

Accident to the Arsi AB Esqual VM-1C registered OO-H81

on 21 August 2018
at Rue (Somme)

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

Time	Around 19:55 ⁽¹⁾
Operator	Aero Club Brugge (A.C.B.)
Type of flight	Instruction
Persons on board	Instructor and student-pilot
Consequences and damage	Instructor and student-pilot fatally injured, microlight destroyed

This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in March 2022. As accurate as the translation may be, the original text in French is the work of reference

Loss of control in instruction flight, collision with the ground, fire

1 - HISTORY OF THE FLIGHT

Note: the following information is principally based on statements and radar data.

The instructor and student-pilot participated in a microlight flight training course organised by the A.C.B., along with a second instructor and five other students. As the Belgian airspace was considered too congested, the club chose to stay at Abbeville aerodrome (Somme) for a period of two weeks. The microlight registered OO-H81 was used for this training. A similar training course was held the previous year at the same location and time.

Flights scheduled for the day had to be delayed due to weather conditions. The accident flight began at around 19:25. After take-off from Abbeville, the instructor and his student flew straight legs at a height of around 3,000 ft, northeast of Somme Bay for about half an hour.

At 19:54, approaching Marquenterre Park⁽²⁾, they bypassed it by heading northeast. After about two minutes of flight in this direction, at a height of around 3,400 ft, the radar path of the microlight curved abruptly to the right by approximately 180° before descending, with the microlight's vertical speed exceeding 5,000 ft/min.

At 19:56, the microlight struck the ground flat in an area of pastures with a high vertical speed, a slightly nose-down attitude and almost zero horizontal speed. It caught fire upon impact.

⁽²⁾ Area shown on
aeronautical charts,
overflight prohibited
below 800 ft.

2- ADDITIONAL INFORMATION

2.1 Examination of site and wreckage

The accident site was a flat grass field, located at an altitude of five metres and surrounded by numerous fields suitable for an emergency landing. No evidence of collision with obstacles or marks left by the microlight in the loose soil were observed in the vicinity of the site.

The wreckage was complete and not dispersed. It was oriented on a 140° heading. It was laying flat on its collapsed landing gear. It was substantially damaged by the fire that broke out as a result of the accident. The examination of the flight control linkages showed that they were continuous prior to the impact with the ground. Observations of the power unit suggested that it was in working order but was supplying little or no power at the time of impact with the ground.

The different items of instrument panel equipment (see picture) that may have had a recording function were extensively damaged by fire and were not downloadable. Only a mechanical accelerometer, initially attached to the left part of the instrument panel, was found in good condition, in the grass, a few metres from the wreckage. It is likely that the extreme values recorded (- 2 g/+ 7 g) resulted from the impact or the ejection of the instrument from the wreckage.



Source: A.C.B.

Photo of the OO-H81 instrument panel in the configuration requested by the club

2.2 Summary of statements

Several witnesses on the ground, with no aeronautical experience, observed the microlight's fall to the ground and described a right-hand spin that seemed to stop only a few metres before impact. They stated that they observed variations in nose-down attitude of varying degrees during the descent. During this phase, the engine operation was audible but irregular, interrupted by one or more stops and restarts.

Concomitant with the microlight's fall, a short "Mayday" message was received on the 121.500 MHz frequency by the pilot of a Cessna 206 on approach to Abbeville after a parachute drop flight. The author of the distress call could not be identified.

2.3 Microlight information

2.3.1 Description of the Arsi AB Esqual VM-1C ULP 260 is

2.3.1.1 Airframe

The VM-1C is a side-by-side, two-seater, single-engine, low-wing microlight with fixed tricycle landing gear. It is built by the Swedish company Arsi AB and is essentially made of carbon fibre, high density PVC/PET foam and epoxy resin. The wing differs from the Esqual originally manufactured in Spain.

The diamond wings (sometimes called tapered wings) are equipped with Fowler flaps and each contain a fuel tank with a total capacity of 110 l. In order to prevent the part of the wing where the chord is reduced and where the flight controls are placed from stalling first, the manufacturer decreased the rigging angle of the wing tip in relation to the wing root. According to the microlight manufacturer, close to the stall speed, action on the ailerons could increase the likelihood of an asymmetrical stall. There is no stall warning system. This is not mandatory on this type of aircraft, under either Belgian or French regulations.

