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**A**VIACIÓN **C**IVIL

## Report A-004/2020

Accident involving a DIAMOND  
D-40 aircraft, registration OH-DTF  
at the Córdoba Airport on 23  
January 2020



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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**

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°	Sexagesimal degrees
ATPL(A)	Airline transport pilot license (airplane)
CPL (A)	Commercial pilot license (airplane)
CIAIAC	Spain's Civil Aviation Accident and Incident Investigation Commission
FI(A)	Flight instructor rating (airplane)
ft	Feet
h	Hours
ICAO	International Civil Aviation Organization
IR(A)	Instrument rating (airplane)
Kg	Kilograms
Kt	Knots
LEBA	Code for the Cordoba Airport
m	Meters
N	North
SPL(A)	Student pilot license (airplane)
W	West
VFR	Visual flight rules

**Synopsis**

Owner and operator:	PATRIA
Aircraft:	DIAMOND D-40, registration OH-DTF
Date and time of accident:	23 January 2020 at 12:59 (local time <sup>1</sup> )
Site of accident:	Cordoba Airport
Persons on board:	Two (uninjured)
Flight rules:	VFR
Type of flight:	General Aviation - Instruction - Landing
Date of approval:	22 April 2020

**Summary of event**

On 23 January 2020, a DIAMOND D-40 aircraft, registration OH-DTF, took off from runway 03 at the Cordoba Airport (LEBA). On board were an instructor and a student.

During the takeoff run, seconds after rotating and once the aircraft was airborne, they simulated an engine stoppage and, as they attempted to land, the front gear collapsed and the propeller impacted the ground.

The aircraft came to a stop off the right edge of the runway.

Neither occupant was injured and they exited the aircraft under their own power.

The airplane sustained significant damage.

The investigation has determined that the accident was caused by an improperly executed landing maneuver.

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<sup>1</sup> Unless otherwise specified, all times in this report are local. To obtain UTC, subtract two hours from local time.

## 1. FACTUAL INFORMATION

### 1.1. History of the flight

On 23 January 2020, an instructor and a student from the PATRIA flight school were going to practice landings and takeoffs on runway 03 at the Cordoba Airport (LEBA) on board a DIAMOND D-40 aircraft, registration OH-DTF.

They began the takeoff run with the instructor at the controls and rotated after traveling a distance of approximately 380 m. Seconds later, while at an altitude of about 84 ft and over the runway centerline, the instructor placed the throttle lever in idle to simulate an engine failure on takeoff and they landed.

During the landing, it touched all three wheels and the nose landing gear collapsed and the propeller impacted the ground.

Upon contacting the runway, the airplane rose again before finally touching down, falling on its main gear wheels. It then continued traveling to the runway 21 threshold, where it veered off the right side of the runway and came to a stop next to the runway.

The two occupants were uninjured. The student turned off the engine after asking the instructor, and both then exited the airplane under their own power.

The aircraft sustained significant damage to its landing gear, propeller and bottom fairing.



Figure 1. Final position of the aircraft

## 1.2. Injuries to persons

Injuries	Fatal	Serious	Minor/None
Crew			2
Passengers			
Other			

## 1.3. Damage to aircraft

The aircraft sustained significant damage.

## 1.4. Other damage

None.

## 1.5. Personnel information

The instructor was 35 and had a commercial pilot license (CPL(A)) since 14 September 2015.

He had a multi-engine piston land rating (MEP land), an instrument rating (IR(A)) and a flight instructor rating (FI(A)), all of them valid. At the time of the accident, he also had valid Class 1 and Class 2 medical certificates.

He had a total of 346 flight hours, of which 146 had been on the type.

The student pilot was 39 and had a student pilot license (SPL(A)), as well as the corresponding Class II medical certificate, both valid.

He had a total of 7:12 flight hours, all of them on the type.

## 1.6. Aircraft information

The DIAMOND D 40 NG aircraft, registration OH-DTF, was the property of the PATRIA flight school. Its serial number was 40.N423.

Its empty weight is 795 kg and maximum takeoff weight is 1310 kg. It has a wingspan of 11.9 m, a length of 8.1 m and a height of 1.98 m. Its surface wing area is 13.5 m<sup>2</sup>.

The Diamond Flight Training Manual specifies that the rotation speed ranges from 56 kt to 67 kt, depending on whether the takeoff mass is 940 kg or 1280 kg. The speed at 50 ft AGL varies from 62 kt to 72 kt for the same mass range, and the speed to reach a safe altitude is 72 kt.



The stall speed with the flaps configured for takeoff (10°) ranges between 54 kt (for 940 kg) and 62 kt (over 1280 kg), and the no-flaps stall speed is between 58 kt (for 940 kg) and 66 kt (over 1280 kg).

The aircraft had an Austro Engines GmbH Austro Engine E-4A installed, along with an MT-Propeller Entwicklung GmbH MTV-6-R/190-69.

It had a valid certificate of airworthiness in the normal category.

The last maintenance inspection (100-h check) had been on 9 December 2019, with 282:45 h on both the aircraft and the engine.

### 1.7. Meteorological information

Not relevant to the investigation.

### 1.8. Aids to navigation

The flight was conducted in VFR.

### 1.9. Communications

Not applicable to the investigation into this event.

### 1.10. Aerodrome information

The Cordoba Airport (LEBA) is located at kilometer marker 5.800 of national road N-437, southwest of the city. Its reference point is at coordinates 37° 50' 31" N – 4° 50' 56" W at an elevation of 94 m (307 ft).

