

ULM A-009/2020

TECHNICAL REPORT

Accident involving an ULM ELA-07 R-115 autogyro, registration EC-GF2, on 9 July 2020 at Villanueva de Gállego Aerodrome, in the municipality of Villanueva de Gállego (Zaragoza – Spain).

Please note that this report is not presented in its final layout and therefore it could include minor errors or need type corrections, but not related to its content. The final layout with its NIPO included (Identification Number for Official Publications) will substitute the present report when available.



FOREWORD

This report is a technical document that reflects the point of view of the Civil Aviation Accident and Incident Investigation Commission (CIAIAC) regarding the circumstances of the accident the object of the investigation, its probable causes, and its consequences.

In accordance with the provisions of Article 5.4.1 of Annex 13 of the International Civil Aviation Convention; Article 5.6 of Regulation (EU) No 996/2010 of the European Parliament and of the Council, of 20 October 2010; Article 15 of Law 21/2003 on Air Safety; and Articles 1 and 21.2 of Regulation 389/1998, this investigation is exclusively of a technical nature, and its objective is the prevention of future aviation accidents and incidents by issuing, if necessary, safety recommendations to prevent their recurrence. The investigation is not intended to attribute any blame or liability whatsoever, and it's not prejudging the possible decision taken by the judicial authorities. Therefore, and according to above norms and regulations, the investigation was carried out using procedures not necessarily subject to the guarantees and rights usually used for the evidence in a judicial process.

Consequently, the use of this report for purposes other than that of preventing of future accidents may lead to erroneous conclusions or interpretations.

This report was originally issued in Spanish. This English translation is provided for information purposes only.

CONTENTS

FOREWORD	Error! Marcador no definido.
ABBREVIATIONS	v
SYNOPSIS	vii
1.- FACTUAL INFORMATION	1
1.1.- History of the flight..	1
1.2.- Injuries to persons.	1
1.3.- Damage to the aircraft.	1
1.4.- Other damage.	2
1.5.- Personnel information.	2
1.6.- Aircraft information.....	2
1.6.1.- Airframe.	2
1.6.2.- Certificate of airworthiness.	2
1.6.3.- Maintenance records.	3
1.6.4.- Engine.	3
1.7.- Meteorological information.	3
1.8.- Aids to navigation.	3
1.9.- Communications.	4
1.10.- Aerodrome information	4
1.11.- Flight recorders.....	4
1.12.- Wreckage and impact information.....	4
1.13.- Medical and pathological information.....	5
1.14.- Fire.	5
1.15.- Survival aspects.....	5
1.16.- Tests and research.	5
1.16.1 - Inspection of the aircraft wreckage.	5
1.17.- Organisational and management information.....	6
1.18.- Additional information.....	6
1.18.1.- Aircraft flight manual. Take-off procedures.	6
1.19.- Useful or effective investigation techniques.	8

2.- ANALYSIS.....	9
2.1.- History of the flight.....	9
2.2 - Analysis of the wreckage.....	9
2.3.- Aircraft performance.....	9
3.- CONCLUSIONS.....	11
3.1.- Findings.....	11
3.2.- Causes/contributing factors.....	11
4.- SAFETY RECOMMENDATIONS.....	13

ABBREVIATIONS

00:00	Hours and minutes (period of time)
00.00:00.....	Hours, minutes and seconds (chronological time)
°C	Degrees Celsius
AEMET	Spain's State Meteorological Agency
AESA.....	Spain's National Aviation Safety Agency
AG	Autogyro rating
cm	Centimetres
dd/mm/yyyy	Day, month and year (date)
ft	Feet
LT	Local time
HP	Horse Power
hPa	Hectopascals
kg.....	Kilogrammes
km.....	Kilometres
km/h.....	Kilometres per hour
LAPL	Light aircraft pilot license
LEVG.....	ICAO callsign for Villanueva de Gállego Aerodrome
m	Metres
METAR	Aviation routine weather report
mph	Ground miles per hour
MHz	Megahertz
QNH	Altimeter setting to obtain elevation above sea level when on the ground
rpm	Revolutions per minute
TULM.....	Ultralight aircraft pilot license
ULM.....	Motorised ultralight aircraft
UTC	Coordinated universal time
VFR	Visual flight rules

SYNOPSIS

Owner and Operator:	Private
Aircraft:	Autogyro ULM ELA AVIACIÓN S.L., ELA-07 R-115, registration EC-GF2.
Date and time of the accident:	09 July 2020, at 10:00 hours ⁽¹⁾
Site of the accident:	Villanueva de Gállego Aerodrome, municipality of Villanueva de Gállego (Zaragoza – Spain).
Persons on board:	1 crew member, fatal.
Type of flight:	General aviation – Private / Visual flight rules
Phase of flight:	Take-off – Initial climb
Date of approval:	25 th January 2023

Summary of the accident.

