# Technical report A-048/2022

Accident involving a CZECH AIRCRAFT WORKS SPORT CRUISER aircraft, registration EC-ZXG, on 07 September 2022 at Mutxamel Aerodrome (ALICANTE).



MINISTERIO DE TRANSPORTES, MOVILIDAD Y AGENDA URBANA SUBSECRETARÍA

COMISIÓN DE INVESTIGACIÓN DE ACCIDENTES E INCIDENTES DE AVIACIÓN CIVIL

## Notice

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

In accordance with the provisions in Article 5.4.1 of Annexe 13 of the International Civil Aviation Convention; and with Articles 5.5 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, 4 and 21.2 of RD 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, nor to prejudge any decisions that may be taken by the judicial authorities. Therefore, and according to the laws specified above, the investigation was carried out using procedures not necessarily subject to the guarantees and rights by which evidence should be governed in a judicial process.

Consequently, the use of this report for any purpose other than the prevention 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.

#### Comisión de Investigación de Accidentes e Incidentes de Aviación Civil – CIAIAC

Subsecretaría Ministerio de Transportes, Movilidad y Agenda Urbana Gobierno de España

C∖ Fruela, 6 28011 Madrid España

NIPO: 796-23-089-6 Edición revisada: Diciembre 2.023

## CONTENTS

Abbreviat	ions4	
Synopsis	5	
1. FACTUA	L INFORMATION	
1.1.	History of the flight	6
1.2.	Injuries to persons	7
1.3.	Damage to the aircraft	7
1.4.	Other damages	7
1.5.	Information about the personnel	7
1.5.1.	Information about the aircraft crew	7
1.6.	Information about the aircraft	8
1.7.	Meteorological information	9
1.8.	Aids to navigation	9
1.9.	Communications	9
1.10.	Information about the aerodrome1	0
1.11.	Flight recorders 1	0
1.12.	Aircraft wreckage and impact information1	2
1.13.	Medical and pathological information 1	4
1.14.	Fire1	4
1.15.	Survival aspects 1	5
1.16.	Tests and research1	5
1.17.	Organisational and management information1	7
1.18.	Additional information 1	7
1.18.1	Information about the maintenance manual	7
1.18.2	Information on the acceleration device1	7
1.18.3	B.Information about the operation1	7
1.19.	Useful or effective investigation techniques1	8
2. ANALYS	JIS19	
2.1 Genera	al aspects19	
2.2 Of the	weather conditions19	
2.3 Of the	aircraft wreckage19	
2.4 Of the	operation	
3. CONCLU	JSIONS	
3.1 Confir	med findings21	
3.2 Causes	s/contributing factors	
4. OPERAT	IONAL SAFETY RECOMMENDATIONS21	

## Abbreviations

0	Sexagesimal degrees
°C	Degrees Celsius
AEMET	State Meteorological Agency
AESA	Spain's National Aviation Safety Agency
CV	Horsepower
ft	Feet
ft/min	Feet per minute
GLONASS	Global Navigation Satellite System
GPS	Global Positioning System
h	Hours
IAS	Indicated airspeed
kg	Kilograms
KIAS	Knots of indicated airspeed
km	Kilometres
km/h	Kilometres per hour
kt	Knots
LEBA	Córdoba Airport
LEMU	Mutxamel Aerodrome
LT	Local time
m	Metres
MHz	Megahertz
min	Minutes
PPL(A)	Private Pilot License
RPM	Revolutions per minute
S	SIERRA waypoint
SEP	Single-engine piston rating
UTC	Coordinated universal time
VFR	Visual flight rules

## **Synopsis**

Operator:	Private
Aircraft:	CZECH AIRCRAFT WORKS SPORT CRUISER, EC-ZXG
Date and time of the accident:	07/September/2022, 13:00 LT <sup>1</sup>
Site of the accident:	Vicinity of Mutxamel Aerodrome (Alicante)
Persons on board:	Pilot seriously injured, passenger with minor injuries
Type of flight:	General aviation - Private
Flight rules:	VFR
Phase of flight:	En route – emergency descent en route
Date of approval:	26 July 2023

## Summary of the incident:

On 7 September 2022, a Sport Cruiser aircraft, registration EC-ZXG, suffered an accident during a flight bound for Mutxamel Aerodrome (Alicante).

