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COMISIÓN DE
INVESTIGACIÓN
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AVIACIÓN **C**IVIL

Report IN-013/2015

Incident on 28 April 2015
involving an AIRBUS 321-212,
registration F-GTAZ, operated
by Air France, and a Boeing
737-400, registration OE-IAP,
operated by TNT Airways,
at the Barcelona-El Prat
Airport (Spain)



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SUBSECRETARÍA

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DE ACCIDENTES E INCIDENTES
DE AVIACIÓN CIVIL

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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.º 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

00 °C	Degrees centigrade
ACC	Area Control Center
ACS	Area control surveillance rating
ADI	Aerodrome control instrument rating
AENA	Spanish Air Navigation Services Provider
AESA	Spain's National Aviation Safety Agency
AIP	Aeronautical Information Publication
AIR	Air control endorsement on air traffic controller license
APS	Approach control surveillance rating
ATC	Air Traffic Control
ATIS	Automatic Terminal Information System
ATM	Air Traffic Management
ATPL(A)	Airline Transport Pilot License (Airplane)
ATS	Air Traffic Service
CATCL	Community Air Traffic Controller License
CIAIAC	Comisión de Investigación de Accidentes e Incidentes de Aviación Civil (Spanish AIB)
CLR	Clearance delivery
CNS	Communication navigation surveillance
CPL(A)	Commercial Pilot License
CRM	Cockpit resources management
CTA	Air Traffic Controller
E	East
EASA	European Aviation Safety Agency
ELR	Non-preferred daytime configuration at the Barcelona-El Prat airport (Spain)
ENR	Preferred nighttime configuration at the Barcelona-El Prat Airport (Spain)
ft	Feet
GC	Ground control
GEMS	General Error Modeling System
GMC	Ground movement control endorsement
GMS	Ground movement surveillance endorsement
GND C	Central Ground Control Service
GND CN	Central and North Ground Control Service
GND N	North Ground Control Service
GND S	South Ground Control Service
GS	Ground station
h	Hour(s)
hPa	Hectopascal
ICAO	International Civil Aviation Organization
ILS	Instrument landing system
IR (ME)	Insructor Rating (Multi-Engine)
kg	Kilogram(s)
kt	Knot(s)
LC GND	Taxi Control Service and Local Control Service
LCL	Local Control Service
LEBL	Barcelona-El Prat Airport (Spain)
LECB	Control Barcelona
LEMG	Málaga Airport (Spain)
LEMD	Madrid-Barajas Adolfo Suárez Airport (Spain)
LVP	Low Visibility Procedures
m	Meter(s)
METAR	Airport weather routine report
MHz	Megahertz(s)
NM	Nautical(s) mile(s)
OJT	On-the-job training
RAD	Radar endorsement on air traffic controller license

Abbreviations

RD	Royal Decree
S	South
SACTA	Automatic Air Traffic Control System
SEGU	Safety
SGSO	Operational Safety Management System
SID	Standard Instrumental Departure
SMP	Command and Display System
TCL	Terminal control endorsement on air traffic controller license
TRM	Traffic Resources Management
TWR	Tower
TWR-E	East Control Tower
TWR-S	South Control Tower
TXY	Taxiway
UQP	Unit Qualification Plan
UTC	Coordinated Universal Time
UTP	Unit Training Plan
VOR	Very high frequency omnidirectional range
WLL	Non-preferred nighttime configuration at the Barcelona-El Prat Airport (Spain)
WRL	Preferred daytime configuration at the Barcelona-El Prat Airport (Spain)

Synopsis

Aircraft 1

Owner and operator:	Air France
Aircraft:	Airbus 321-212; registration F-GTAZ
Persons onboard:	196; no injuries
Type of flight:	Commercial aviation – Scheduled – International – Passengers
Phase of flight:	Taxi – Taxi to the runway

Aircraft 2

Owner and operator:	TNT Airways
Aircraft:	Boeing 737-400; registration OE-IAP
Persons onboard:	2; no injuries
Type of flight:	Commercial aviation – Scheduled – International – Passengers
Phase of flight:	Approach – Final approach

Date and time of incident: Saturday, 28 April 2015; at 06:58 local time¹

Site of incident: Barcelona-El Prat Airport (Barcelona, Spain)

Date of approval: 25 November 2015

Summary of incident

On 28 April 2015 at 06:45, an Airbus 321-212, registration F-GTAZ, operated by Air France with callsign AFR1449, started taxiing from parking stand 221 at the Barcelona-El Prat Airport to the 25L threshold. While it was on the taxiway, it was cleared by ATC to cross runway 02.

At that time the airport had not yet changed from its nighttime configuration (ENR), which uses runway 07R for takeoffs and runway 02 for landings, to its daytime configuration (WRL), which uses runway 25L for takeoffs and 25R for landings, as this change is made daily at 07:00.

At 06:58, it reached the intersection of the taxiway with runway 02, and it stopped upon seeing the stop bar lights energized. The crew asked ATC to confirm they were cleared to cross the runway. ATC instructed them to hold their position.

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

One minute earlier, a Boeing 737-400, registration OE-IAP, operated by TNT Airways and with callsign TAY421J, had been cleared by ATC to land on runway 02. It was on the last segment of the approach.

Aircraft TAY421 continued its approach and landed normally, passing in front of the other aircraft.

Given the prior events investigated at this airport, occurring on 27 May 2012 and 5 July 2014, both at times very close to 07:00, involving very similar situations, it was decided to issue three preliminary safety recommendations, two of them to ENAIRE and one to AESA. These were published on 10 June 2015.

The investigation into this event concluded that the incident occurred because the airplane with callsign AFR1449 was cleared to cross the runway due to an oversight by the central ground controller.

1. FACTUAL INFORMATION

1.1. History of the flight

On 28 April 2015 at 06:45, an Airbus 321-212, registration F-GTAZ, operated by Air France with callsign AFR1449, started taxiing from parking stand 221 at the Barcelona-El Prat Airport to the 25L threshold. While it was on the taxiway, it was cleared by ATC (GND C) to cross runway 02.

At that time the airport had not yet changed from its preferred nighttime configuration (ENR), which uses runway 07R for takeoffs and runway 02 for landings, to its preferred daytime configuration (WRL), which uses runway 25L for takeoffs and 25R for landings, as this change is made daily at 07:00.

At 06:58 it reached point D2, which is the intersection of taxiway D with runway 02, and it stopped upon seeing the stop bar lights energized. The crew contacted ATC (GND C) to confirm they were cleared to cross the runway. ATC instructed them to hold their position.

One minute earlier, a Boeing 737-400, registration OE-IAP, operated by TNT Airways and with callsign TAY421J, had been cleared by ATC to land on runway 02. It was on the last segment of the approach.

The aircraft with callsign TAY421 continued its approach and landed normally, passing in front of the other aircraft. It left runway 02 via exit taxiway V1 (the first on the left



Figure 1. Moment the crossing occurred

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after crossing runway 07L/25) and then taxied to parking via taxiways U and T (parallel to runway 07L/25R).

Aircraft AFR1449 continued taxiing with no further incidents via taxiways D, K and G to the runway 25L threshold, taking off a few minutes later.

1.2. Injuries to persons

1.2.1. Airbus 321-212

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal				
Serious				
Minor				Not applicable
None	7	189	196	Not applicable
TOTAL	7	189	196	

1.2.2. Boeing 737-400

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal				
Serious				
Minor				Not applicable
None	2		2	Not applicable
TOTAL	2		2	

1.3. Damage to aircraft

Neither aircraft suffered any damage.

1.4. Other damage

There was no other damage.

1.5. Personnel information

1.5.1. *Crew of the Airbus 321-212*

The captain was 43 years old and had an airline transport pilot license (ATPL(A)) issued by the French aviation authority on 18 May 2009. He also had A320 and multi-engine instructor (IR ME) ratings. He had a total of 8,642 flight hours, of which 3,765 had been on the type. Both the license and the associated Class 1 medical certificate expired on 31 August 2015.