It is within the Seville TMA<sup>2</sup> and is only authorized for use by light aircraft in VFR. It is closed to aircraft without two-way communications.

It is categorized as a 3C airport, as per ICAO Annex 14<sup>3</sup>. The category<sup>4</sup> of the Rescue and Firefighting Service for public use is 3.



Figure 2. Cordoba Airport

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<sup>2</sup> TMA is the terminal control area.

<sup>3</sup>The number 3 indicates a runway length in excess of 1800 m and the letter C a wingspan from 24 m to 36 m (exclusive), and a main gear outer track of 6 m to 9 m (exclusive).

<sup>4</sup>Category 3 implies aircraft 12 m to 18 m long and a maximum fuselage width of 3 m.

It is at an elevation of 94 m (307 ft) and it has one asphalt runway in a 3/21 orientation that is 45 m wide. Runway 03 is 2241 m long and runway 21, which has a displaced threshold, is 2076 m long.

The airport traffic pattern is north of the runway.

### **1.11. Flight recorders**

The aircraft did not have flight recorders, as they were not required by law. It was, however, equipped with a GARMIN G1000 GPS, which recorded the flight and which revealed that the takeoff began at 11:55:44 and that at 11:56:04, the aircraft reached a maximum altitude of 380 ft, with an indicated airspeed of 71 kt. At that point its altitude over the runway was 73 ft (22 m), since the airport's elevation is 307 ft. From that moment on, it began to descend and it stopped 32 s later. The figure below shows the flight profile.



Figure 3. Flight profile recorded in the GPS

### **1.12. Wreckage and impact information**

As a result of the initial impact and subsequent runway excursion, all three propeller blades broke and there were varying degrees of damage to the lower engine fairing, to the front gear wheel in the area where it attaches to the fork, to the fairing of said wheel, to the right main gear wheel, affecting the brake disk and caliper, and to the left wing, which had a mark on its lower surface.



Figure 4. Damage to the propeller blades



Figure 5. Damage to the nose wheel gear

### **1.13. Medical and pathological information**

Not applicable to this event.

### **1.14. Fire**

There was no fire.

### **1.15. Survival aspects**

Neither occupant was injured and they were able to exit the aircraft under their own power.

### **1.16. Tests and research**

No special tests or research were required.

### **1.17. Organizational and management information**

The Finnish flight school PATRIA began its activity in 1998 and has subsidiaries in several european countries.

It has been at the Cordoba Airport since 31 August 2019, providing training to obtain CPL(A) and ATPL(A) licenses, as well as the flight instructor (FI(A)) license.

Its fleet consists of TECNAM P2002JF, DIAMOND DA40 NG, and DIAMOND DA42-VI airplanes.

The operator has published procedures for dealing with a simulated engine stoppage both during takeoff and after a touch and go.

A summary of the actions specified in these procedures is to always execute the maneuver at an altitude AGL higher than 400 ft, not over the runway, with the airplane in a no-flaps configuration and a sustained indicated airspeed of 88 kt.

It also specifies the direction in which the aircraft must be flying, outside the aerodrome, depending on the wind configuration.

### **1.18. Additional information**

Not applicable to this event.

**1.19. Useful of effective investigation techniques**

The use of special investigation techniques was not required.

## **2. ANALYSIS**

The information obtained from the GARMIN G1000 GPS that recorded the flight indicates that it reached a maximum altitude of 380.57 ft with an indicated airspeed of 71.16 kt, which is above the maximum stall speed of 66 kt. This rules out the possibility that the airplane stalled.

The aircraft's behavior following the initial impact, becoming airborne again, also rules out a stall.

The speed to reach a safe altitude is 72 kt, which is slightly above the maximum airspeed attained by the aircraft, meaning that at no point did it have a sufficient safe altitude, according to the procedures or to the operator's guidelines, which call for an even higher speed.

Everything seems to indicate that the instructor simulated an engine stoppage in violation of the procedures approved by the School.

The nose wheel gear collapsed on the first impact, and it was also when the propeller broke.

When it touched down for a second time, after bouncing back into the air, the pilot was able to control it properly, since he held it on the main gear wheels and steered it to a certain extent until it veered off the runway. He did not drag the airplane on the runway with its damaged front wheel.

According to an account of the event, it was the student who decided to turn off the engine master, which further corroborates that the entire maneuver was very improvised and the instructor was overwhelmed by the sequence of events.

### **3. CONCLUSIONS**

#### **3.1. Findings**

- The flight in question was a training flight with dual controls.
- The aircraft took off from runway 03 at the Cordoba Airport.
- During the takeoff, while at an altitude of approximately 22 m, the instructor pulled the throttle back to the idle position to simulate an engine stoppage.
- The airplane's nose leg broke during the landing upon on all three wheels and the propeller were broken too.
- The aircraft bounced into the air and the main wheels touched down first during the second landing.
- The aircraft veered off the right side of the runway and stopped at the threshold marks for runway 21.
- Once the aircraft came to a stop, the student stopped the engine after checking with the instructor.
- There were no injuries and the crew exited the aircraft under their own power.

#### **3.2. Causes/Contributing factors**

The investigation has determined that the accident was caused by an improperly executed landing maneuver.

#### **4. SAFETY RECOMMENDATIONS**

None.