



**COMISIÓN DE
INVESTIGACIÓN
DE ACCIDENTES
E INCIDENTES DE
AVIACIÓN CIVIL**

Report ULM A-010/2019

Accident involving a TL Ultralight
TL-96 Star aircraft, registration
EC-DS5, at the aerodrome of
Mérida-Royanejos (Badajoz) on 8
June 2019



GOBIERNO
DE ESPAÑA

MINISTERIO
DE TRANSPORTES, MOVILIDAD
Y AGENDA URBANA

Edita: Centro de Publicaciones
Secretaría General Técnica
Ministerio de Transportes, Movilidad y Agenda Urbana.©

NIPO: 796-20-051-3

Diseño, maquetación e impresión: Centro de Publicaciones

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Notice

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 object of the investigation, and its probable causes and consequences.

In accordance with the provisions in Article 5.4.1 of Annex 13 of the International Civil Aviation Convention; and with articles 5.5 of Regulation (UE) n° 996/2010, of the European Parliament and the Council, of 20 October 2010; Article 15 of Law 21/2003 on Air Safety and articles 1., 4. and 21.2 of Regulation 389/1998, this investigation is exclusively of a technical nature, and its objective is the prevention of future civil aviation accidents and incidents by issuing, if necessary, safety recommendations to prevent from their reoccurrence. The investigation is not pointed to establish 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 evidences in a judicial process.

Consequently, any use of this report for purposes other than that of preventing 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.

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ABBREVIATIONS

° ' "	Sexagesimal degrees, minutes and seconds
°C	Degrees centigrade
AD	Airworthiness Directive
AEMET	Spain's National Weather Agency
AESA	Spain's National Aviation Safety Agency
h	Hours
ICAO	International Civil Aviation Organization
Km	Kilometers
Km/h	Kilometers/hour
LAPL	Light-aircraft pilot license
LEBZ	ICAO code for the Badajoz – Talavera la Real Airport
LEMY	ICAO code for the aerodrome of Mérida-Royanejos
m	Meters
MAF	Multi-axis fixed wing
METAR	Meteorological aerodrome report
TAF	Aerodrome forecast
TULM	Ultralight license
ULM	Ultralight
UTC	Coordinated universal time
VFR	Visual flight rules

Synopsis

Owner:	Private
Operator:	Private
Aircraft:	TL Ultralight TL-96 Star, registration EC-DS5
Date and time of accident:	8 June 2019 at 08:15 ¹
Site of accident:	Aerodrome of Mérida-Royanejos (Badajoz)
Persons on board:	1, uninjured
Type of flight:	General aviation - Private
Phase of flight:	Takeoff
Type of operation:	VFR

Date of approval: 25 September 2019

Summary of event:

On Saturday, 8 June, the pilot was preparing to take off from the aerodrome of Mérida-Royanejos when he noticed a strong smell of gasoline, which he saw spilling onto the floor of the aircraft's cockpit. Since he was on the takeoff run, he decided to abort the takeoff. He vacated the runway and exited the aircraft without stopping it.

The aircraft continued to move on its own. It then impacted the perimeter fence at the aerodrome and burned completely.

There were no injuries.

The aircraft was destroyed by the fire.

The investigation has concluded that the accident was likely caused by the pilot exited the aircraft when the emergency situation became apparent without stopping it.

Investigators were unable to determine the cause of the fuel leak.

¹ All times in this report are local. To obtain UTC, subtract 2 hours from local time.

1. FACTUAL INFORMATION

1.1. History of the flight

On Saturday, 8 June, the pilot was preparing to take off from the aerodrome of Mérida-Royanejos when he noticed a strong smell of gasoline, which he saw spilling onto the floor of the aircraft's cockpit. Since he was on the takeoff run, he decided to abort the takeoff. He vacated the runway and exited the aircraft without stopping it.

The aircraft continued to move on its own. It then impacted the perimeter fence at the aerodrome and burned completely.

There were no injuries.

The aircraft was destroyed by the fire.

1.2. Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal				
Serious				
Minor				N/A
None	1		1	N/A
TOTAL	1		1	

1.3. Damage to aircraft

The aircraft was destroyed by the impact and subsequent fire.