The aircraft, which was taking part in the Vuelta Aérea España 2022 and the SM el Rey Trophy, had taken off for a flight from Córdoba Airport (LEBA) to Mutxamel Aerodrome (LEMU) (Alicante) with the pilot and one passenger on board.

In the final part of the flight, when they were in the cruise phase and close to the aerodrome's S waypoint, the aircraft's occupants noticed engine vibrations and reduced propeller traction, forcing the pilot to make an off-airfield landing in an area between several roads.

The pilot was seriously injured and the passenger suffered minor injuries. Aircraft significantly damaged.

The investigation has concluded that the cause of the accident was an emergency offairfield landing undertaken due to a loss of engine power, probably as a result of poor maintenance.

<sup>&</sup>lt;sup>1</sup> Unless specified otherwise, all times referenced in this report are local. On the day of the accident, the local time was equivalent to UTC +2 hours.

## **1. FACTUAL INFORMATION**

## **1.1.** History of the flight

On Wednesday, 7 September 2022, the Sport Cruiser aircraft, registration EC-ZXG, with the pilot and a passenger on board, was making a flight between Córdoba Airport and Mutxamel Aerodrome, the origin and destination, respectively, of the first stage of the forty-eighth Vuelta Aérea a España, a race in which the aforementioned aircraft was registered.

The day before, it had flown a 4 h 54 min positioning flight over three legs without incident.

After the pre-flight inspection, the aircraft took off and passed most of the flight without incident. However when it was almost over the LEMU 'S' waypoint at 5,500 ft, the engine suddenly began to vibrate violently.

After unsuccessfully attempting to re-establish the initial engine operating conditions, the pilot decided to land immediately on runway 12 at Mutxamel, informing the aerodrome and requesting that the runway and circuit be kept clear.

According to the pilot himself, once on the vertical of the final leg, he manoeuvred to lose altitude with the throttle set at idle, but when it was time to land, he realised there might not be enough runway left to do so safely and decided to go around.

Given that the aircraft was unable to climb more than a few metres and couldn't return to the circuit or make a 180° turn, the pilot decided to make an emergency landing. He selected a field that ultimately proved unreachable and, as a result, was forced to touch down in an area between several roads.

The pilot was seriously injured and the passenger suffered minor injuries. The aircraft was significantly damaged.

## 1.2. Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatalities				
Serious	1		1	
Minor		1	1	
Unharmed				
TOTAL	1	1	2	

## 1.3. Damage to the aircraft

The aircraft sustained significant damage.

## 1.4. Other damages

N/A.

## 1.5. Information about the personnel

## 1.5.1. Information about the aircraft crew

The 55-year-old pilot had a private pilot license (PPL(A)) issued by Spain's National Aviation Safety Agency (AESA) on 23 August 2017, with a single-engine piston land rating (SEP(land)), valid until 31 August 2023. He also had a Class 2 medical certificate, valid until 5 October 2022.

He had 179 h 25 min of flight experience, of which 53 h 59 min were in type.

## 1.6. Information about the aircraft

The aircraft involved was an amateur-built Sport Cruiser with a maximum take-off weight of 598 kg. The aircraft's serial number was 07009-2217, and it was manufactured in 2007 and registered on 25 April 2007. The aircraft is equipped with a ROTAX 912 ULS 100 CV engine.

It had a special restricted airworthiness review certificate issued by the Spanish Aviation Safety Agency (AESA) on 13 April 2021 when the aircraft had 751:38 h of flight time, valid until 4 May 2023 or until the aircraft has 951:38 h of flight time.

The aircraft had undergone a scheduled 100 h overhaul on 05 August 2022, when it had 823 h 41 min of flight time.

At the time of the accident, the aircraft had 831 h 57 min of flight time.

The following operating speeds are detailed in the aircraft's checklists:

- Glide speed: 60 kt
- Stall speed with flaps fully deployed (30°): 32 kt
- Glide speed with flaps fully deployed (30°): 54 kt

In addition, the Flight Manual states the following in reference to landing distances:

## Landing distances:

	Landing distance over 50 ft obstacle	Landing run distance (braked)	
	ft	ft	
CONCRETE	591	180	
GRASS	558	197	

The Flight Manual also states the following stall speeds:

Conditions: Max.take-off weight		IAS		CAS		Altitude loss at recovery
Engine: idle	poor	knot	mph	knot	mph	ft
	<b>0</b> °	39	45	43	49	65
Wing level stall	15°	35	40	39	45	49
	<b>30</b> °	32	37	37	43	33
Coordinated	<b>0</b> °	42	48	46	53	82
turn	15°	38	44	42	48	66
30° bank	<b>30</b> °	35	40	39	45	49

## 3.1 Stalling speeds at maximum take-off weight

## 1.7. Meteorological information

The State Meteorological Agency (AEMET) does not have a station at the accident site; the closest and most representative station is in Alicante, located 8 km to the southwest.