2.3.1.2 Power unit

The engine is a flat-four, air-cooled, fuel-injected engine developed by the Belgian company ULPower. This engine is not certified by the European Aviation Safety Agency (EASA). The "UL260iS" version delivers 93 hp at 2,800 rpm. The engine parameters are managed by an engine control computer (FADEC).

When asked about the engine stop(s) and restart(s) described by witnesses during the event, the engine manufacturer suggested that they may have been caused by the disruption to the fuel supply during the spin. This manufacturer explained that for an uncommanded shut-down, if the propeller is windmilling above 300 rpm, the FADEC automatically restarts the engine as soon as the fuel supply is effective, without any pilot action.

2.3.2 Legislation on microlights and microlight pilots in Belgium

The national regulation contained in [circular CIR/AIRW-12](#) of the Federal Public Service (FPS) Mobility and Transport applies.

The "Arsi AB Esqual VM-1C ULP 260 is" two-seater microlight was registered under number 2017/203 in the "List of Authorised Motorised Microlight Aircraft in Belgium". This list is established and updated by the FPS Mobility and Transport. Contrary to the other Esquals with different engines in this list, the "applicant" for the type approval was not the Swedish manufacturer ARSI AB but a Belgian national, instructor in the A.C.B., who also participated in the training course at Abbeville.

To obtain a microlight type approval, the "applicant" submits a technical file to the Belgian ULM Federation (BULMF). This file contains an operation and maintenance manual and a flight test report. The BULMF certifies the conformity of the file before transmitting it to the Belgian Directorate General for Air Transport (DGTA) which registers it and issues the "applicant" with the microlight type approval.

The "pilot authorisation" is issued to the student microlight pilot at the end of the training cycle provided that they have, among other conditions:

- Passed an examination on the aviation laws and regulations pertaining to the pilot licence for an aeroplane, helicopter, or free balloon.

⁽³⁾ Version 1.0 -
Issued 01/03/2017
published in English.

⁽⁴⁾ Compliance
Document Book 2
of 5 Flight Testing
N°01802-00 dated
21-01-2016
performed by
the Test-Institute
Prüfzentrum
Oldenburg Hatten.

- ❑ Demonstrated theoretical (aerodynamics, meteorology, flying techniques) and practical knowledge before an examiner.
- ❑ Passed a practical exam during which they have, alone on board, in one or more flights:
 - Performed a cross-country flight between two points at least 35 km apart
 - Performed 10 landings and 10 take-offs
 - Performed 3 landings within 20 m of a ground marking
 - Performed a landing within 30 m of a ground marking with the engine at idle
 - Performed a dive (for microlights only).

2.3.3 Excerpts from the manufacturer's documentation concerning the flight characteristics

The following information is taken from the "Esqual VM-1C UL Power 260 is - Pilot & maintenance manual"⁽³⁾:

- ❑ In the event of engine failure, the speed to be maintained is 120 km/h with the flaps in the first detent (10°) or 125 km/h with the flaps retracted.
- ❑ The stall speeds are 82 km/h with the flaps retracted (Vs1) and, depending on whether the engine power is reduced or full, 61 km/h (Vs0) or 58 km/h with flaps extended at 38°.

All the above information was validated by a flight test campaign⁽⁴⁾ carried out in Germany at the request of the Swedish manufacturer, with a view to certifying a version of the microlight equipped with a Rotax engine in Germany (*German LTF-UL, Musterzulassungschein für Luftsportgeräte Nr. 61237*).

In Section 4 "Emergency Procedures", it is stated in Chapter 4.8 "Non powered stall":

- ❑ *"A stall is recognized by a slight disturbance or rumbling of the aircraft and an eventual loss or degradation of controls. If you persist with this situation, then the aircraft will most probably go uncontrolled and may enter a spin."*
- ❑ *"To counter the stall, keep the ailerons neutral, use the rudder to control any Wing drop and push the stick forward to unload the aircraft and to reduce the angle of attack considerably clearing the stall. If engine was idling give full power when recovering. If the stall was during a forced landing procedure recover the airplane and continue the forced landing procedure."*

In Chapter 4.9 "Powered stall", it states:

- ❑ *"A power ON stall may occur at any speed, When passing the critical angle of attack by pulling too many "G's" for the speed you fly at the actual weight, then the airplane stalls. Relaxing the stick force may recover the airplane from the stall immediately, If you fly too rough at too low a speed then a RATE Stall may occur. The airplane may recover from itself but it might as well go inverted."*

Lastly, in chapter 4.10 "Spin", the manufacturer states that:

- ❑ *"Spin practice is not authorized on ultra lights. The VM-1C Esqual spins like a normal aircraft and respond immediately to the normal spin recovery procedure."*

2.3.4 Modifications made to the microlight since its delivery

The microlight, acquired new, was issued with its registration certificate on 27 November 2017. At the time of the purchase, the club chose to modify its instrumentation and not to equip its microlight with an airframe parachute proposed as an option by the manufacturer. OO-H81 flew under a permit before obtaining its "Ultralight Restricted Flight Authorisation" from the Belgian authority on 05 June 2018.