The copilot was 26 years old and had a commercial pilot license (CPL(A)), issued by the French aviation authority on 19 April 2010, with an A320 type rating and a multiengine instructor rating (IR ME). He had a total of 2,226 flight hours, of which 2,078 had been on the type. His license expired on 31 December 2015 and his Class 1 medical certificate on 31 May 2016.

1.5.2. *Crew of the Boeing 737-400*

The captain was 43 years old and had an airline transport pilot license (ATPL(A)) issued by the Belgian aviation authority on 3 March 2007. He had a total of 5,526 flight hours, of which 75 had been on the type. His license expired on 31 March 2016 and his Class 1 medical certificate on 24 July 2015.

The copilot was 52 years old and had an airline transport pilot license (ATPL(A)) issued by the Belgian aviation authority on 3 August 1999. He had a total of 8,394 flight hours, of which 1,735 had been on the type. His license expired on 30 November 2016 and his Class 1 medical certificate on 2 December 2015.

1.5.3. *Controllers on duty*

The controllers on duty at the time of the incident at the Local (LCL) and Central Ground (GND C) had a Community Air Traffic Control License (CATCL) and aerodrome ADI instrument control ratings with the following endorsements: control tower (TWR), ground movement control (GMC), ground movement surveillance (GMS), air control (AIR) and aerodrome radar control (RAD). They also had air control surveillance ratings (ACS) with radar (RAD) and terminal control (TCL) ratings.

Both had approach control surveillance (APS) ratings with radar (RAD) and terminal control (TCL) endorsements, and their associated language endorsements indicated a level of six (6) for Spanish and five (5) for English.

Their licenses, ratings and relevant medical certificated had been issued by Spain's National Aviation Safety Agency (AESA) and were valid.

Local controller

The controller in the local position (landings and takeoffs) at the main tower (East) was 40 years old. All of his ratings expired on 9 January 2017 and his medical certificate on 3 March 2016. His language endorsement expired on 9 January 2017.

He had 12 years of experience at the Barcelona Tower, which had been his only assignment. He had been a Supervisor since 2005 and a Chief Supervisor since 2007.

Central ground controller

The Central Ground controller, who was in the South control tower, was 37 years old. All of his ratings expired on 20 September 2015 and his medical certificate on 28 September 2015. His language endorsement expired on 16 May 2019.

He had 5 years of experience, all of them at the Barcelona - El Prat Airport tower.

1.6. Aircraft information

1.6.1. *Airbus 321-212*

The Airbus A-321-212 is a transport airplane measuring 44.51 m long and 11.76 m high with a 34.1-m wingspan. The incident model, with registration F-GTAZ, was manufactured with serial number 4901 and had a valid standard certificate of airworthiness issued by the French Civil Aviation Administration (Directione Générale de l'Aviation Civile) on 25 November 2011, as per type certificate EASA.A.064, which was valid until 25 November 2015.

Its maximum takeoff weight was 83,000 kg and it was outfitted with two CFM56-5B3/3 engines, with serial numbers 643690 and 643692.

1.6.2. *Boeing B-737-400*

The Boeing B-737-400 is a transport airplane with a wingspan of 28.88 m, a length of 36.45 m and a total height of 11.13 m. The incident model, with registration OE-IAP, was manufactured with serial number 29206 and had a valid certificate of airworthiness,

no. 4549, issued by the Austrian Civil Aviation Authority on 31 October 2011. It expired on 26 September 2015.

Its maximum takeoff weight was 65,090 kg and it was outfitted with two CFM56-3C1 engines.

1.7. Meteorological information

Based on the information provided by ENAIRE, visibility conditions at the airport were good at the time of the incident. The wind was from the northwest at a speed of 10 kt.

The airport issued the following METARs at 06:30, 07:00 and 07:30, which show that the wind was from the northwest at around 10 kt, with good visibility.

SA 28/04/2015 05:30-> METAR LEBL 280530Z 32010KT 290V350 9999 FEW025 12/05 Q1013 NOSIG=

SA 28/04/2015 05:00-> METAR LEBL 280500Z 32009KT 9999 FEW020 13/05 Q1013 NOSIG=

SA 28/04/2015 04:30-> METAR LEBL 280430Z 33007KT 9999 FEW018 13/06 Q1013 NOSIG=

1.8. Aids to navigation

Not applicable.

1.9. Communications

Below is a summary of the communications between the airplanes and ATC.

Time	Station	Message
06:38:42	LC supervisor	Hey, we'll be changing to WRL, ok. Two incoming, the first on 02, the first will be on 02... the QUALITY at around the time of the runway change. Then an American, the one that comes in every morning, which will be coming in on 25 right, ok?
06:38:58	LC GND C	Very good.
06:45:43	AFR1449	Ground AFR1449 ¿buenos días? Stand 220 ready for push.

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Time	Station	Message
06:45:51	GND C	AFR1449 push back approved stand 220 facing south.
06:45:54	AFR1449	Pushing back facing south AFR1449.
06:47:18	LC GND S	Hi ¿could you?
06:47:20	LC GND C	What?
06:47:23	LC GND S	Hi, the Air France is going to 25... in case you change its clearance.
06:47:27	LC GND C	France to 25.
06:47:29	LC GND S	That's right.
06:47:31	GND C	¿AFR1449?
06:47:34	AFR1449	Yes go.
06:47:35	GND C	Just for your information, we are changing the runway and you will depart from runway 25 Left, so please as soon as you have some time, call me to give you the new clearance.
06:47:46	AFR1449	Ah god, ready to copy AFR1449.
06:47:49	GND C	Roger, AFR1449 you can expect runway 25 Left for departure and it is OKABI 3Q SID.
06:47:57	AFR1449	Runway 25 left, OKABI 3Q SID AFR1449.
06:48:01	GND C	1449 correct.
06:50:42	AFR1449	AFR1449 ready for taxi.
06:50:49	GND C	AFR1449 taxi via Echo Sierra gate Mike to the right hold short of Echo.
06:50:56	AFR1449	Echo Sierra gate, to the right Mike hold short Echo, Air France1449.
06:53:03	LCL	TAY421J, RWY02, Clear to land, the wind 340/10KTs.
06:53:52	AFR1449	Approaching Echo AFR1449.
06:53:55	GND C	AFR1449 taxi Mike and Delta, cross 02 hold short Kilo.
06:54:02	AFR1449	Mike and Delta, cross 02, hold short Kilo, AFR1449.
06:55:14	AFR1449	AFR1449 eh... I suppose we have to stop, red lights on and aircraft on final.
06:55:21	GND C	AFR1449 hold short please, call you back.
06:55:26	AFR1449	Ok.
06:55:28	AFR1449	(Inintelligible)... initially to cross.
06:55:37	GND C	I was just coordinating while you were taxiing, hold short please, I will call you back.

Time	Station	Message
06:55:43	LC supervisor	As soon as the Quality lands, that's the last one, runway 02 is, local is losing it, Ok?
06:56:13	LC GND C	I'll cross it for you, ¿ok?
06:56:15	LC GND S	Tes, 02 no longer active.
06:56:21	LCL	TAY421J vacate via Uniform Bravo and contact 121.7, adiós.
06:56:28	TAY421J	121.7 and Uniform Bravo, adiós, TAY421J.
06:56:37	GND C	AFR1449 cross runway 02, not active now, and continue to hold short Kilo, please.
06:56:43	AFR1449	We cross 02, we continue to hold short Kilo AFR1449.
06:57:42	GND C	AFR1449 contact 122.225, have a nice flight, goodbye.
06:57:46	AFR1449	122.225 AFR1449, and we will file a safety report.
06:57:56	GND C	Roger sir.

1.10. Aerodrome information

1.10.1. General information

The Barcelona-El Prat Airport (LEBL) has three runways, designated 02/20, 07L/25R and 07R/25L. The first two intersect (see photograph in Figure 4²). All three are 45 m wide.

Runway 02/20 is 2,645 m long, runway 07L/25R is 3,472 m long and runway 07R/25L is 2,780 m long.

Runway 02 has a Cat I³ ILS and the other two (07L/25R and 07R/25L) have a category II/III⁴ ILS. Runway 20 (which is not normally used) does not allow for ILS precision approaches.

