

CIAIAC

COMISIÓN DE
INVESTIGACIÓN
DE **A**CCIDENTES
E **I**NCIDENTES DE
AVIACIÓN **C**IVIL

Report A-020/2016

Accident involving an EMBRAER ERJ
190-200, registration EC-LKX,
operated by Air Europa Líneas Aéreas,
at the Adolfo Suárez Madrid-Barajas
Airport (Spain) on 15 June 2016



GOBIERNO
DE ESPAÑA

MINISTERIO
DE FOMENTO

Report

A-020/2016

**Accident involving an EMBRAER ERJ 190-200,
registration EC-LKX, operated by Air Europa Líneas
Aéreas, at the Adolfo Suárez Madrid-Barajas Airport
(Spain) on 15 June 2016**



GOBIERNO
DE ESPAÑA

MINISTERIO
DE FOMENTO

SUBSECRETARÍA

COMISIÓN DE INVESTIGACIÓN
DE ACCIDENTES E INCIDENTES
DE AVIACIÓN CIVIL

Edita: Centro de Publicaciones
Secretaría General Técnica
Ministerio de Fomento ©

NIPO: 161-17-047-8

Diseño, maquetación e impresión: Centro de Publicaciones

COMISIÓN DE INVESTIGACIÓN DE ACCIDENTES E INCIDENTES DE AVIACIÓN CIVIL

Tel.: +34 91 597 89 63
Fax: +34 91 463 55 35

E-mail: ciaiac@fomento.es
<http://www.ciaiac.es>

C/ Fruela, 6
28011 Madrid (España)

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 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.

Table of contents

Abbreviations	vii
Synopsis	ix
1. Factual information	1
1.1. History of the flight	1
1.2. Injuries to persons.....	1
1.3. Damage to aircraft.....	1
1.4. Other damage.....	1
1.5. Personnel information	2
1.6. Aircraft information.....	2
1.7. Meteorological information	2
1.8. Aids to navigation.....	2
1.9. Communications	2
1.10. Aerodrome information	3
1.11. Flight recorders	3
1.12. Wreckage and impact information.....	3
1.13. Medical and pathological information.....	3
1.14. Fire	3
1.15. Survival aspects	3
1.16. Tests and research	3
1.16.1. Statement from the aircraft's captain.....	3
1.16.2. Statement from the injured maintenance technician	4
1.16.3. Statement from the maintenance technician who was not injured.....	5
1.16.4. Maintenance procedure	5
1.16.5. The safety strap as a safety barrier	5
1.17. Organizational and management information.....	6
1.18. Additional information	6
1.18.1. Report written by the Occupational Hazard Prevention Department at Globalia	6
1.19. Useful or effective investigation techniques	7
2. Analysis	9
2.1. General	9
3. Conclusions	11
3.1. Findings	11
3.2. Causes/Contributing factors	11
4. Safety recommendations	13

Abbreviations

°C	Degrees centigrade
AEMET	Spain's National Weather Agency
AESA	Spain's National Aviation Safety Agency
AMT	Aviation maintenance technician
EICAS	Engine Indicating and Crew Alerting System
FL	Flight level
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
LEMD	ICAO code for the Adolfo Suarez Madrid Barajas Airport
m	Meters
METAR	Aviation routine weather report
QNH	Altimeter subscale setting to obtain elevation when on the ground
UTC	Universal coordinated time

Synopsis

Owner:	Air Europa Líneas Aéreas ¹
Operator:	Air Europa Líneas Aéreas
Aircraft:	EMBRAER ERJ 190-200 LR
Date and time of accident:	15 June 2016 at 13:47 ²
Site of accident:	Adolfo Suárez Madrid Barajas Airport (Spain)
Persons onboard:	2 pilots and 2 AMTs. 1 ATM seriously injured
Type of flight:	Commercial Air Transport – Scheduled – Domestic - Passenger
Phase of flight:	Parked – Engines off
Date of approval:	25 January 2017

Summary of the event

On Wednesday, 15 June 2016, an EMBRAER ERJ 190-200 LR aircraft, registration EC-LKX, had an aft-door open warning while flying toward the Adolfo Suárez Madrid-Barajas Airport. The crew carried out the relevant procedure and the aircraft landed at its destination without incident.

After landing and disembarking the passengers, the crew, which remained in the cockpit to prepare for the next flight, contacted maintenance to have it check the condition of the door. While conducting the maintenance, one of the technicians fell from the airplane, suffering serious injuries.

The aircraft was not damaged.

The investigation has determined that this accident was caused due to aviation maintenance technician's inattention while performing maintenance.

¹ On the registration certificate, Air Europa Líneas Aéreas is shown as the aircraft's sub-lessee.

² All times in this report are local. To obtain UTC, subtract two hours.

1. FACTUAL INFORMATION

1.1. History of the flight

On Wednesday, 15 June 2016, an EMBRAER ERJ 190-200 LR aircraft, registration EC-LKX, had an aft-door open warning while flying toward the Adolfo Suárez Madrid-Barajas airport (Spain). The crew carried out the relevant procedure and the aircraft landed at its destination without incident.