According to the data recorded at that station, the most likely meteorological conditions in the area at the time of the accident was a light wind of just over 6 km/h from 184°, with no significant weather phenomena. Light gusts were recorded at 11.5 km/h from 170°. The temperature was 33.7 °C.

## 1.8. Aids to navigation

N/A.

## 1.9. Communications

According to the pilot, he had radio contact with Mutxamel Aerodrome twice in reference to the incident, firstly to report the problems with the aircraft and request that the runway and circuit be kept clear as he was going to try to land on runway 12 and, secondly, after the failed attempt to land on the runway to declare MAYDAY and communicate his intentions to land in an empty car park next to an industrial estate.

## 1.10. Information about the aerodrome

Mutxamel Aerodrome (LEMU) is located in the municipality of Mutxamel, 10 km to the northeast of Alicante. Its elevation is 437 ft, and it has an asphalt runway with a 12/30 orientation measuring 1000 m x 23 m. The aerodrome radio frequency is 123.50 MHz.

## 1.11. Flight recorders

The aircraft was not equipped with a conventional flight data recorder or a cockpit voice recorder. The applicable aeronautical regulations do not require the installation of any type of recorder on this type of aircraft.

It had a SkyDemon navigator installed on a tablet with a connection, via an external GARMIN Glo2 antenna, to the GPS and GLONASS geolocation systems.

We were able to extract the data corresponding to the accident flight, and after studying it, deduced that the aircraft was flying without incident and that when it was in the vicinity of waypoint S (1), it was at an altitude of 910 m.

From that moment on, the aircraft began to descend, initiating a spiral at an altitude of 720 m (2) and exiting it at an altitude of 392 m (5). It then manoeuvred in a continuous descent to align with runway 12 at the aerodrome, with an altitude of 90 m (7) over the head of runway 12 and 43 m (8) over the head of runway 30.

Once past the runway, the aircraft turned left, initially increasing its altitude by 10 m midturn (9) and then completing the turn to close to 180° (10) and losing altitude to 50 m above the ground.

Finally, it continued to descend in a curvilinear path to the right until it made contact with the ground.



Fig. no. 1.- Flight path of the aircraft. Final leg

Córdoba, Flight path and planned site for emergency landing, Mutxamel Aerodrome



Fig. no. 2.- Depiction of the aircraft's altitude on the final leg of its flight path.

Mutxamel Aerodrome		

## 1.12. Aircraft wreckage and impact information

The accident occurred during the emergency landing in an area between roads located 1,200 m to the northeast of Mutxamel Aerodrome.



Fig. no. 3.- Vicinity of the crash site

The wreckage was found on a concrete channel belonging to the transversal rainwater drainage works in the space between the central lanes of the CV-800 road, the deceleration lane and the change of direction lane, which crosses perpendicularly over the central lanes.

It was located at the crash site, where the ground begins to rise, forming the slope corresponding to the raised change of direction lane that crosses the road, thus conditioning the change in the path of the channel from above ground to below ground.

The structure of the aircraft remained largely intact, except for the propeller blades which had broken and the wings which were damaged and deformed, particularly at the base of the left wing.



Fig. no. 4.- Final condition of the aircraft

The wreckage of the aircraft was resting on the right side of the channel, according to the aircraft's direction of travel, on the right leg of the main gear and the right lower part of the tail assembly. The lower forward part of the fuselage at the base of the left wing was resting on the edge of the framework of the concrete structure. The left wing was overhanging the channel itself.

There were no drag marks on the ground preceding the impact.

## 1.13. Medical and pathological information

There is no evidence of any physiological factors or disabilities that may have affected the pilot's actions.

1.14. Fire

No fire broke out.

## 1.15. Survival aspects

The harnesses and restraint systems worked adequately, and the cabin interior maintained its structural integrity.