For environmental reasons directly related to noise pollution, the airport uses two different configurations, one during daytime hours (from 07:00 until 23:00) and another at nighttime (from 23:00 until 07:00).

² Image taken from Google Earth.

³ Category I has a decision altitude of no less than 200 ft and a runway visual range in the impact zone of no less than 550 m.

⁴ Categories II/III are more restrictive.

The most typical preferred daytime configuration (West) is known as WRL, in which airplanes land on runway 25R and take off from 25L; in other words, runway 25R/07L, which is the longest, is used for landings in the WRL (preferred daytime) configuration, instead of being used for takeoffs. This forces the airport to have specific procedures to accommodate those aircraft for which runway 07R/25L is not long enough.

The non-preferred daytime configuration (East) is called ELR and uses runway 07L for landings and 07R for takeoffs.

The preferred nighttime configuration (North) typically used is called ENR. In this configuration traffic lands on runway 02 and takes off from 07R.

The other, non-preferred, nighttime configuration (West) is WLL, and uses runway 25L for both takeoffs and landings.

There are aircraft that, for performance reasons, request to take off from the longest runway (07L/25R). This is described in a procedure in an ENAIRE Aeronautical Information Publication (AIP).



Figure 2. Aerial photograph of the airport

All of the possible configurations are shown in the table below:

Configuration	Landings	Takeoffs	Remarks
WRL	25 R	25 L	Preferred daytime configuration (most typical).
ELR	07 L	07 R	Preferred daytime configuration.
ENR	02	07 R	Preferred nighttime configuration (most typical).
WLL	25 L	25 L	Preferred nighttime configuration.
ELL	07 L	07 L	Only used in duly authorized cases.
ELS	07 L	20	Used exceptionally.
ENL	02	07 L	Only in duly authorized cases.
ENN	02	02	Used exceptionally.
ERR	07 R	07 R	Used exceptionally.
WLS	25 L	20	Used exceptionally.
WRS	25 R	20	Used when runway 25L is closed.
WRR	25 R	25 R	Only in duly authorized cases.

1.10.2. Information on the control tower at the Barcelona-El Prat Airport

The control tower at the Barcelona-El Prat Airport⁵ is divided into two stations, the main tower (East) and the auxiliary tower (South).

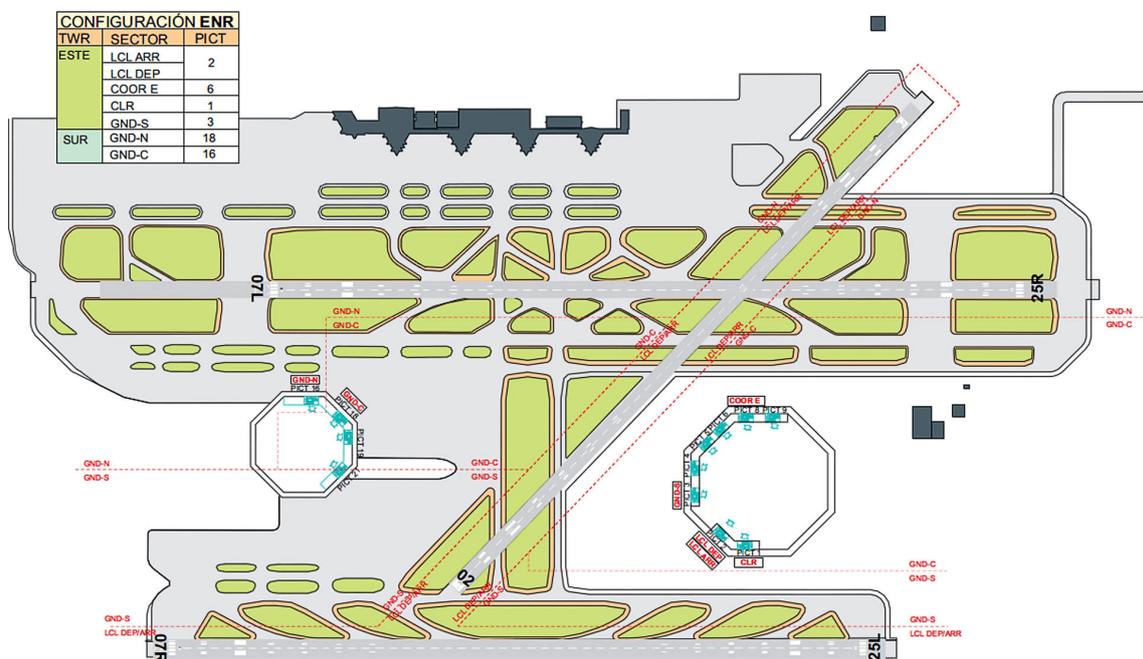


Figure 3. Location of the towers

⁵ As indicated in the 2013 ENAIRE report, the control tower at the Barcelona Airport handled over 300,000 movements that year.

In the maximum staffing configuration, the North Ground (GND-N) and Central Ground (GND-C) duties are handled from the South tower (TWR-S) by two different controllers, while the remaining posts are located in the East tower (TWR-E). Those posts are South Ground (GND-S) and Local (LCL), which authorize takeoffs and landings. There is also a post for Clearance Delivery (CLR). The duty supervisor stands watch in the TWR-E.

The posts in the tower in the ENR configuration, which was the one in use at the time of the incident, are arranged as follows:

The GND-N and GND-C controller posts face north, meaning that traffic approaching runway 02 is behind them. As a result, these controllers can only turn enough to see approaching traffic to 02 as far as the coastline. These controllers also have the tower supervisor's tables directly behind them, partially blocking their view. The Local controller (LCL) post faces the intersection of runways 02 and 07R.

In the nighttime configuration, the GND-N and GND-C posts are combined into a single work post, GND-CN, which is manned by one controller. The coordination needed between the two towers to change configurations takes place shortly before the GND-C and GND-N duties are split.

To avoid possible traffic incursions on runway 02, the M-5 stop bar lights are always on in the ENR configuration, even when runway 02 is not in service in the WRL configuration, to protect runway 25R. As a result, turning these lights off is part of the taxi procedure for non-preferential traffic to the 25R threshold. The LCL controller in the ENR configuration has to turn to see all of runway 02. Thus, the controller, who was focused on separating arriving traffic on 02 and departing traffic on 07R, was unable to see the runway incursion of the Air France airplane.

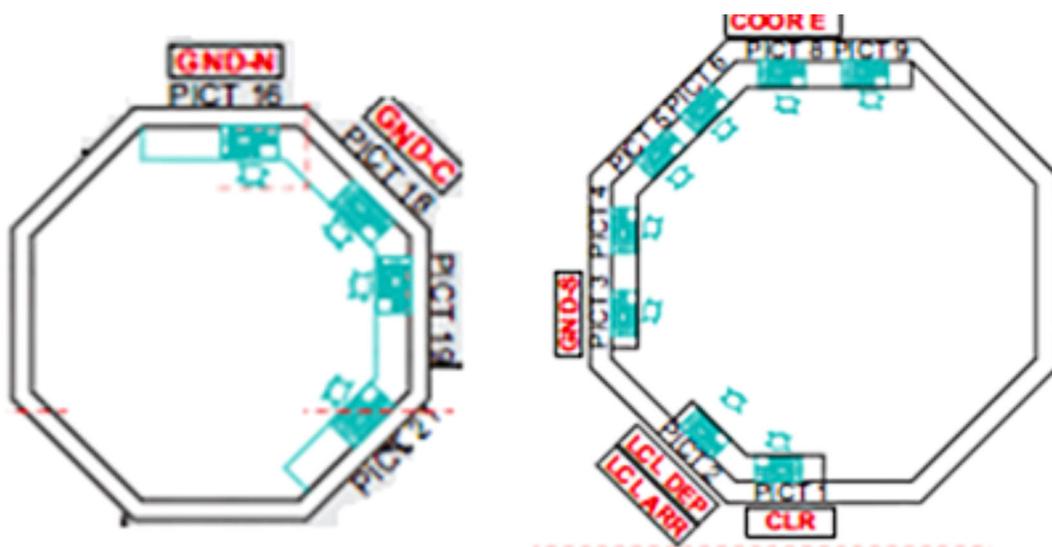


Figure 4. Arrangement of posts in the towers

There are two radar screens used at GND-C, one set up by default to monitor ground traffic, with a manually configured zoom setting that normally impedes seeing the approach to runway 02, and another set up to see the air space around the airport.

