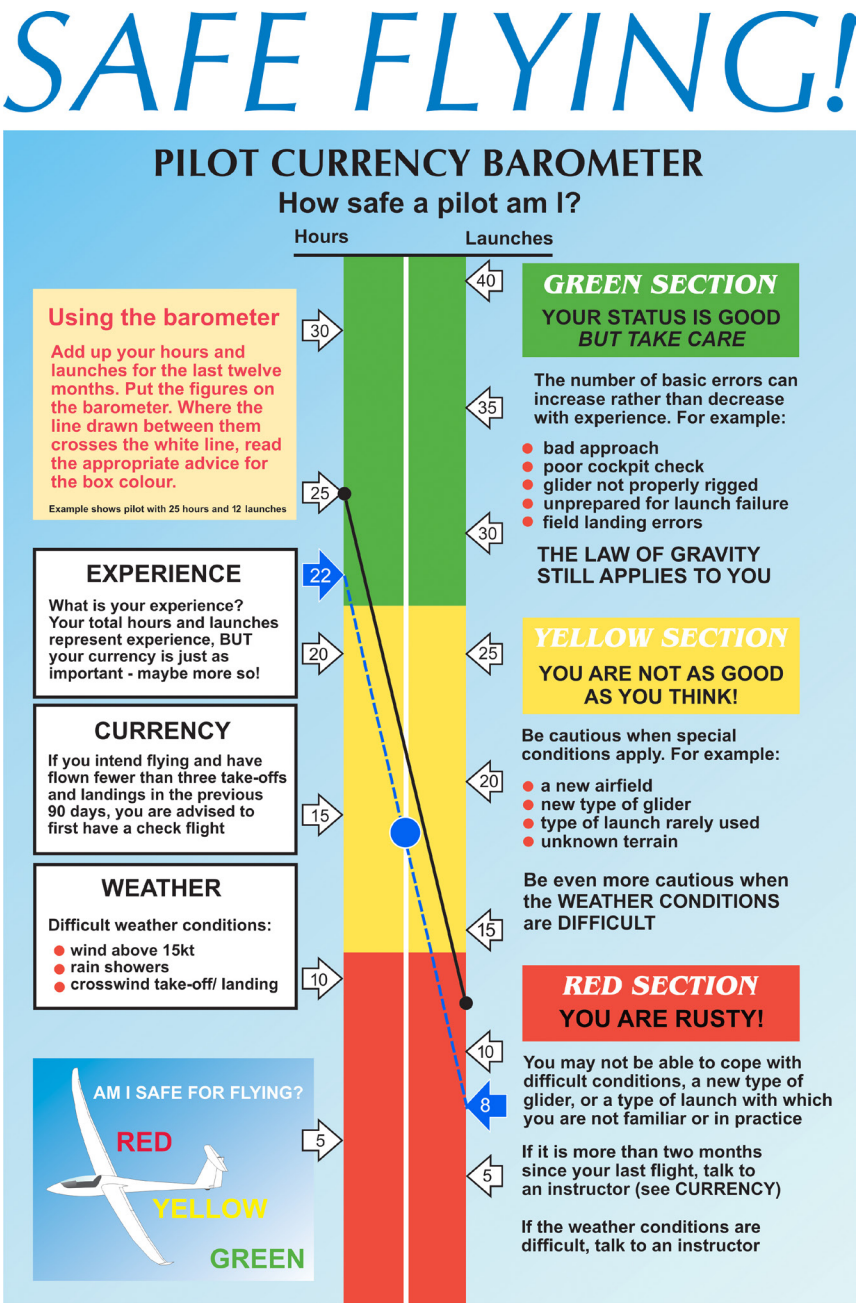


Figure 5: Self-assessment questionnaire used by FFVP (source: British Gliding Association)
(The values **in blue** correspond to the situation of the F-CHDJ pilot)

On 20 May 2020, considering that the health measures described in the government decree of 11 May 2020, supplemented by those specific to gliding presented in the "*French Gliding Federation Guide to Health Measures*"[9] guaranteed health safety for flights in two-seat gliders, the French Gliding Federation specified in a new bulletin that it had no opposition to the resumption of flights in two-seat gliders, unless otherwise stated by a local or regional authority.

[9] The French Gliding Federation sent this guide to flying club presidents on 29 April 2020 with a view to the resumption of activity post-lockdown.

On 8 June 2020, after the accident, a national protocol for the lifting of lockdown was published for the entire transport sector (commercial air transport and general aviation practised privately at flying clubs). This document officially authorised proficiency flights, instruction flights, training flights and flights following a long period of inactivity in compliance with social distancing rules, specifically the mandatory wearing of surgical masks and frequent aircraft disinfection.

2.7 Operator's opinion regarding resumption of activity

The CVVU's internal regulations in force at the time of the accident contained no requirement pertaining to the resumption of flights after the winter break. Only the authorisation of the chief-pilot or the latter's representative was required to perform a flight, with the chief-pilot having the right to ask any pilot requesting a towed take-off by the club to carry out a check flight.

Since the accident, the CVVU requires all of its members to systematically perform a check dual flight in case of a resumption following any period of inactivity, when they want to use one of the centre's gliders.

2.8 Statements

2.8.1 Chief-pilot

He explained that usually, in the event of lack of recent activity, pilots must perform a dual flight lasting one hour to include handling with figures, stalling, U-shaped approaches, and slope soaring. Depending on the level of the pilot, a second flight may be performed with another instructor.