The autogyro ELA AVIACIÓN S.L., model ELA-07 R-115, registration EC-GF2, took off at approximately 10:00 hours from runway 32 at Villanueva de Gállego Aerodrome (LEVG–Zaragoza – Spain), for a local flight with the pilot as the sole occupant on board.

According to the information provided by the aerodrome flight director, the aircraft was scheduled to conduct a local recreational flight and, on its return, fly aerodrome traffic circuits to practise landings and take-offs.

The aircraft crashed during its initial climb, landing on the extension of the runway centreline, just 30 m beyond the end of the runway. The pilot died and the aircraft was destroyed.

The investigation has concluded that the accident was caused by a deceleration of the rotor, which resulted in the loss of lift and subsequent descent of the aircraft, with insufficient altitude to recover the rotor speed before the impact with the ground.

No safety recommendations were issued as a result of the investigation into the accident.

⁽¹⁾ All times referenced in this report are local time.
UTC can be calculated by subtracting two hours from the local time.

1.- FACTUAL INFORMATION

1.1.- History of the flight.

On Thursday 09 July 2020, at 09:30 hours, the pilot and owner of the autogyro ULM ELA AVIACIÓN S.L., model ELA-07 R-115, registration EC-GF2, set out to begin a flight from the aircraft's base at Villanueva de Gállego Aerodrome, intending to conduct a local recreational flight and, on returning, fly aerodrome traffic circuits to practise landings and take-offs; the pilot and owner of the aircraft typically carried out this type of flight and practice manoeuvres several times a month. Before taking off, the aircraft was refuelled with 30 litres of fuel, sufficient for at least 90 minutes of flight.

After the pre-flight inspection, the pilot spoke with the aerodrome flight director, who deemed that he was fit to fly and that the weather conditions were suitable. Subsequently, the aircraft taxied to the head of runway 32, with the pilot as the sole occupant on board, and took off at around 10:00 hours.

According to several people who were present at the time, the take-off proceeded normally and, apparently, at the appropriate speeds. Once airborne, the aircraft made an excessively steep initial climb followed by a very steep descent with no apparent change in engine speed, and then crashed into the ground in line with the runway centreline, just 30 m from the end of the runway.

As a result of the collision with the ground, the sole occupant and pilot in command was killed, and the aircraft was destroyed.

1.2.- Injuries to persons.

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Total in the aircraft</i>	<i>Others</i>
Fatalities	1		1	
Serious				N/A
Minor				N/A
Unharmmed				N/A
TOTAL	1		1	

1.3.- Damage to the aircraft.

The aircraft was destroyed as a result of the impact with the ground.

1.4.- Other damage.

There was no other damage.

1.5.- Personnel information.

The 74-year-old pilot in command held an ultralight pilot's licence (TULM), issued on 16/08/2019, and an Autogyro (AG) rating, valid until 16/08/2021, issued by Spain's National Aviation Safety Agency (AESA).

In addition, he had a LAPL medical certificate, issued on 25/04/2019 and valid until 27/04/2021.

According to the available information, he had 85 hours of flight experience (51 hours prior to obtaining his licence and 34 hours up to the accident date), all of which had been carried out in the accident aircraft flights made to and from Villanueva de Gállego Aerodrome.

1.6.- Aircraft information.

The ELA AVIACIÓN S.L. ULM autogyro, model ELA-07 R-115, registration EC-GF2, was a two-seater tandem aircraft with a metal structure and composite fairings, fixed tricycle landing gear with a directional nose wheel and a semi-rigid two-bladed rotor made of aluminium and composite materials. It was equipped with a ROTAX 914 UL engine capable of delivering a maximum power of 115 HP at 5,800 rpm and a three-bladed, ground-adjustable pitch pusher propeller, made of carbon fibre.

It had a rotor diameter of 8.53 metres and measured 4.99 metres long and 2.80 metres maximum high.

1.6.1.- Airframe.

Manufacturer:	ELA AVIACIÓN, S.L.
Model:	ELA-07 R-115
Manufacturing No.:	02113190724
Year of manufacture:	2011
Registration number:	EC-GF2
Operator:	Private

1.6.2.- Certificate of airworthiness.