1.4. Other damage

The property adjacent to the aerodrome was affected by the burning aircraft.

1.5. Personnel information

The pilot, a 68-year-old Spanish national, had an ultralight pilot license (TULM(A)) since 18 October 1994, with a multi-axis fixed-wing (MAF) rating that expired on 31 October 2019.

He had a LAPL medical certificate that was valid until 11 October 2019.

He estimated that he had about 56 total flight hours on the type. All of the documentation was burned in the aircraft, which is why he could not provide the exact number of hours flown on the accident aircraft.

1.6. Aircraft information

The aircraft, a TL Ultralight TL-96 Star, registration EC-DS5 and serial number TL-96-03-024, was built in 2003 and registered in Spain's Aircraft Registry on 14 April 2003. On 5 April 2018, the Spanish Aircraft Registry issued a new registration certificate in the name of the current owner. The aircraft was outfitted with a Rotax 912 ULS engine with serial number 4428690.

The aircraft had a Restricted Certificate of Airworthiness in the "Private (3)² Normal³" category. It was issued on 2 June 2003 by Spain's National Aviation Safety Agency.

The aircraft's owner estimated that the aircraft and engine had about 1,854 h of operation when the accident occurred. As noted in the previous section, all of the documentation was burned in the aircraft fire, and hence the exact number of flight hours of the accident aircraft and the engine were not available.

Maintenance tasks

The most recent maintenance tasks recalled by the aircraft owner were:

- On 23 November 2017, the airframe underwent a 100-hour inspection and the engine was overhauled at the maintenance center of Aeronáutica Delgado, which at the time owned the aircraft.

According to the Return to Service Certificate, the engine had 1,718:48 h of operation. The following work was done:

- Overhaul of the Rotax 912 ULS engine as per the Maintenance Manual, MMH-912/MMH-914, Ed. 1, Rev. 5, dated 1 March 2017.
- Non-destructive testing as per Aerohélice certificate no. 051012/2017.
- Verification that AESA Airworthiness Directives AD 03/17 and AD 04/17 are not applicable.
- Successful inspection on test-stand.

The Aeronáutica Delgado maintenance center stated that when installing the engine, it is normal to replace any fuel lines that are stiff, worn or degraded. In this case, the maintenance center does not have records detailing which lines, if any, were replaced.

² The (3) indicates that an aircraft is only approved for visual flight.

³ The "Normal" technical specification indicates that it is authorized for normal flight, excluding any acrobatic maneuvers.

- Subsequently, with 48 additional flight hours on the aircraft, the current owner replaced various components and all the lines in the lubrication and fuel systems after detecting an oil leak.

The maintenance technician who carried out these tasks informed the owner of the poor overall condition of all these lines.

- Later, with an additional 52 flight hours on the aircraft, the oil and filter were changed.

By the time of the accident, some 4 hours had elapsed since the oil and filter change.

Fuel system

The diagram below shows the fuel system installed by the aircraft manufacturer.