The practice for ground sector operations is primarily to watch the ground radar display. Only occasionally is the "air side" radar display used to verify arrival sequences. In the early morning hours there are normally very few arrivals and transitions are critical, with even the smallest detail having the potential to affect the controller's situational awareness.

The unique feature of the ENR configuration (and of any configuration that uses runway 02) is that it divides the areas of responsibility of all the Ground C controllers into two areas while one runway is active.

The SACTA system only prints out arrival cards for those ground controllers through whose areas a landing airplane is expected to taxi. That is why a landing on runway 02 always affects several controllers, but since the taxi routes are designed to avoid crossing runway 02, the card is not printed out for some of the ground controllers (those in the East tower), as it would create too many unused cards and encourage controllers to ignore them.

1.10.3. *Lighting at the airport and stop bars*

The tower at the Barcelona - El Prat Airport has a lighting Command and Display System (SMP) featuring consoles that display information on the status of the lighting system and that can be used to configure it⁶. There are four SMP consoles in the East tower and two in the South tower. All of them have the same features and the same permissions.

The SMP can be programmed with a configuration for the runways, for the taxiways or for both, including any exceptions. Each of the lighting components can also be operated individually.

Every lighting configuration is designed based on the taxi routes set up for each of the airport's active runway configurations. Every lighting configuration includes the status (on/off) for all of the airport's stop bars.

One of the positions for the light stand is next to the post for the local controller (LCL) and South Ground controller (GND S).

⁶ A description and representation of the lighting system that is displayed for each configuration is contained in the document: OPERATING LIGHTING CONFIGURATIONS AT THE BARCELONA-EL PRAT AIRPORT DORE-09-INF-014-1.4.

When the airport configuration is changed, the lights for that new configuration are turned on and the lights for the old configuration are kept on until the final aircraft reaches its corresponding apron.

The procedures contain a permission policy for operating the stop bars, but the system does not have physical protections (equivalent to switchguards in an airplane cockpit). Physical protections are also not programmed into the computer software that operates the system, assigning permissions to an operating configuration at a specific console. Anyone can operate any of the lighting elements, including the stop bars, from any console. As such, there are no protections for critical operational elements, such as stop bars, other than the proper application of procedures.

Another issue is that the lighting system display is not integrated into the Automated Air Traffic Control System⁷ (SACTA), and is displayed on another screen.

1.10.4. *Other information about the airport and its surroundings*

The Master Plan for the Barcelona-El Prat Airport was approved via Order 22566 of the Ministry of Development of 22 October 1999, published in the Official State Journal on 24 November 1999.

Chapter 6, Territorial Setting and Planning for the Delta, explains that the airport is located in the county of Baix Llobregat, which contains the lower part of that river valley, the delta and an extensive ocean coastline.

From a city planning point of view, the area containing the airport occupies spaces that are within the limits of the towns of El Prat de Llobregat, Sant Boi and Viladecans.

Within the airport's affected area, the Plan identifies two highly sensitive areas in terms of the environmental effect of the noise associated with the airport's activity: El Prat de Llobregat, located north of the airport, and the coastal areas of the towns of Gavá and Castelldefels, both to the west-southwest of the airport.

Chapter 14, Environmental Management, and Chapter 16, Effects on the Land and the Environment, explain the actions contained in the Plan to offset the noise impact in affected areas.

The fact that there are two daily runway configurations, one for the daytime and another for nighttime, is one of the main measures for combatting the noise effects.

⁷ This system uses international standards for exchanging information, thus reducing manual operations to a minimum.

1.11. Flight recorders

By the time the CIAIAC was notified of the incident, it was no longer possible to obtain information from the recorders on either aircraft, though in this case the information that could have been extracted would not have added any information of use to the investigation.

1.12. Wreckage and impact information

Not applicable.

1.13. Medical and pathological information

Not applicable.

1.14. Fire

Not applicable.

1.15. Survival aspects

Not applicable.

1.16. Tests and research

1.16.1. *Information provided by the crew of the Airbus 321-212*

The captain of AFR1449 reported in writing that they were cleared to cross runway 02/20, and that as they approach the holding point, they saw that the stop bar lights were on. As they called ATC to confirm if they were cleared to cross the runway, they saw a Boeing 737 operated by TNT landing on runway 02. ATC told them they were calling, but in their opinion, if they had not stopped and asked it would have been too late. He also added that the event had affected him and that he had lost confidence in Spanish ATC services.

As for the copilot, he reported, also in writing, that they had been cleared by the control tower to cross runway 02/20. They saw the red stop bar lights and stopped, looked out both sides and that is when they saw an airplane operated by TNT on short final. They did not see any maneuver by way of reaction from this airplane. He also

noted that they are aware of the dangerous situation at the airport involving crossing runways since they saw the video of the incident from 5 July 2014 (IN-015/2014), which is similar to what happened to them.

1.16.2. *Information from the controllers⁸ involved in the incident*

Local controller (landings and takeoffs) who was in the main (East) tower

In addition to being the local controller, he was also the Supervisor, and his post was in the East tower. Officially his job is to enforce procedures, but in reality his task is to coordinate the actions of all the other controllers (much like an orchestra conductor, as he said).

At 06:25 he is usually looking at the radar display to assess the situation in north Spain and anticipate the air traffic in his area.

At the supervisor's post he can see the situation and the traffic that will be arriving in Barcelona on the radar screens. His duties are to pay attention to the lights, the nav aids, prepare the ATIS, watch the various aircraft taxi to the runways and coordinate with the Control Center. He usually receives calls from several people at the Control Center.

In his opinion, there are only two possibilities during a configuration change: to have arrivals at around 06:55 or not. If there are, the configuration change tends to be more complicated, which is why what he normally does is to look at the takeoffs planned for the following 40 minutes.

As for the incident, he recalled there was an arrival scheduled for the time when it occurred.

Everything was more or less normal and he usually applies the procedures fairly well.

Although he does not like having traffic taxi to runway 25L when there is inbound traffic, he did not expressly tell the Central Ground (GC) controller to taxi the AFR toward runway 25R. He recalled thinking about it, that is, he thought he had not told him anything. He told the South Ground controller that he was going to keep an eye on AFR1419 as it taxied.

At first he thought the crew's attitude was that of a crew that did not know why they had been instructed to hold short of the runway, when in fact they could cross it. It was only after the incident that he realized it was the complete opposite.

⁸ No other controllers were interviewed as they did not have a relevant role in how the event unfolded.

In his opinion, the circular published by ENAIRE to keep AESA from issuing a resolution serves no purpose. As he noted, there have been many other incidents (minor incidents of no importance), and he does not think it is possible to keep them from occurring as long as runway 02 remains operational.

In his judgment, the airport has two problems. One is that runway 02 is operational, which requires a daily configuration change, and the other involves the parking stands, since the space available for them to manage taxiing aircraft is limited.

He added that runway 25L is inspected once a month, and that landings are on 25R and takeoffs from 20. This usually starts at 06:30 and is over by 08:00.

He also reported that the Supervisors usually work nights and the Chief Supervisors the rest of the schedule.

There are currently 8 Chief Supervisors, and there is usually one Chief Supervisor on day shift and another on swing shift. He confirmed that everyone stands watch as a controller and that 25% of their duty time is as a controller.

Central Ground controller who was in the South tower

He went on duty at 06:30 and his post was activated in the computer system by the Supervisor. The Air France flight is always active at around that time.

There was not much traffic that day. AFR1449 asked for pushback. He did not recall anything unusual. He taxied him by segments to see how the arrival unfolded.

He instructed AFR1449 MD cross 02 hold short K, which is a typical instruction. When the crew informed him that the lights were red, he was convinced he had told them to hold short of the runway. When he heard the pilot's tone of voice, he thought perhaps he had not given the instruction he thought he had.

The airplane stopped at the bar and said they had seen another airplane on short final. The pilot told him he would report the incident, and then he again thought that he may not have given the right instruction.