Class:	Special restricted
Category:	Private
	Aerial work (School) (ULM)
Technical performance:	Normal

Aircraft for visual flight only

Date of issue: 05/06/2018

Validity: Valid as long as the aircraft is maintained and used as per the specifications and pertinent usage limitations set forth in the Airworthiness Type Certificate No. 284/2 issued by Spain's National Aviation Safety Agency (AESA).

1.6.3.- Maintenance records.

Total flight hours: 732:00
Last general check: 20/06/2018
Hours since last general check: 551:30
Last 100-hour check: 05/12/2019
Hours since last 100-hour check: 699:30

1.6.4.- Engine.

Make: ROTAX
Model: 912 UL
Manufacturing No.: 6779640

Flight hours and maintenance interventions as airframe.

1.7.- Meteorological information.

There were no limiting meteorological conditions for visual flight.

According to the information recorded by the weather station at the aerodrome and the METAR reports from Zaragoza Airport (LEZG), also located in the Ebro valley and 19 km from the accident site, around the time of the accident, the temperature was approximately 24 °C, the wind was light from the northwest with an average speed of about 11 km/h, there was little cloud cover, and the QNH was 1,018 hPa. It has therefore been concluded that there was no significant meteorological phenomenon at the time of the accident.

1.8.- Aids to navigation.

Not applicable.

1.9.- Communications.

On the date of the accident, Villanueva de Gállego Aerodrome was using the 130.125 MHz frequency and did not have a system for recording communications.

There is no record of the aircraft involved in the accident having communicated on that frequency.

1.10.- Aerodrome information.

Villanueva de Gállego Aerodrome is located about 2 km west of the town of the same name, in the province of Zaragoza. Its elevation at its reference point (N 41° 47' 9" & W 0° 50' 54") is 281 m / 921 ft. On the date of the accident, it had an asphalt runway measuring 1,140 m x 20 m, with a 14/32 orientation.

It has two defined aerodrome traffic circuits, both to the left.

1.11.- Flight recorders.

The aircraft was not equipped with flight recorders. They are not a requirement for the type.

1.12.- Wreckage and impact information.

At the impact zone, the aircraft was embedded in the ground in a nose-down attitude consistent with the steep downward attitude reported by the people who witnessed the take-off. The aircraft's airframe was severely deformed.

The rotor blades were damaged as a result of the impact with the ground. One had broken into multiple fragments, while the other was deformed but remained intact.

The pusher propeller was damaged as a result of its impact on the remains of the gyroplane due to the deformation of the propulsion assembly support. This damage indicates that the engine was operating at high speed and confirms the aircraft's direction of displacement at the time of impact.

The nose wheel detached from the autogyro and fell about 25 m from the main wreckage in the aircraft's horizontal direction of displacement, as did the rear seat, which was empty at the time as it was intended for use by potential passengers.

Except for one of its wheel rims, which had bent out of shape due to the flexion of the aircraft, the main landing gear suffered relatively minor damage, as it did not directly impact the ground.

The main wreckage of the aircraft was highly concentrated, with no evidence of horizontal displacement in the impact zone. The frame remained embedded in the terrain and the components that had detached during the impact were found in the immediate vicinity.