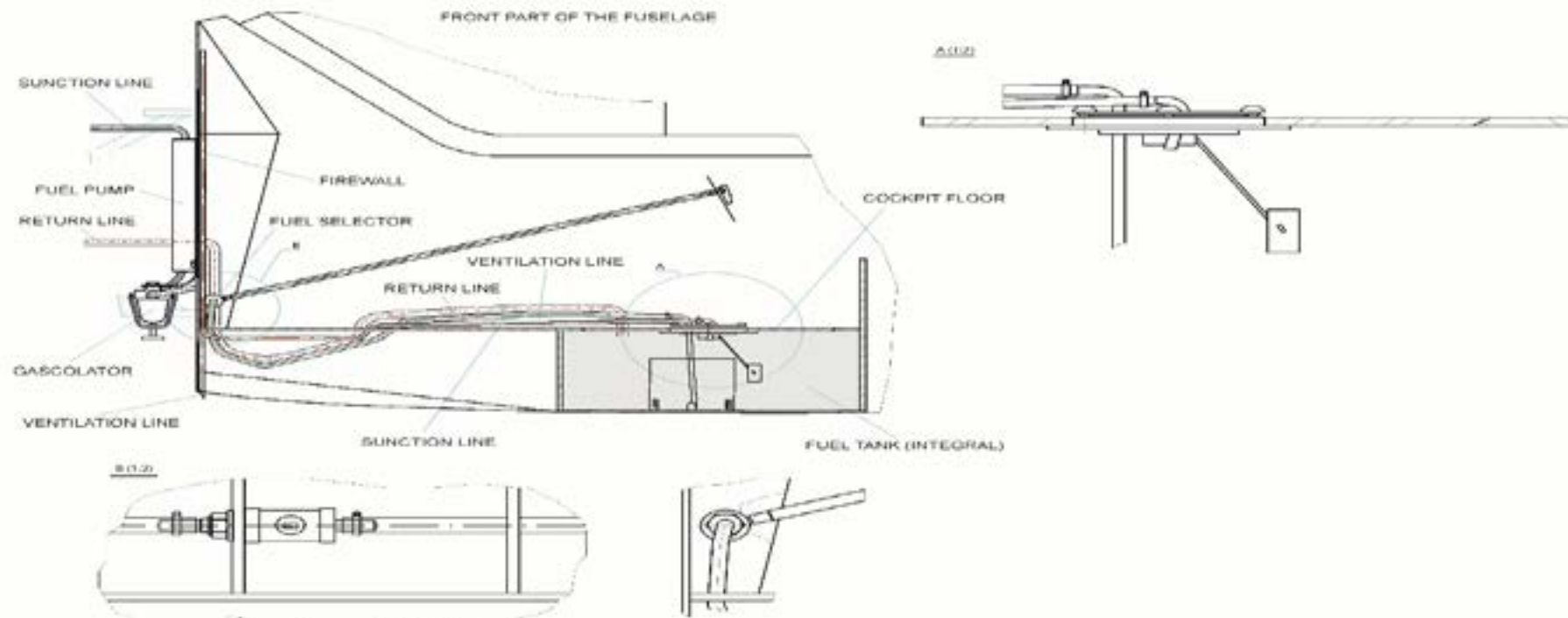


Illustration 1: Diagram of the fuel system installed by the aircraft manufacturer

The aircraft manufacturer stated that there are several couplings and ventilation lines in the floor at the front of the cockpit. The fuel return line is also in this area. These lines are located at the center of the fuselage (widthwise) and covered with a console, the inside of which is made of composite materials. The pilot indicated that the console installed in its aircraft partially covered the lines.

It stated that it was difficult to ascertain where the fuel leak may have originated. It could be that a connector in one of these lines was in bad condition, broken or that the rubber on the lines was old. It added that it could not find any cases in its record similar to this one.

Maintenance recommended by the aircraft manufacturer.

The Flight and Operational Manual written by the aircraft manufacturer specifies the following with regard to the periodic maintenance and repairs of the fuel system:

- 50-hour periodic check.

The user of the airplane can do this check if he has received training on airplane maintenance; if not, the check must be performed at the manufacturer's service center.

The check includes the following tasks: check the fuel system installation, verify the tightness of the connections, the condition of the lines and clean the fuel filter.

- Fuel system repairs.

If leaks are found in the fuel system, repairs must be made immediately.

The user of the airplane can make certain repairs, such as: coupling hoses to lines, fouled filters, etc. Other repairs can only be performed at the manufacturer's service center.

1.7. Meteorological information

AEMET does not have an automatic station at the aerodrome of Royanejos. The nearest stations are in Mérida (7 km south), Almendralejo (32 km south-southwest), Peralada del Zaucejo (32 km west-northwest) and Talavera la Real (28 km west-southwest). The readings from these stations at the time of the accident were as follows:

- Mérida. Average wind speed of 7 km/h from the southwest, gusting to 11 km/h from the same direction, temperature of 14° C and relative humidity of 70%.
- Almendralejo. Average wind speed of 5 km/h from the northwest, gusting to 9 km/h from the same direction, temperature of 13° C and relative humidity of 62%.