As for the service schedule in general, he noted that the last shift always works nights as it is better rested.

In the time elapsed since the incident, instead of trying to conceal the event, he has talked about it often with his colleagues, as he believes it important to foster a safety culture. He thinks that ENAIRE has also applied the concept of safety culture not by pressuring him, but by doing the opposite; everyone has tried to learn positive lessons from the event.

He also commented that training could be improved since they do not have a refresher per se; what they do instead is rotate through the different posts to maintain their ratings.

They are not required to do TRM sessions (equivalent to CRM for flight crews), but they are trying to implement a pilot program.

1.17. Organizational and management information

1.17.1. Information provided by the airport

On 30-04-2015, the Eastern Region of the ENAIRE Safety Department received the Tower notifications issued between 28-04-2015 and 30-04-2015, as happens every week pursuant to AENA Operating Instruction EXA 71, "Instruction on communications/ notifications between ATS and CNS providers and the airports".

At the weekly meeting held on 06-05-2015 between the Office for Operational Safety Management, the Operational Safety Department and the Manager of the Operational Safety Management System to validate the report on the incidents that had occurred in the previous week, this incident was inadvertently left out when the tower reports were reviewed.

On 20-05-2015 a notification was received from Air France through the airport's Operations Division in which it requested information from ENAIRE on this incident. It was then that the Operational Safety Department, in keeping with its procedure BCN-PGS-08, "Operational Safety Reporting", decided to register it in the relevant module of the Operational Safety Management System (SGSO) database under code BCN-PGS-08-2541. As a result of this report, the tower notifications received were reviewed and the incident was recorded as per SGSO procedure BCN-PGS-04, "Processing accidents and incidents".

In order to prevent runway incursions, the Barcelona El Prat Airport has the regulatory stop bars required by the maps in the Airport Manual, MA.04.2, Horizontal Markings, and MA.04.3, Lighting.

In addition, the airport's Visual Aids Department wrote a report on the status of the visual aids at the time of the incident.

This report shows that there were configuration changes at 07:00:29 and at 22:52:24 on 28 April 2015 at stop bar D2. At the time of the incident in question, the stop bar was on.

The visual aids in the area were checked as per procedure 4.6 in the Airport Manual and found to be in good working order.

Thus, both the lighting Command and Display System and the stop bar at TWY D2 worked correctly.

The status of airport infrastructure in terms of the visual aid systems was correct at the time of the event, and in light of how the event unfolded, the stop bars in this case provided an effective defense against potential errors in the aircraft taxiing procedures. All of the stop bars at the airport comply with the standards and recommendations in RD 862/09.

Lastly, airport officials also reported that the Operational Safety Department periodically issues bulletins aimed at raising the awareness of the groups that work in the maneuvering area, reminding them of the need to take every precaution and avoid possible runway and taxiway incursions. The airport will continue to emphasize the need to avoid runway incursions with the Local Runway Safety Committee and at various meetings with airlines, pilots, etc., in compliance with EAPPRI 2.0.

The following corrective measures and actions were taken:

- Review and apply the RECOMMENDATIONS resulting from the investigations by the CIAIAC and the LECB Safety Department.
- Convene the Local Runway Safety Committee to discuss this event, its gravity and any possible additional measures, as well as those stemming from the CIAIAC investigation, so as to prevent runway incursions in compliance with EAPPRI 2.0.
- Issue a safety bulletin to raise awareness and prevent runway incursions by aircraft, vehicles and people.

1.17.2. *ENAIRE procedures*

Arrangement of posts at the Barcelona control tower the day of the incident.

The ATC posts on the day of the incident were as follows:

- Until 06:00, every sector was combined into a single post, VICTOR, POST 3 (CLR/GC/GN1/GN2/GS/LCL ARRIVALS/LCL DEPARTURES), in the East tower.
- Starting at 06:01, POST 1 was opened, clearance delivery (CLR, on 121.800). The remaining posts remained combined at POST 3 (GC/GN1/GN2/GS/LCL ARRIVALS/LCL DEPARTURES), in the East tower.
- Also at 06:01, a post in the South tower was opened that combined North and Central ground (121.700 and 121.650 MHz) at POSITION 16 (GC/GN1/GN2), meaning three posts were active after 06:01: POST 1 (CLR) and POST 3 (GS/LCL ARRIVALS/LCL DEPARTURES) in the East tower, and POST 16 (GC/GN1/GN2) in the South tower.
- At 06:16 the posts were reconfigured and the LCL ARRIVALS (118.100 MHz) and LCL DEPARTURES (118.325 MHz) were transferred to POST 2 in the East tower. The situation at that time was: POST 1 (CLR), POST 3 (GS), POST 2 (LCL ARRIVALS/LCL DEPARTURES) in the East tower and POST 16 (GC/GN1/GN2) in the South tower.

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- At 06:25, the GC post (121.650 MHz) was opened in the South tower. Every sector was now open in the South tower, meaning the situation was as follows: POST 1 (CLR), POST 3 (GS), POST 2 (LCL ARRIVALS/LCL DEPARTURES) in the East tower and POST 16 (GN1/GN2) and POST 18 (GC) in the South tower.
- At 06:38 the Supervisor, located in the East TWR, coordinated with the GC CTA, in the South TWR, to change configurations and informed him of what the last arrival on runway 02 would be.
- At 06:47 the GS CTA, in the East TWR, informed GC, in the South TWR, that the AFR had to taxi to the runway 25L threshold, as a result of which the GC CTA changed the departure clearance for the AFR.
- At 06:50 the GC CTA cleared the AFR to taxi via M and hold short of Echo.
- At 06:53 the LCL CTA cleared the QUALITY to land.
- 50 seconds later the AFR reported reaching E on the GC frequency. It was then that the CTA made a mistake by giving the standard taxiing instruction for the WRL configuration, which included crossing the still active runway 02, **"AFR1449 taxi Mike and Delta, cross 02, hold short Kilo"**.

At 06:56, after the QUALITY landed, the configuration was changed from ENR to WRL and POST 8 was opened in the East tower to handle LCL ARRIVALS (118.100 MHz), thus completing the staffing of the sectors in both towers as follows: POST1 (CLR), POST 3 (GS), POST 2 (LCL DEPARTURES), POST 8 (LCL ARRIVALS) in the East tower, and POST 16 (GN1/GN2) and POST 18 (GC) in the South tower.

This is all summarized in the table below:

Position	Tower	Function	Time	Configuration	Controller
1	East	CLR	6:02-7:20		Controller 1
2		LCL ARRIVALS/LCL DEPARTURES	6:16-6:56	ENR	Controller 2
		LCL DEPARTURES	6:56-7:26	WRL	
		LCL DEPARTURES	7:27	WRL	Controller 3
3		CLR/GC/GN1/GN2/GS/ LCL ARRIVALS/LCL DEPARTURES	5:27-6:00	ENR	Controller 4
		GC/GN1/GN2/GS/ LCL ARRIVALS/LCL DEPARTURES	6:00-6:01	ENR	
		GS/LCL ARRIVALS/LCL DEPARTURES	6:01-6:15	ENR	
		GS	6:15-6:56	ENR	
		GS	6:56-7:19	WRL	
8		LCL ARRIVALS	6:56	WRL	Controller 5. Supervisor

Position	Tower	Function	Time	Configuration	Controller
16	South	GC/GN1/GN2	6:01-6:25	ENR	Controller 6
		GN1/GN2	6:25-6:56	ENR	
		GN1/GN2	6:56-7:24	WRL	
18		GC	6:25-6:56	ENR	Controller 7
		GC	6:56-6:28	WRL	

Training of tower controllers

The Training Plan for the Barcelona Tower⁹ specifies the program that a controller who will be joining this station must follow in order to obtain the unit endorsement¹⁰ and thus be able to stand watch as an executive controller at the various posts in the Barcelona tower.

The program has a theory phase (transitional part) and a practical phase (on-the-job instruction).