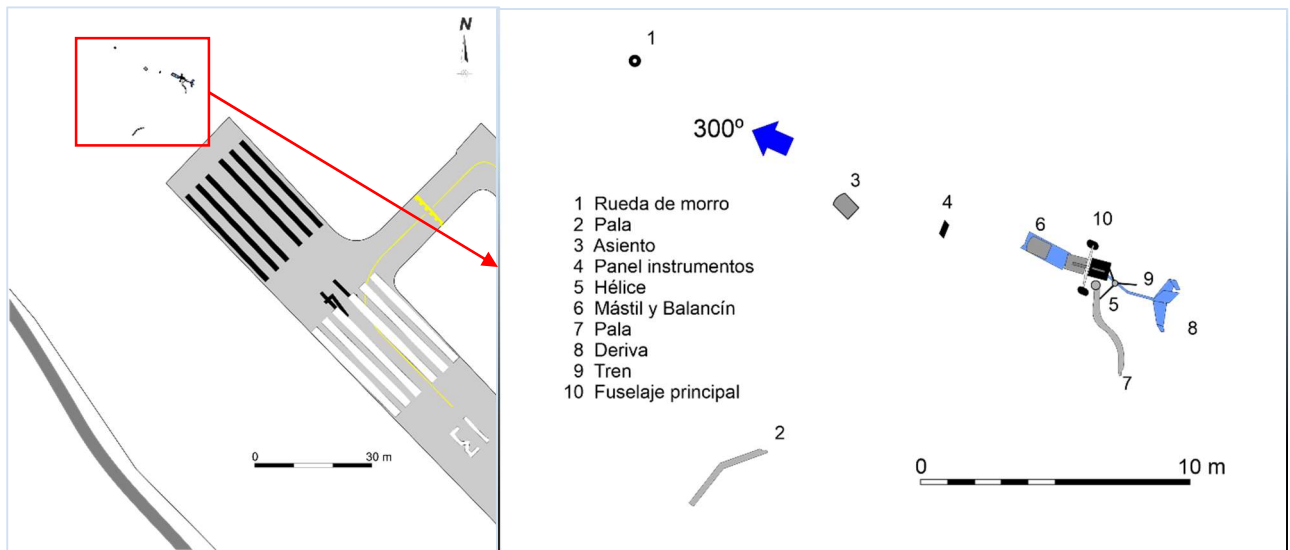


Figure 1 - Final position and distribution of the aircraft wreckage.

1.13.- Medical and pathological information.

The pilot in command of the aircraft was sat in the front seat and died as a result of the injuries sustained in the accident.

The forensic investigation did not find any evidence of circumstances that could have incapacitated the pilot prior to impact.

1.14.- Fire.

There was no fire.

1.15.- Survival aspects.

Given the characteristics of the impact of the aircraft with the terrain, there was no possibility of survival for the pilot, the only occupant of the aircraft.

1.16.- Tests and research.

1.16.1.- Inspection of the aircraft wreckage.

A Civil Aviation Accident and Incident Investigation Commission investigation team inspected the aircraft's wreckage the day after the accident.

The accident had caused severe impact damage and drastically altered the aircraft's structure. However, all its main components were found in their relative positions and, to a greater or lesser extent, connected to each other.

In addition, the inspection of the aircraft's structural components and control surfaces revealed that all the deformations and breakages were consistent with the nature of the

crash. There was no evidence of any failure of the aircraft's structure or flight controls prior to its impact with the ground.



Figure 2 - Pictures of the aircraft wreckage.

- Main wreckage
- Detached blade
- Rear seat, detached



1.17 - Organisational and management information.

Not applicable.

1.18.- Additional information.

1.18.1.- Aircraft flight manual. Take-off procedures.

The rotor pre-launch and take-off procedures, which are provided in the Aircraft Owner's Manual (Version V07-06 ESP, dated February 2020), Section 4 Standard Procedures, are set out below:

4.5 ROTOR PRE-LAUNCH

Alignment: Runway alignment.

- 1. Engine:** Move the throttle until the engine reaches 2,200 rpm.
- 2. "Flight" position:** Keep the control stick **fully forward and centred** with your right hand. With your left hand, select the 'Flight' position on the pneumatic valve. Wait five seconds for the pneumatic system to charge fully.

- 3. Pre-launch:** Press and hold the pre-launch button on the control stick with your thumb. This engages the pre-launcher. You will hear some squeaking noises from the pre-launch belt. Wait for the squeaking to stop, and then slowly and gradually increase the rotor power to 220 rpm.

Notice

Before engaging the pre-launcher, check that the area is clear.

For shorter take-offs, it is advisable to increase the rotor rpm to 300, but as this increases the stress on the pre-launch system, only do so if strictly necessary.

Caution

Initiating take-off with rotor revolutions below 200 requires considerable skill. Take-off must not be initiated if the rotor revolutions are below 150.

4.6 TAKE-OFF

Once the pre-launch procedure is complete, gently move the control stick **as far back** as it will go, release the brakes, and progressively increase engine power.

Notice

Make sure the control stick is in the full-back position before initiating take-off. A take-off run with the control stick forward can have fatal consequences.

Use the pedals carefully to maintain alignment with the runway (right pedal).

Once the nose wheel lifts, move the control stick forward to keep it about 10 cm off the ground while the autogyro accelerates.

When the autogyro takes off, fly level until reaching 60 mph (optimum rate of climb), and then raise the nose to maintain this speed.

Use the pitch compensator to adjust the autogyro's speed:

Compensator back = nose up = reduce speed

Compensator forward = nose down = increase speed

Note

Remember: Adjust the speed of the autogyro with the control stick (trim). Climb and descend by adjusting the engine power.