- Peraleda del Zaucejo. Calm winds, gusting to 1 km/h from the north, temperature of 14° C and relative humidity of 46%.
- The aerodrome reports (METAR) for Talavera la Real, which is the nearest aerodrome, were:

*METAR LEBZ 080600Z 26006KT CAVOK 11/07 Q1019=
METAR LEBZ 080700Z 30006KT 270V340 CAVOK 15/07 Q1019=*

The aerodrome forecast (TAF) in effect was:

TAF LEBZ 080500Z 0806/0906 30007KT CAVOK TX29/0815Z TN09/0905Z=

Based on these conditions, namely low humidity, calm winds and barely any clouds, it is possible to state that there were no significant meteorological phenomena that could have contributed to the accident.

1.8. Aids to navigation

No aids to navigation are available for this type of flight.

1.9. Communications

None.

1.10. Aerodrome information

The aircraft was taking off from the aerodrome of Mérida-Royanejos (LEMY), located in the province of Badajoz, to go on a local flight.

The aerodrome has one asphalt runway in a 16/34 orientation that is 800-m long and 11-m wide.

1.11. Flight recorders

Not applicable.

1.12. Wreckage and impact information

The wreckage of the aircraft was found in the vicinity of the fence that surrounds the aerodrome of Mérida-Royanejos, in Badajoz. The aerodrome fence helped stop the aircraft. The impact with the fence and with rocks near the fence caused the aircraft, which was loaded with fuel, to burst into flames.

The photograph below shows the condition of the aircraft after the accident.



Illustration 2: Wreckage of aircraft on wheat field

1.13. Medical and pathological information

There are no indications that the pilot's actions were affected by any physiological factors or impairments.

1.14. Fire

A fire broke out after the aircraft impacted the perimeter fence and some rocks near said fence. The fire spread to the adjacent property.

1.15. Survival aspects

Upon noticing the fuel leak, the pilot hurried out of the aircraft. He was not injured.

The aircraft had a ballistic parachute that exploded during the fire.

1.16. Tests and research

Pilot's statement.

Shortly after starting the takeoff roll, he smelled gasoline. He verified that the fuel pressure was normal. The smell of gasoline grew stronger and he felt something wet near his right ankle. He looked in that direction and saw that the carpet was soaked in gasoline.

He instinctively decided to exit the aircraft as quickly as possible, despite knowing that the tank was full.

He immediately throttled back and braked gradually while releasing his harness with one hand and opening the right side of the canopy with the other. He then opened the left and center segments simultaneously and exited the cockpit. Once on the left wing, he tried to flip the master switch, but a sudden acceleration made him lose his balance and fall. Once outside, on the ground, he tried to hold onto the airplane's horizontal stabilizer but was unable to.

The aircraft continued moving and veered off the side of the runway. It fell down a slight incline, impacting and breaking the aerodrome fence. It stopped even though the engine was still running.

He ran up to the aircraft and again tried to stop the engine but the fire flared up, preventing him from doing so.

As he was returning from the hangar with an extinguisher, he called 112. He tried to put out the fire but could not, not even with a second extinguisher.

He later stated that the flight prior to the accident had been uneventful. The fuel leak must have occurred during the takeoff run, in the return lines, not in the supply lines, because the engine did not stop at any point.

1.17. Organizational and management information

Not applicable.

1.18. Additional information

Regulatory situation involving the documentation required to be carried on board the aircraft

During the investigation, AESA was asked about the documents that are required to be carried on board an aircraft and available in the event of an inspection. According to AESA:

Since the ULM regulation provides no specifics, the contents of the following regulation apply:

1. *Law 48/1960 on Air Navigation*

Chapter IV On the on-board documents

Article twenty.

Aircraft shall carry the following documents on board:

- *One. Registration certificate, specifying the owner.*
- *Two. Certificate of airworthiness.*
- *Three. License of each crewmember.*
- *Four. When carrying passengers or cargo, list of passengers' names, boarding location, points of destination and cargo manifest and declaration.*
- *Five. Any other document that may be required by law.*

Article twenty-one.

The aircraft shall also carry its radio station license and certificate, as well as the radio service log, recording any communications made and any problems involving communications.