- 1) The transitional part itself has two separate parts:
 - a) General theory, which refreshes the student’s knowledge and provides a basis for the aerodrome control instrument (ADI) rating.
 - b) Specific theory. The goal of this phase is to give trainees information on the issues specific to the unit, i.e. on the operational and technical environment in which they will perform their duties.
- 2) On-the-job training. In this phase the trainee provides control services in a real operational environment under an instructor’s supervision. This phase lasts a minimum of 90 hours or one month (whichever is greater). If the trainee comes from a station whose unit endorsement features the same ratings, the number of hours can be reduced by 25%.

While not specifically considered in the training plan, the practical training includes three days of simulator sessions where the focus is on practicing the non-preferred, and thus less usual, configurations at the airport. These sessions, involving simulated traffic, take place at the ACC radar control post, where what is shown on the display is a

⁹ LEBL training Plan A331A-10-PES-030-2.0

¹⁰ Endorsement added to a license, of which it is a part, which notes the ICAO location indicator and the sectors and/or job posts where the license holder is qualified to work. In the case of the Barcelona tower, these entries do not indicate a specific post (LCL, Area GMC) or the operational configurations to which they apply.

representation of system at the TWR control post. Thus, the physical reality of the control room is not reproduced (in terms of the locations of the control posts, outside visibility, blind spots, etc.). This session does not allow interacting with the stop bar system or simulate the coordination between the two towers, between the control posts or between a control post and a supervisor using a hotline.

The training plan does not specify that the controller must receive on-the-job training for each of the airport's operational configurations, not even for the preferred configurations. The configuration changes are taught on a theoretical level but the document does not explicitly require any hands-on training in this area.

There is also a Qualification Plan¹¹ whose goal is to have controllers maintain the operational skills associated with their unit ratings and endorsements in force.

It specifies that controllers must be on duty at least 80 h a year in the executive controller's post in order to maintain their unit endorsement. They must also stand watch at every post at least once each six months.

This plan also does not require a minimum number of hours per operational configuration, not even the preferred ones, or a minimum number of hours during configuration changes.

The Qualification Plan includes the theory and practical training they must receive annually. It features a course on emergencies and special situations that includes a module on non-preferred configurations. As a general rule, the duration of the training on emergencies and special situations is six hours per calendar year.

Procedure for crossing runways

The Local controller is in charge of the active runways. When the airport is in a parallel runway configuration, there are two local controllers, one in charge of the preferred runway for arrivals and another in charge of the preferred runway for departures. During cross-runway or single-runway operations, there is a single controller responsible for departures and arrivals.

A runway must be crossed as per the relevant procedure¹², which in general specifies the following:

- The local controller is responsible for expressly authorizing the crossing of an active runway under his control.
- Ground controllers will authorize all movements by aircraft, vehicles and people that involve crossing an inactive runway under their control.

¹¹ LEBL Qualification Plan A331C-10-PES-029-2.0.

¹² PROCEDURE FOR CROSSING RUNWAYS AT THE BARCELONA-EL PRAT AIRPORT. 541-10-DTC-003-1.1.

- The standard lighting configurations are programmed such that all the stop bars that protect the active runways in that configuration are on, as well as those stop bars that protect inactive runways that are not crossed as part of a standard taxi route.
- A clearance to cross is issued not only verbally on the frequency, but the stop bar on the SMP must be turned off. Once the runway is crossed the stop bar must be turned on again.

The steps to follow for crossing a runway are different depending on whether or not it is active.

For an *active runway*:

- The ground controllers will coordinate the runway crossing with the local controller responsible for that runway, to notify him of the request to cross and of any relevant information.
- Once coordinated, the ground controller will send the traffic to the relevant holding point, ensure that the stop bar (if present) is on, and transfer communications to the local controller after reminding the traffic to hold short of the runway.
- Before authorizing the crossing of the runway, the local controller will notify the ground controller of the taxiway to which the traffic will proceed after crossing, so as to coordinate the limit clearance.
- The local controller will decide on the suitable moment for the crossing, turn off the stop bar and issue the clearance to cross.
- Once the traffic confirms having crossed, the local controller will transfer it to the corresponding ground frequency.

An *inactive runway* will be crossed as follows:

- The relevant ground controller is responsible for authorizing the maneuver.
- Even though the runway is inactive, any instruction involving crossing a runway must expressly include the clearance to cross it.
- When crossing a runway is not part of the standard taxi route for the configuration in use, the stop bar will be on. In this case, the ground controller must turn it off when the runway crossing clearance is issued, and once the runway is crossed, the stop bar will be turned on again.

1.18. Additional information

1.18.1. Previous incidents

It was not the severity of this event that led to an investigation; rather, it was the repeat occurrence of similar events at the Barcelona-El Prat Airport, since the Civil Aviation

Accident and Incident Investigation Commission already investigated two incidents that occurred under similar circumstances. One was IN-021/2012, the final report for which has already been published, and the other was IN-015/2014, which is in the final stages of the investigation prior to publication.

In light of the similar incidents that were occurring against the backdrop of the daily configuration change that takes place every day at 07:00, three preliminary recommendations were issued, which were published on 10 June 2015.

Below is a review of the previous incidents and the steps taken prior to the issuance of the preliminary recommendations.

IN-021/2012

The first occurred on 27 May 2012 at 07:00, when a Boeing 737, with callsign RYR6363, was making an ILS approach to runway 02. The crew was in radio contact with ATC on the Local (LCL) frequency for runway 02. It was the final aircraft in the landing sequence for this runway before the configuration change from nighttime preferred to daytime preferred, which had been decided a few minutes earlier.

The other aircraft, an A-320 with callsign AFR2349, was taxiing from stand 13 on the parking apron and was in radio contact with ATC on the South Ground frequency. It was cleared to proceed to the runway 25L holding point via taxiway K and crossing runway 02. Shortly thereafter, RYR6363 was cleared to land on that runway.

Upon noticing the imminent runway incursion by AFR2349, the local controller alerted the ground controller, who instructed the aircraft to stop. It did so after going past the holding point on taxiway K7, which protects runway 02. In light of this, the controller told the crew to continue taxiing and the local controller asked RYR6363 to go around.

After completing the go-around maneuver, RYR6363 was cleared to make a new approach and it landed without incident. AFR2349 continued taxiing and took off, also with no further incident.

The investigation concluded that the possible cause of the incident was that the ground controller cleared AFR2349 to cross the runway without first coordinating with the local controller responsible for clearing landings on and crossings of that runway, which was still active since the configuration change was not complete. The lack of familiarization with that day's scenario, resulting from having received no hands-on training with that configuration, influenced in the controller's handling of the situation, which adhered to the scheme that he was most used to working in and in which landings on runway 02 were not expected, especially at a time with few arrivals at the airport.

The following recommendations were issued:

REC 29/13. It is recommended that AENA (now ENAIRE) modify the Training Plan for the Barcelona tower so as to guarantee that a minimum amount of time is spent during the practical training periods in each and all of the preferred airport configurations as well as in changing configurations before a controller receives the unit endorsement.

REC 30/13. It is recommended that AENA modify the Barcelona tower Qualification Plan so as to guarantee that a minimum amount of on-duty time is spent in each of the preferred airport configurations as well as in changing configurations as a requirement for tower controllers to maintain their operational proficiency.

The final report was approved by the CIAIAC at a meeting on 26 June 2013. On 4 July 2013 ENAIRE was sent a letter informing of the final report and the safety recommendations being issued. On 8 July 2013 ENAIRE acknowledged receipt of the report.

On 18 September 2013 ENAIRE replied to the actions taken in response to the recommendations, saying, with respect to REC 29/13, that “the Regional Evaluation and Training Department is in the process of modifying the current Training Plan to stipulate a minimum number of hours to be given to each Air Traffic Controller at each of the preferred configurations before being granted the endorsement”.

The current status of this recommendation is OPEN, RESPONSE SATISFACTORY. IN PROGRESS, since the CIAIAC’s understanding is that the recommendation has to remain open until the change to the Training Plan is implemented.

As concerns REC 30/13, ENAIRE reported that “to comply with the ‘National Aviation Safety Agency Directive on the provision of air traffic control services and maintaining proficiency’, issued by AESA on 28/09/2012, a document was written called ‘Procedure for maintaining proficiency in the tower’, A331C-12-PES-005. Also generated were ‘Guidelines for applying the procedure to maintain proficiency in the tower’, reference code A331C-13-GUI-001, for those towers where operational configurations are not implemented in the SACTA system, that is, for every tower in the ENAIRE network except LEMD, LEBL and LEMG”.