After landing and disembarking the passengers, the crew, which remained in the cockpit to prepare for the next flight, contacted maintenance to have it check the condition of the door. While performing the maintenance, one of the technicians fell from the airplane, suffering serious injuries.

The aircraft was not damaged.

1.2. Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft	Others ³
Fatal				
Serious				1
Minor				
None	2		2	1
TOTAL	2		2	2

1.3. Damage to aircraft

The aircraft was not damaged.

1.4. Other damage

There was no material damage of any other kind.

³ This category includes the maintenance technicians who were on the airplane at the time of the accident.

1.5. Personnel information

The maintenance technician who was injured was a 44-year old Spanish national with a B1 category license and a B1.1 sub-category, which allowed him to perform maintenance tasks on jet engine airplanes. It was issued on 4 November 2015 by AESA and was valid until 4 November 2020. The license included the following aircraft type ratings:

Aircraft type rating	Category	Date type rating was added
B1	B1	20/07/2009
B1.1	B1.1	20/07/2009
Airbus A330 (GE CF6)	B1.1	04/11/2015
Airbus A330 (RR RB 211 Trent 700)	B1.1	04/11/2015
Boeing 737-300/400/500 (CFM56)	B1.1	20/07/2009
Boeing 737-600/700/800/900 (CFM56)	B1.1	20/07/2009
Embraer ERJ-170 Series (GE CF34)	B1.1	07/11/2011
Embraer ERJ-190 Series (GE CF-34)	B1.1	07/11/2011

He had a total of 196 months of experience since joining Air Europa Líneas Aéreas on 21 February 2000.

1.6. Aircraft information

Not applicable to this accident.

1.7. Weather information

According to the METAR from 11:30 UTC, a few minutes before the accident, there was an 11-knot wind from 220° at the Adolfo Suarez Madrid-Barajas Airport.

1.8. Aids to navigation

Not applicable.

1.9. Communications

Not applicable.

1.10. Aerodrome information

The aircraft was parked at the Adolfo Suarez Madrid-Barajas Airport, ICAO code LEMD.

1.11. Flight recorders

Not applicable.

1.12. Wreckage and impact information

The aircraft was not damaged.

1.13. Medical and pathological information

There are no indications that physiological factors or impairments affected the aircraft maintenance technician's performance.

1.14. Fire

There was no fire.

1.15. Survival aspects

The fall, from an approximate height of 3 m, caused injuries to several parts of the body.

1.16. Tests and research

1.16.1. Statement from the aircraft's captain

The aircraft's captain stated that during the flight from La Coruña to Madrid, while at FL 310, they received a "DOOR PAX AFT OPEN" warning on EICAS. They carried out the relevant procedure and landed without incident at the Madrid Airport, after which he reported the problem to maintenance to have them inspect the problem and dispatch the airplane for the return flight to La Coruña.

Two maintenance technicians proceeded to inspect the problem with the aft door while the captain and first officer remained in the cockpit to prepare for the flight to La Coruña, at which time they were called by one of the maintenance technicians to report that his colleague had fallen to the platform.

The pilot immediately asked airport services for an ambulance, which arrived at 11:58 UTC. Civil Guard personnel also reported to the scene, as did two officers from the Civil Guard's Judiciary Police Unit who, after investigating the event, cleared the pilots to board the passengers and start the flight to La Coruña.

1.16.2. Statement from the injured maintenance technician

The maintenance technician involved in the accident, who will be referred to in this report as AMT1, had problems remembering the events of that day clearly, but he was nonetheless interviewed.

He recalled that a coworker asked him for help, since he had a B1.1 license and is certified on that airplane type, unlike said coworker. So as not to delay the flight, since the airplane was ready for boarding, he interrupted the maintenance activities he was performing on another airplane and went to assist her coworker.

Her coworker told him that the door was open. He did not recall if he opened it to do the maintenance on it or if it was already open. To prevent falls when the door is open, the airplane features a safety strap. This strap is more to warn of the danger than to protect against it, since it is not capable of supporting a person. In fact, her coworker informed him that the safety strap was in place at the time of the accident. He was also holding on to a safety handle, which also did not keep him from falling.

He thought he performed the procedure correctly. Since he was only going to visually inspect the door sensor, he was not using the maintenance manual at that time. He thought that to identify the fault, he must have opened and closed the door while visually inspecting the sensor from the inside. During the visual inspection, he must have placed his leg outside the airplane and fallen.

He stated that the workload on the day of the accident was normal. In the time period when the accident took place, the workload was usually high. He was in a hurry, since he had to do maintenance on other airplanes, and this was a routine visual inspection, so he did not consider calling for a platform. As a safety measure to avoid a repeat occurrence, however, he would recommend the use of a platform any time a door is open.

1.16.3. Statement from the maintenance technician who was not injured

The maintenance technician who was not injured in the accident, who will be referred to in this report as AMT2, stated that they were checking the left aft passenger door (specifically, L2) and its associated sensor when his coworker (AMT1) placed his left foot down outside the airplane and fell. In her opinion, the accident occurred because his coworker (AMT1) misjudged the distance.