1. *Air Traffic Regulation, approved by Royal Decree 57/2002.*

Book Seven – Chapter 2 (applicable to airplanes)

7.2.5 Instruments and Equipment

7.2.5.1 For all airplanes on all flights

7.2.5.1.2 Equipment

7.2.5.1.2.1.1 All airplanes on all flights shall have on board:

d) The following manuals, charts and information:

- i) the airplane's flight manual, or other documents or information related to any usage limitation in effect for the airplane issued by the certifying authority, by the State of registry and required to apply Section 7.2.4.*
- ii) updated charts suitable to the planned flight route and to all routes to which the airplane could conceivably divert.*

Ignition sources inside the aircraft cabin.

The manufacturer was asked about the presence of potential sources of ignition in the aircraft cockpit that could cause a fire after a fuel leak.

According to the manufacturer, there are no elements in the aircraft's cockpit that could cause a fire. The power plant, battery, etc. are all behind the engine firewall. The cockpit only contains the instruments in the instrument panel and, of course, the fuel tank capacity sensor. None of these components could be considered an ignition source.

Specifically, the inside of the center console, which covers the fuel lines, consists of a laminate that according to the manufacturer, had no effect on the subsequent fire.

1.19. Useful or effective investigation techniques

Not applicable.

2. ANALYSIS

2.1. Analysis of the aircraft's maintenance status

Due to the aircraft's condition after the fire, it was not possible to determine the source of the fuel leak.

The aircraft manufacturer provides instructions in the periodic 50-hour inspection to check the fuel system installation, verify the tightness of the connections, the condition of the lines and the cleanliness of the fuel filter.

There is no documentary evidence that this periodic 50-hour inspection was being carried out correctly. There is also no documentary evidence of the last time that the fuel system lines were replaced, since neither the previous owner, Aeronáutica Delgado, nor the current owner kept records. During the investigation, however, the current owner of the aircraft stated that he had replaced all the lines in the fuel and lubrication systems following a fuel leak. After an additional 52 flight hours, he changed the oil and filter. However, he must not have done the relevant 50-hour periodic inspection.

It is likely that the lines in the fuel system were not replaced properly, since only 56 hours had elapsed when the leak occurred that triggered the accident.

2.2. Analysis of the operation of the aircraft

According to the pilot's statement, during the takeoff run, upon noticing the fuel leak, he decided to exit the aircraft as soon as possible without first ensuring that the aircraft was stopped.

In light of the emergency situation, the pilot should have remained calm, since a fuel leak does not, in and of itself, pose an imminent fire risk in the airplane. For a fire to occur, in addition to fuel and oxygen, there needs to be an ignition source. And while there are many ignition sources in an aircraft, such as hot components and engine exhausts, bleed air systems, sparking from both electrical systems and friction, and overheating brakes and equipment, none of these sources is present in the cockpit.

Furthermore, the manufacturer confirmed that there were no elements in the cockpit that could have acted as an ignition source and cause a fire after a fuel leak.

2.3. Analysis of the regulatory situation involving the documentation required to be carried on board the aircraft

The pilot thought he was required to have on board the aircraft both the pilot's log book and the aircraft log book; however, after asking AESA about the regulation that is applicable to ultralight aircraft, it was determined that it is not necessary for these aircraft to have this documentation on board, based on the contents of Law 48/1960

of 21 July on Air Navigation, and the Air Traffic Regulation, approved by Royal Decree 57/2002.

It is important to underscore this fact in this report so that these documents can be stored in a safe place, as required in the aforementioned Law 48/1960 for the aircraft, engine and propeller log books.

3. CONCLUSIONS

3.1. Findings

- The pilot had a valid license and medical certificate.
- The aircraft's documentation was valid.
- The maintenance of the aircraft could not be analyzed during the investigation since the maintenance records were lost during the accident.
- The pilot exited the aircraft without stopping it.

3.2. Causes/Contributing factors

The investigation has concluded that the accident was likely caused by the pilot exited the aircraft when the emergency situation became apparent.

Investigators were unable to determine the cause of the fuel leak.

4. SAFETY RECOMMENDATIONS

None.