The current status of this recommendation is also OPEN. RESPONSE SATISFACTORY. IN PROGRESS, since the reviewed “Procedure for maintaining proficiency in the tower” states that ENAIRE “must ensure that all its personnel are regularly and uniformly rotated through all the posts included in the relevant unit endorsement”. In addition, “in the event where more than one operational scenario exists, the rotations will be computed for each one independently”. This recommendation will be kept open until the

requirements of these stipulations are transferred to the Qualification Plan for the Barcelona tower, as the recommendation asks.

On 5 June 2015, the CIAIAC sent a new memo to ENAIRE asking about the status of implementing the two recommendations, with the following reply being received from ENAIRE on 18 September 2015:

Regarding recommendation 29/13

Documents were added to ENAIRE's certification as a provider of training services for 2014 pursuant to applicable regulations.

Said documents do not require the specific UTPs (Unit Training Plan) to contain more than they already do, which is a direct relationship between the Training Plan and the Operations Manual, the document that lists the procedures and posts in the control tower.

The number of on-the-job training (OJT) hours by station is determined by the number of posts in the control room, so that trainees can rotate during the unit training process through all the posts and configurations.

As the General UTP specifies regarding the functions of the personnel involved in the Unit Training, the Training Supervisor is responsible for planning and tracking a student's UTP process, to which end the supervisor ensures the student under instruction stands watch at every post and in every configuration during the process.

The Unit Operations Manual, listed as the reference document for training at a unit, specifies the air space over which LEBL control services have jurisdiction.

The training plan for the LEBL TWR is carried out such that all newly qualified personnel stand watch at every post in the TWR in the preferred configurations, as well as during configuration changes.

As evidence of compliance with the foregoing, ENAIRE's certificate as a training provider was attached.

Regarding recommendation 30/13

The UQP (Unit Qualification Plan) requires adhering to the "PROCEDURE FOR MAINTAINING PROFICIENCY IN THE TOWER, Code: A331C-12-PES-005-3.1, dated 09/04/14", according to which "There is compliance with point 3 of the "National Aviation Safety Agency's Safety Directive on the provision of air traffic control services

and maintaining proficiency”, which stipulates that the provider must ensure that all its personnel are regularly and uniformly rotated through all the posts included in the relevant unit endorsement”.

Complying with this procedure ensures that the Tower controllers regularly and uniformly stand watch at every station: LCL 07L/25R, LCL 07R/25L, GMCC, GMCN, GMCS, CLD, LCL 02/07R and TWR (all of the combined posts).

In addition, in 2013, 2014 and 2015, as specified in the 2013-2014-2015 ATC Training Plan, the following training activities are conducted annually:

- NON-STANDARD configurations, with simulator sessions involving non-preferred, and less frequent, configurations.
- LVP simulation, which practices the following configurations:
 - WRL (daytime preferred) configuration and change to WRL configuration with LVP.
 - ELR (non-preferred daytime) configuration and change to ERR (non-preferred daytime) with LVP.

Also, following the implementation of Regulation (EU) 340/2015 laying down technical requirements and administrative procedures relating to air traffic controllers’ licenses and certificates pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council, amending Commission Implementing Regulation (EU) No 923/2012 and repealing Commission Regulation (EU) No 805/2011, changes are being made to the Unit Qualification Plans (including the one for the Barcelona Tower).

Finally, as contained in the documentation sent to the CIAIAC (in the “Risk evaluation report on configuration changes at LEBL and mitigative measures” SGOP-15-INF-056-4.0), this change to the Barcelona UTP/UQP will incorporate and define aspects such as the annual training required to refresh the procedures and actions for changing configurations, the duration and contents of the training required for the various operational configurations, the definition of special and emergency situations requiring theory and/or practical training. The training will include a refresher on phraseology and the technical skills contained in the training program for supervisors.

IN-015/2014

The second event took place on 5 July 2014 at 06:52. In this case a Boeing 767-300, operated by UTAIR, was on short final to land on runway 02 at the Barcelona - El Prat Airport (LEBL). At the same time, an Airbus 340-300 operated by Aerolíneas Argentinas was crossing runway 02 where it intersects with taxiway M as it was taxiing to the runway 25R holding point for takeoff.

When the crew of the Boeing noticed the presence of the other aircraft, they decided to go around. The Airbus 340 took off normally minutes later and reached its destination. The Boeing 767 landed after doing a circuit of the aerodrome.

The investigation concluded that the cause of the incident was the sequence of a series of mistakes made at the various control posts that were not detected in time due to a lack of coordination and that occurred during the runway configuration change that takes place at the airport every day at 07:00, going from the nighttime to the daytime configuration.

Contributing to this incident is the fact that the Aerolíneas Argentinas flight was not scheduled at its usual time and that the takeoff was from a non-preferred runway, which forced it to cross the active runway on three separate occasions.

The draft report was presented for approval on 24 June 2015. After being reviewed by the Board, the version sent to the parties for comments contained a safety recommendation issued to AENA and six to ENAIRE, the first involving parking stand management and the other six with questions related to allocating rest time more equitably, improving procedures, more efficiently locating the watch stations, better integration of ATC control systems, and improved training.

After the comments were received from both AENA and ENAIRE, no safety recommendation was issued because by the time the investigation was completed, both AENA and ENAIRE had accepted the recommendations and implemented solutions that were considered satisfactory.

1.18.2. *Preliminary recommendations*

Taking into account the preceding recommendations, on 10 June 2015 three preliminary recommendations were issued and published, and a meeting with AESA and ENAIRE was held on 26 June during which the CIAIAC expressed its concern over the continued presence of the risk scenario, given that three incidents had occurred under similar circumstances.

These three preliminary recommendations are as follows:

REC 16/15. It is recommended that ENAIRE lay out a specific plan to ensure compliance with procedures during the nighttime to daytime runway configuration changes at the Barcelona-El Prat Airport.

REC 17/15. It is recommended that ENAIRE evaluate the risks associated with runway configuration changes at the Barcelona-El Prat Airport and propose mitigative measures.

REC 18/15. It is recommended that AESA, in coordination with the air navigation services provider, ENAIRE, review the evaluation of the changes associated with runway configuration changes at the Barcelona-El Prat Airport and the mitigative measures proposed.

On 10 September 2015, the CIAIAC received a letter from ENAIRE in which it replied to safety recommendations REC 16/15 and REC 17/15.

Regarding REC 16/15:

“Attached is the «Plan for complying with applicable procedures during nighttime to daytime configuration changes at the Barcelona El Prat Airport» (SGOP-15-INF-057-3.0).

Furthermore, ENAIRE has published Operational Circular S41-15-CIR-172-2.0, which includes the following measures:

- a) Crossing RWY 02 is prohibited during configuration changes from East cross-runway configurations (ENR and ENL) to parallel runway or single West runway configurations (WRL, WLL, WRR). This prohibition is applicable during the transition period between configurations, from the start of the transition until:
 - The last inbound traffic has landed on RWY 02,
 - The intersection of RWY 02 and RWY 25R is clear,
 - The RWY 25R ILS is confirmed to be operational (or if malfunctioning, that VOR approaches are in place),
 - The supervisor has individually notified each and every CTA in operational posts that crossing RWY 02 is once again permitted, an exact acknowledgment is received and the supervisor explicitly confirms that the readback is correct.
- b) Organization of the staffing of operational posts so that the watch stations associated with the runway configuration in use are fully staffed by 06:30 local time at the latest”.

The revised “Plan for complying with applicable procedures during nighttime to daytime configuration changes” establishes the following “Scope of the assurance plan”:

“The configuration change at the Barcelona-El Prat Airport is contained in the document: Procedure for configuration changes at the Barcelona-El Prat Airport, code DORE-09-DTC-011-2.1, version dated 15/02/13.

This procedure considers any configuration change and thus includes all of the possible changes that can be made at 07:00 local time, which is when the nighttime to daytime configuration change takes place at the Barcelona-El Prat Airport.