1.16.4. Maintenance procedure

The Air Europa Maintenance Department was asked which specific maintenance task the maintenance technician was performing when he fell. According to the department, it was a visual inspection, which he was conducting in accordance with task 20-00-00-910-801-A, described in the Aircraft Maintenance Safety Procedures - Standard Procedures. This task requires the safety strap to be installed if there is no platform at the door. The Air Europa Maintenance Department stated that if said visual inspection revealed a problem in the sensor requiring its replacement, the tasks described in the Fault Isolation Manual would be carried out.

1.16.5. The safety strap as a safety barrier

The safety strap is not designed to prevent a fall; it simply provides a visual cue that the door is open.

There are aircraft manufacturers, like Boeing⁴, that recommend installing a net whenever a door is open and unprotected.

During the investigation, the CIAIAC contacted IATA, which has specified the following in its Airport Handling Manual:

- No cabin doors (the door that allows external access to the passenger cabin) shall be opened, closed or left open without ground equipment or appropriate fall protection in place. To ensure safe operation, avoid damage and prevent falls, only trained personnel may operate cabin doors. A single strap is unsafe and does not meet this criteria.
- Some airlines may permit doors to be opened and have a full size door net fitted which is attached to anchor points. When fitting door nets operators must either have a working platform outside the door or wear a fall restraint device for both

⁴ For more details, see the Boeing article "Protecting Airline Personnel from Falls", which may be found at http://www.boeing.com/commercial/aeromagazine/articles/qtr_4_07/article_04_1.html

fitting and removal. The operator must ensure the door is fully closed before removing the safety harness.

Therefore, the safety strap, as it does not prevent falls, cannot replace a work platform installed outside the door as a safety barrier.

1.17. Organizational and management information

Not applicable to this investigation.

1.18. Additional information

1.18.1. Report written by the Occupational Hazard Prevention Department at Globalia

The report written by the Occupational Hazard Prevention Department yielded the following information:

- The accident occurred during the maintenance technician's (AMT1) 6th hour of his shift, which had started at 07:00 and ended at 15:00. It was his fourth task since commencing his shift.
- At that time, maintenance technician AMT1 was wearing the following personal protective equipment: safety footwear and a vest.
- Maintenance technician AMT1 supposedly opened the door and started the visual inspection. This could not be confirmed with maintenance technician AMT2, since by the time she got to where his coworker was, the door was already open and AMT1 was looking at the sensor in the door frame.
- Maintenance technician AMT1 informed her colleague, AMT2, that he saw nothing unusual. He continued checking the sensor and when he shifted his stance, he stepped off the edge and fell.
- He was not using any tools during the visual inspection.
- AMT2 recalled that AMT1 was holding on to the door handle intended to be used with the right hand when opening the door. The safety strap was in place.

Included below are two photographs, one showing the safety barriers available when opening the door (safety strap and handle) and another showing the position of maintenance technician AMT1 at the time of the accident.



Figure 1. Close-up of the handle and safety strap (left) and reconstruction of the AMT's position (right)

1.19. Useful or effective investigation techniques

Not applicable.

2. ANALYSIS

2.1. General

On Wednesday, 15 June 2016, an EMBRAER ERJ 190-200 LR aircraft, registration EC-LKX, had an aft-door open warning while flying toward the Adolfo Suárez Madrid-Barajas airport (Spain).

After landing and disembarking the passengers, the crew, which remained in the cockpit to prepare for the next flight, called the maintenance technicians to have them check the condition of the door.

Maintenance technician AMT2, assigned to this aircraft, had a certifying authority of scope "D", and thus could not issue a return to service certificate. After being informed by the pilot of the problem with the door, she notified maintenance technician AMT1, who had a B1.1 maintenance license for that airplane model.

Maintenance technician AMT1 was busy on another airplane, but so as not to delay the departure of aircraft EC-LKX, which was ready for boarding, he reported to EC-LKX to help her coworker.

His plan was to visually inspect the condition of the sensor. He did not request to have a platform installed at the door for this inspection. He set up the safety strap, as instructed by the manufacturer for a visual inspection, and held on to the handle. The strap, however, did not keep him from falling when he stepped off the edge while looking at the door sensor.

Since the safety strap has been shown to be ineffective in preventing accidental falls, a Safety Recommendation is issued to the aircraft operator so that whenever a door has to be open for maintenance, a safety system is used that can prevent accidental falls.

3. CONCLUSIONS

3.1. Findings

- Maintenance technician AMT1 had a valid license and medical certificate.
- The maintenance task, involving a visual inspection, was conducted as specified in the manufacturer's manual.
- The safety strap is not a replacement for installing a platform at the door as a safety barrier, as it does not prevent accidental falls.

3.2. Causes/Contributing factors

The investigation determined that this accident was caused by aviation maintenance technician's inattention while carrying out a maintenance task.

4. SAFETY RECOMMENDATIONS

The safety strap is not a system for preventing accident falls. As a result, the following Safety Recommendation is issued:

REC 03/17. It is recommended that Air Europa take the measures deemed appropriate to avoid a repeat occurrence of this type of accident.