The pilot had asked to perform his first resumption flight of the season. The chief-pilot stated that he was the only instructor present on that day but, being 73 years old and therefore more susceptible to COVID-19, he had not wanted to fly in dual flight to avoid any exposure to the virus. As the pilot of F-CHDJ was considered to be a seasoned pilot, the chief-pilot decided to carry out a briefing on the ground only.

He added that he had never discussed the specificity of the speed brake control on F-CHDJ with the pilot during his training[(10)] and had not spoken about this during the briefing either.

When the pilot signalled to him that he was able to position the glider horizontally before take-off, the instructor noticed that the speed brakes were not fully retracted and immediately told the pilot, who extended them then fully retracted them.

[(10)] He asked student pilots to read the flight manual and to ask questions if necessary.

2.8.2 Tug pilot

According to the pilot of the tug plane, the glider speed brakes remained retracted during the towed flight.

2.8.3 Glider pilot

Before joining the start of the downwind leg, the pilot used a French mnemonics to configure his glider (Landing gear extended/flaps/speed/water ballasts emptied/settings/trim). He stated that he had commanded extension of the landing gear and that following this action, the glider had adopted an abnormal rate of descent. He could not remember if he had visually identified the control he had grabbed before taking this action. He stated that he had then announced on the radio that he was in the downwind leg with the landing gear extended and locked[(11)].

He added that, at no time during the flight had he intended to handle the speed brake control. Convinced that this control was in the "*speed brakes retracted and locked*" position, he never checked its position during the flight, even after the occurrence of the fast rate of descent of the glider at the start of the downwind leg.

When he tested the speed brakes on the ground prior to take-off, he did not notice the specific nature of the speed brake control on this glider.

He explained that he did not know that modifications had been made to the hand rudder control on F-CHDJ, in particular the addition of the speed brake control notch system. He added that he had received no explanation regarding the characteristics associated with these modifications.

[(11)] The CVVU recommends the practice of specifying "*landing gear extended and locked on green*" when joining the start of the downwind leg. The chief-pilot stated that he had not heard the pilot's message (as the aerodrome's radio frequency is not recorded, it was not possible to confirm the transmission of this message or its content).

3 - CONCLUSIONS

The conclusions are solely based on the information which came to the knowledge of the BEA during the investigation. They are not intended to apportion blame or liability.

Scenario

Having failed to find any uplift after release, the pilot decided to abort the flight and to return to the aerodrome to land. The actions that he took from this moment on could not be precisely established.

However, it is very likely that when it came to configuring the glider for landing before joining the start of the downwind leg, the pilot inadvertently handled the speed brake control instead of the landing gear control. He then locked the speed brake control on the notch corresponding to the first position, "*speed brakes extended*".

When handling the controls, the pilot went through the checklist in the form of a to-do-list. Consequently, he did not visually check the position of the controls after his actions. As a result, he did not realise his mistake.

The pilot then focused his attention on the significant degradation of the glider's performance supposing that this was due to an aerological phenomenon and not to an erroneous handling of the speed brake control. The glider lost altitude and was too low during the downwind leg, forcing the pilot to make a U-shaped approach to reach the runway. During the manoeuvre, the glider hit a tree.

Contributing factors

The following factors may have contributed to the likely confusion of the pilot between the controls:

- His lack of recent experience. The lack of references while starting his first approach in nearly nine months may have required increased attention on his part to certain aspects of the flight, such as the path, to the detriment of other aspects, such as the checking of the controls handled.
- The inappropriate management of the resumption of activity by the CVVU, notably in the specific context of the COVID-19 health crisis, which, in this instance, did not ensure that each pilot had sufficient recent experience to fly solo.

The following factors may have contributed to the locking of the speed brakes in intermediate position and to the non-detection of this situation:

- The pilot's lack of knowledge of the characteristics of this glider, in particular the presence of lock notches in extended position on the speed brake control in F-CHDJ.
- The failure on the part of the CVVU to make pilots aware of these characteristics, notably with regards to the differences that exist between this glider and the second and unmodified PEGASE glider operated by the CCVU.
- The lack of a visual check by the pilot of the result of his actions on the flight controls, in particular the correct positioning of the landing gear control. In the absence of this systematic check being carried out, the simultaneity between the action carried out and the high rate of descent observed by the pilot should have alerted him.

Safety lessons

Prevention of risk of confusion between controls

Two accidents associated with a confusion between the speed brake control and the landing gear control were reported by the BEA in the past on PEGASE gliders. The first occurred on 11 March 2000 to the PEGASE registered F-CHFK[12]; the second occurred on 27 June 2015 to the PEGASE registered F-CHFX[13].

On its part, the French Gliding Federation identified, through feedback, lots of occurrences in a glider resulting from a confusions between controls, in particular between those of the speed brakes and landing gears on CENTRAIR 101A PEGASE gliders.

An article devoted to this problem was published by the French Gliding Federation in issue 50 of the magazine PLANEUR INFO during the 3rd quarter of 2015[14] to draw the attention of pilots to this risk and to enable them to implement safety measures to guard against any error of this type. In particular, pilots are advised to visually check the position of a control to be moved before performing any action on it. Faced with any abnormal situation, notably a sudden deterioration in rate of descent following an action on a control (supposed manoeuvre of the landing gear or speed brakes), pilots are also advised to check that the correct control has been handled.

[12] https://www.bea.aero/docspa/2000/f-fk000311/pdf/f-fk000311.pdf

[13] https://www.bea.aero/fileadmin/documents/docspa/2015/BEA2015-0324/pdf/BEA2015-0324.pdf

[14] https://fr.calameo.com/read/0047216102fafc30ca5e9