## 1.16. Tests and research

Once the wreckage had been properly relocated, it was inspected, focusing mainly on the engine and the propeller control system.

It was an in-flight variable pitch propeller with activation through an electric governor.

The gearbox, hub, control system and governor were disassembled. The inspection confirmed that the components were in good general condition and functioning correctly.

As regards the engine, the spark plugs of cylinders No. 1 and No. 3 indicated poor carburation, and the spark plug in No. 1 had a defective electrode. The fuel hoses and pump were out of date. The lubrication and cooling system hoses were also out of date.



Fig. No. 5.condition of the

cylinder No. 1

Close-up of the spark plug in

The carburettor throttle spring on the 1/3 side was loose due to material wear on the throttle lever and the plastic guard.



Fig. no. 6.- Close-up of the condition of the throttle lever

## **1.17.** Organisational and management information

N/A

## 1.18. Additional information

## **1.18.1.** Information about the maintenance manual

In regard to checking the carburettors, the Engine Maintenance Manual, among other considerations, specifies that as part of the scheduled 100 h maintenance overhaul:

- the free movement of the carburettor actuators (throttle lever and choke) must be checked.
- the Bowden cable must be checked to ensure it allows the throttle lever to move fully from stop to stop.

In addition, the carburettors must be disassembled and assembled for inspection during the scheduled 200 h maintenance overhaul.

## 1.18.2. Information on the acceleration device

The engine's acceleration system works by opening the throttle valve of the corresponding carburettor. The mechanism used to manipulate this valve consists of a throttle spring which, by acting on the throttle lever, keeps the valve in the maximum open position so that when we use the throttle lever to request different levels of power, we modify its opening using the throttle cable (see fig. no. 6).

It is designed to ensure that, should the throttle cable break, the lever keeps the throttle valve in its maximum open position thanks to the pressure exerted by the spring, thus allowing the engine to reach maximum revs.

## 1.18.3. Information about the operation

According to the pilot, once they became aware of the anomalous performance of the aircraft, they tried to re-establish proper flight conditions.

To do so, they first switched on the pump and carburettor heating. As this failed to produce any change and in anticipation of a fuel supply failure, they switched the fuel tank. However, the aircraft's performance remained unchanged. Subsequently, the pilot reduced power and set the propeller to fine pitch at 5,700 RPM, thus reducing the intensity of the vibrations.

They then informed LEMU of the incident, requesting that both the runway and circuit be cleared as they were going to attempt to land on runway 12.

Continuing with their testimony, they headed towards the right-hand base leg for runway 12 while descending, and on the vertical of the final leg for that runway, "performed two descending spirals at an approximate IAS of 65 kt, with a descent rate of about 700 ft/min", keeping the throttle at idle.

At approximately 500 ft above the ground, we joined the final for runway 12, with full flaps and performing a slip manoeuvre to lose altitude as quickly as possible in a controlled manner.

The aircraft reached 73 KIAS, so we raised the nose to lose the excess speed, halting the descent for such a long time that we then realised there might not be enough runway left to land.

It was then that the pilot decided to go around and try again, setting full engine power and retracting the flaps to flaps 1, but according to his assessment, "although the engine seemed to be working properly, the propeller was not providing traction, and we only climbed due to the momentum of the aircraft".

Finally, after realising that he could neither return to the circuit nor do a 180°, he chose an empty car park near an industrial estate to make an emergency landing, declaring "MAYDAY" and his intentions on the radio.

As the aircraft was unable to reach the chosen car park, he reduced speed to the minimum possible to limit the consequences of the impact, which, as he saw on the anemometer moments before, occurred at approximately 32 kt.

After the impact both occupants evacuated the aircraft without assistance.

## **1.19.** Useful or effective investigation techniques

N/A.

## 2. ANALYSIS

## 2.1 General aspects

The pilot held the required licence and relevant medical certificates for the flight.

The aircraft had the correct documentation for the flight.

## 2.2 Of the weather conditions

The data recorded at the different meteorological stations in the area confirms non-limiting meteorological conditions for the flight.

## 2.3 Of the aircraft wreckage

Following the inspection of the propeller and the components related to its control and operation, we have concluded that the propeller was working correctly, and there is no reason to suspect a malfunction of any of its parts.