⁽⁵⁾ [Accident ultralight Esqual VM 1C at Landegem on 19 November 2021.](#)

By this date, several modifications had been made within the owner club where the “applicant” was a member. These modifications essentially entailed a change of propeller. Following a propeller loss in flight on a microlight of the same type⁽⁵⁾, the composite three-blade propeller originally installed was replaced with a Hercules wooden fixed-pitch two-blade propeller.

The last weighing record was made on 03 March 2018, in accordance with the protocol defined by the microlight manufacturer. In comparison with the initial weighing record of 30 October 2017, the empty weight had increased by 0.68 kg and the empty centre of gravity had moved backwards by 1 cm passing from 15.7% to 16.69% of the root chord.

2.4 Occupant information

2.4.1 Instructor information

The 28-year-old Belgian instructor held a “microlight pilot authorisation” issued by the Belgian authority in March 2016 and an instructor rating issued in March 2017, both still valid. His class 2 medical certificate was valid up to May 2022. On 17 February 2018, he stated that he had totalled 222 flight hours in a microlight and 230 landings.

Previously, he had started, but not completed, a fighter pilot training course within the air component of the Belgian Army. During his instruction, he had had the opportunity to conduct aerobatic training on the SF-260 then the Alpha Jet.

Two witnesses stated having each flown once as passengers on board OO-H81, accompanied by the instructor, a few days prior to the accident. Aerobatic figures were performed during these two flights, in particular barrel rolls and loops.

2.4.2 Student-pilot information

The 16-year-old Belgian student-pilot held a “microlight training authorisation” issued by the Belgian authority on 15 June 2018, as well as a “class 4”⁽⁶⁾ medical certificate valid up to June 2023.

He had begun the “Basic Flying Course Esqual” (BFCE) organised by the A.C.B. with a flight made on 04 August 2018. The following flights had been made between 18 and 21 August 2018. The accident flight was the seventh flight on this microlight.

The written reports on the student-pilot's progress showed that during the previous two flights with the same instructor, demonstrations and stall exercises had been performed in various configurations.

2.5 Meteorological information

The automatic METAR report at 19:30 for Touquet-Côte d’Opale airport (Pas-de-Calais), located 25 km to the north of the accident site, indicated:

- wind from 280° of 5 kt, varying between 250° to 310°;
- visibility greater than 10 km;
- scattered clouds (SCT) with a base at a height of 1,200 ft, broken clouds (BKN) with a base at a height of 4,100 ft, temporarily broken clouds at a height of 500 ft;
- a temperature of 20°C and a dew point temperature of 19°C;
- a pressure of 1019 HPa.

The photos taken by witnesses just after the event showed that these observations were close to the prevailing conditions at the accident site.

The meteorological situation in the zone was compatible with making a VFR flight.

⁽⁶⁾ Certificate specific to Belgian regulations.

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

The instructor and the student-pilot undertook a local instruction flight that may have included stall exercises in various configurations such as those performed during the two previous instruction flights. After around half an hour of flight, when flying at a height of around 3,400 ft above cultivated areas, they lost control of the microlight, which entered a right-hand spin with variations in attitude up to collision with the ground.

The safety investigation was unable to determine what actions the pilot at the controls carried out before and after the loss of control, or to establish the height and recovery time needed to exit from a spin.

The installation of an airframe parachute proposed as an option by the microlight manufacturer would have enabled the microlight, then entering a spin, to reach the ground while limiting injuries to the occupants.

Safety lessons

In its flight manual, the microlight manufacturer states that maintaining a stall situation can result in loss of control that may continue into a spin.

It also cites, in chapter 4.10 regarding spin, that the “normal procedure” for exiting a spin must be applied, although it does not describe this procedure.

In a summary document on the topic⁽⁷⁾, the European General Aviation Safety Team (EGAST) emphasises that this procedure can be specific to a type of aircraft.

⁽⁷⁾ GA 8 [Stall and spin loss of control](#), page 20.