Once the safety altitude is reached, reduce engine power to maintain level flight at the desired speed.

ABORTING TAKE-OFF

In the event of a problem, such as insufficient runway during pre-launch or take-off, the pilot must abort the take-off. The abort procedure is to cut engine power, use the left pedal to maintain alignment with the runway and brake to land. Practising this manoeuvre is essential to fly safely.

1.19.- Useful or effective investigation techniques.

None applied.

2.- ANALYSIS.

2.1.- History of the flight.

On Thursday, 9 July 2020, at 09:30 hours, the aircraft was removed from the hangar where it was located; the pilot carried out the necessary routine inspections and refuelled it with 30 litres of fuel for the planned one-hour flight.

At around 10:00 hours, the aircraft started take-off on runway 32 and began to climb, apparently reaching an adequate speed. However, it then entered an abnormally steep climb which, in the absence of a strong headwind, led to a reduction in rotor speed and the consequent loss of lift. It then descended with an abnormally steep nose-down attitude and no change in engine speed until it crashed into the ground approximately 30 m from the end of runway 32.

The only person on board was the pilot in command, who was licensed and qualified to fly the aircraft; the pilot in command was killed, and the aircraft was destroyed.

2.2 - Analysis of the wreckage.

As described in 1.12, the damage and deformities sustained by the aircraft and the distribution of the wreckage suggest that the autogyro hit the ground with considerable force, as a consequence of following a steep descent path while maintaining a nose-down attitude.

Both rotor blades were damaged during the crash; however, while one broke into several fragments due to the violence of the impact, the other was deformed but not fragmented due to the lower speed at which it impacted. This suggests lower rotor revolutions at the moment of impact with the ground.

2.3.- Aircraft performance.

Taking into account the aircraft's performance, the witness statements and wreckage analysis, it can be established that the aircraft followed an abnormal, exceptionally steep ascent path during the take-off phase, followed by an exceptionally steep nose-down descent to the ground, which could be due to the following reasons:

- As stated in the aircraft user's manual, the pilot must correctly compensate the aircraft's pitch control to take off safely. Therefore, it is imperative they position the control stick forward and to the centre before activating the pneumatic assistance system, which, after initiating the take-off with the stick backward, will facilitate the pilot's action to change the attitude of the aircraft by moving the control forward, flying parallel to the runway at about 10 cm to reach the optimum rate-of-climb speed, and then moving the control stick back to maintain a stable indicated speed of 60-65 mph. These actions ensure that the rotor speed is maintained, and the autogyro is kept under control. However, if the pilot fails to follow the compensation procedure for the pneumatic rotor movement assistance system, which primarily controls the attitude of the aircraft, the possibility of forward movement with a nose-down attitude and,

therefore, airspeed control is significantly compromised. This situation may cause the pilot to apply more force than usual to achieve the movement, which can result in a more abrupt action on the stick while at the same time delaying the aircraft's response at a low altitude, leading to impact with the ground. This sequence of events would be consistent with the attitude of the aircraft described by the people who witnessed the take-off, as well as with its final position and the distribution of the wreckage on the ground; the steep climb could have reduced the rotor speed, and the aircraft may not have had sufficient lift to maintain flight.

- Given the take-off procedure described above, even if the pneumatic compensation system was used correctly, an untimely reaction by the pilot during any one of the different take-off phases could also have resulted in a reduction of the rotor speed, leading to the same result.

In both cases, for the nose-down attitude to occur, the pitch control stick must have been actuated from the cockpit, in other words, it must have been pushed forward; if this wasn't the case and the pitch control stick was pulled back, the aircraft would have climbed steeply as far as the rotor speed allowed and then fallen to the ground with a nose-up attitude, which didn't happen in this incident.

3.- CONCLUSIONS.

3.1.- Findings.

- a) There were no limiting meteorological conditions for the intended flight.
- b) The abnormally steep climb was followed by an exceptionally steep descent to the ground with a nose-down attitude.
- c) There was no evidence of pre-accident failures or anomalies in the aircraft's airframe, control surfaces or engine.
- d) The pilot in command of the aircraft died as a result of its collision with the ground.

3.2.- Causes/contributing factors.

The accident was caused by a deceleration of the rotor, loss of lift and subsequent descent of the aircraft, when it was at an insufficient height to recover the rotor rotation speed before the impact with the ground.

4.- SAFETY RECOMMENDATIONS.

No safety recommendations have been issued as a result of the investigation into this accident.