As for the engine, some of its components, such as the fuel pump hoses and the lubrication and cooling system hoses, had been inadequately maintained. In addition, the condition of the spark plugs of cylinders No. 1 and No. 3 indicated poor carburation, and the spark plug in No. 1 had a melted electrode. Irrespective of their condition, these circumstances were not decisive factors in the functioning of the engine.

A separate issue was that the carburettor throttle spring on the 1/3 side was loose due to material wear on the throttle lever and the plastic guard.

The throttle spring ensures that if the throttle cable breaks, it opens the carburettor throttle valve fully, and the engine should reach full throttle.

The 2/4 carburettor was working normally, but the 1/3 carburettor had a loose throttle spring, which meant it was not accelerating correctly. This caused a desynchronisation between the carburettors, resulting in strong vibrations and spluttering.

The Engine Maintenance Manual indicates that the free movement of the carburettor actuators (throttle lever and choke) must be checked, as should the Bowden cable (to ensure that the throttle lever can move fully from stop to stop) every 100 h. Furthermore, the carburettors must be disassembled and reassembled for inspection every 200 h.

The material wear on the throttle lever and the corresponding plastic guard at the spring attachment point indicates poor maintenance work in this regard.

## 2.4 Of the operation

According to the pilot's statement, on reaching the S waypoint of Mutxamel Aerodrome, they were at an altitude of 5,500 ft. Given that the aerodrome is at an elevation of 437 ft, they had almost 5,000 ft to descend, align with the runway head and land on runway 12.

He also stated that, in his attempt to lose altitude, he first performed two spirals maintaining a speed of 65 kt and a descent rate of 700 ft/min, and later, on final, he executed a slip manoeuvre with full flaps. However, he was unable to lose the excess altitude and finished the manoeuvre at a speed of 73 kt, which is 19 kt above the aircraft's recommended speed of 54 kt for a full flaps approach.

According to the data extracted from the navigator, the aircraft made a single 360° turn in which it lost 300 m (1,000 ft), so when it was aligned with runway 12 on the airfield (point 6 in figure 1) it was at an altitude of more than 450 m (approximately 1,500 ft) above the ground. At this point, the aircraft was very high and very close to the runway head where it intended to land, which meant it ended up overflying the runway, reaching its end at 150 m (approximately 500 ft) above the ground.

All of the above leads us to believe that the pilot made his approach very close to the runway and at high speed, which meant that despite trying to descend as quickly as possible, he was unable to do so and ended up overflying the runway and executing a go around.

As he indicates, the engine did not deliver sufficient power when he applied the throttle, and it was the aircraft's own momentum that powered its limited climb.

It was then that the pilot decided to make an emergency landing, choosing a car park, which ultimately proved unreachable, forcing him to land in an area close to the CV-800 road.

The sequence of events shows that on two occasions, the pilot was unable to reach the selected landing area, which may be indicative of a lack of experience in operating the aircraft in glide conditions with the throttle at idle. In fact, one of the items on the pilot's landing checklist is to reduce throttle when the aircraft is below 50 ft. This tells us that the pilot would normally perform the approach with the engine supplying power.

Lastly, the aircraft finally touched down more than one kilometre from the runway. If we take this distance into account, the fact that the aircraft overflew the runway at height and that it had an excess speed of 19 kt, which it used to climb, the pilot could have tried to land on the opposing runway (runway 30) and could have done so safely given that the aircraft's stall speed in a 30° turn with flaps at 30° is 35 IAS, a much lower speed than that at which the aircraft was travelling at that time.

Moreover, according to the Flight Manual, the aircraft's landing distances are not demanding, varying between 54.8 m and 60 m, depending on whether the surface is tarmac

or grass, which means that when selecting a suitable field for landing, its distance from the aircraft is more important than its dimensions.

## **3. CONCLUSIONS**

## **3.1 Confirmed findings**

There were no limiting meteorological conditions for the flight.

The carburettor throttle spring on the 1/3 side was loose.

The engine was not accelerating properly.

The aircraft was not able to lose sufficient altitude to make a safe landing on the runway.

The choice of the emergency field was inappropriate.

The condition of the components indicates that the aircraft was poorly maintained.

## **3.2 Causes/contributing factors**

The cause of the accident was an emergency off-airfield landing undertaken due to a loss of engine power, probably as a result of poor maintenance.

## 4. OPERATIONAL SAFETY RECOMMENDATIONS

None