Operational Circular S41-15-CIR-172-1.0 has been in effect since 3 July 2015. This circular completes the procedure for changes from ENR/ENL → WRL/WLL/WRR, adding to the actions to take the prohibition to clear crossing RWY 02 while it is active in the nighttime configuration.

This plan for ensuring compliance guarantees the application of the procedures defined in the document "Procedure for configuration changes at the Barcelona-El Prat Airport", code DORE-09-DTC-011-2.1, version dated 15/02/13, for nighttime to daytime changes, as well as of Operational Circular S41-15-CIR-172-1.0.

After analyzing the reply, the preparation of the "Plan for complying with applicable procedures during nighttime to daytime configuration changes" complies with recommendation REC 15/16. It was proposed at the CIAIAC meeting of 26 October 2015 that this reply be considered satisfactory and the recommendation be closed out, which it was.

Regarding REC 17/15:

"Attached is the "Risk evaluation report on configuration changes at LEBL and mitigative measures" (included also in SGOP-15-INF-056-4.0), stemming from the risk evaluation process undertaken and coordinated with AESA, which lists the measures planned and adopted.

The purpose of the "Risk evaluation report on configuration changes at LEBL and mitigative measures" was to "Document the results of the initial analysis of the SEGU along with the results of the risk identification session held with operational experts at the control tower of the Barcelona - El Prat Airport on 1 July 2015, in response to the CIAIAC safety recommendation 17/15 to conduct a risk analysis associated with configuration changes at LEBL.

It also addresses the AESA requirement relayed to ENAIRE (CNA-266-2015).

The risk identification session was based on a previous initial analysis conducted by SEGU that presented theoretical fault models that were used to identify threats in three main areas. A further area was included in reference to the latent risks that exist at the station stemming from the operational environment. The approach taken by ENAIRE with the analysis was broader than recommended by the CIAIAC, and its goal was always focused around the safety recommendation (REC 16/15) on adherence to procedures.

This report analyzes the scenario before the special measures were taken to reduce incursions and pre-incursions, measures that prohibited crossing RWY 02 (S41-15-CIR-172-1.0). In other words, it analyzes the normal operation which allows re-routing traffic that includes crossing RWY 02 when it is active so as to determine the risks involved in this scenario.

To this end, a more in-depth analysis is presented of the problems with configuration changes that can trigger a safety incident. The results of the analysis can be used as part of a procedural compliance plan, but its scope goes beyond that, since it will address aspects to improve the situational awareness of controllers, technical aspects and systemic aspects.

The report lists and structures all of the elements identified as causal factors in the risk identification session, the barriers and measures proposed by participants to mitigate the general threat of «ATC deviations from ATM procedures». Complementing the report are additional documentation and analyses on aspects involving human error that were outlined during the session and subsequently developed to consider the results of the session. There are also barriers and measures that have been identified and added to the analysis with aid from the result of the session during the preparation of this report.

The report concludes by identifying possible barriers and mitigative measures that address the four identified areas of the threat. These barriers and mitigative measures were evaluated for inclusion in plans to improve the station, or they can be complemented with others not identified in that document. The result is the 2015 Action Plan.”

After analyzing the reply, it was also regarded as satisfactory and it was proposed at the CIAIAC meeting of 26 October 2015 that the recommendation be closed out, which it was.

Regarding REC 18/15:

On 11 September 2015, the reply from AESA was received, along with the supervisory report written by AESA regarding the evaluation of the risks associated with the nighttime-daytime configuration change prepared by ENAIRE, which was used to reply to safety recommendation REC 18/15.

The “Supervisory report on the evaluation of the risks associated with runway configuration changes at LEBL written by ENAIRE in response to CIAIAC REC 17/15” was reviewed, the goal of which was to “*Record and document the review activities carried out by the National Aviation Safety Agency to address CIAIAC REC 18/15 to review the evaluation of the risks associated with the runway configuration changes at*

the Barcelona-El Prat Airport and the mitigative measures proposed, the conduct of which was in turn recommended to ENAIRE through CIAIAC REC 17/15. Said documentation was generated by ENAIRE in coordination with AESA in response to the AESA requirement relayed to ENAIRE via memo Ref. CAN-266-2015".

This Commission regards AESA's response as satisfactory, since the supervisory report attached is sufficient evidence that the risks associated with runway configuration changes at the Barcelona-El Prat Airport and the mitigative measures proposed have been reviewed, as recommended to AESA in REC 18/15.

Likewise, once the reply was analyzed it was also regarded as satisfactory and it was proposed at the CIAIAC meeting of 26 October 2015 that the recommendation be closed out, which it was.

1.19. Useful or effective investigation techniques

The investigation analyzed the influence of human factors through the use of the well-known GEMS (Generic Error Modeling System) approach, which classifies error types arising from human intervention and which has proven useful in associating the behaviors of the people involved in the event with a series of patterns that have been thoroughly established through previous analyses and studies. This model differentiates between two fault types: mistakes and violations.

Mistakes occur involuntarily and may be due to execution faults (skill-based), to an incorrect interpretation of a norm (rule-based) or to incomplete/inaccurate understanding (knowledge-based). Rule-based and knowledge-based mistakes are often confused since the absence of skill and a lack of knowledge tend to have a common origin, which is a lack of procedures.

Violations, on the other hand, occur when a decision is made to deliberately violate a rule. They can be routine (partial non-compliance with a rule that we know well because we do it as a matter of habit), situational (isolated and occasional non-compliances that save work), to show off or they can be exceptional (a completely anomalous situation in a way requires violating the rule).

2. ANALYSIS

As noted in previous investigations, the Barcelona-El Prat Airport has a significant factor conditioning its operations, namely the fact that it has to change its configuration every day at 07:00 and 23:00 due to problems stemming from the environmental effect resulting from the noise generated by its activity in certain neighborhoods surrounding the airport.

This situation requires the use of the cross runway (RWY 02) from 23:00 to 07:00. The most significant problems always occur around 07:00, which is when the nighttime to daytime configuration change takes place. Shortly before, many aircraft start taxiing to take off, starting at 07:00, and while taxiing they are forced to cross runway 02, often more than once.

In other airports, it is common to have a standard configuration that on most days is dictated by the wind in the area, and to change it only occasionally.

If only the parallel runways were used, as is currently done in the daytime configuration, the high risk that is now present during the configuration changes, especially from nighttime to daytime, would be eliminated.

There is also the fact that changes in wind direction in and around the airport are frequent due to its location near the coast¹³. Other factors, along with the fact that there are three operational runways (six thresholds), mean that there can be up to twelve possible configurations, even if three of them (those involving the use of runway 20) are rarely used.

In addition, the airport has some limitations in terms of taxiing for large wingspan airplanes. Operations involving airplanes of this type have increased in recent years. These operations generally take place at certain times and coincide with peaks in both arriving and departing traffic and with the daily configuration changes.

Approximately 20% of large airplanes request to take off from the longest runway, 07L/25R, which is the runway used for landings in the preferred configuration. This hampers taxiing maneuvers and, along with the other circumstances already mentioned, places certain limits on the airport's operability and poses certain safety risks.

The combination of all these situations places significant stress on controllers, whose mission is to attempt to keep traffic flowing while maintaining optimum levels of operational safety. On top of this is the social pressure they are subjected to when, due to some circumstance stemming from the mechanics of traffic control, there is a delay

¹³ In coastal areas, sea breezes blow offshore at night and onshore during the day. This is evident in the METARs contained in this report, which show the clear change in wind direction in one hour.

in changing from the daytime from the nighttime configuration. This pressure is made even greater by legal cases that are pending in various courts.

Recently ENAIRE has adopted very specific measures that seem sufficient to mitigate those situations that could pose a risk.

Within this context, in this specific case it seems clear that the instruction given by the central ground controller to the aircraft taxiing on runway D was due to a mental lapse. This is supported by the fact that initially, when the crew saw that the stop bars were on and asked if the instruction was correct, the controller automatically replied to hold short, unaware that he had given an incorrect instruction until the captain informed him that he would report the incident. It was then that the controller admitted to having doubts as to the instruction he had given, and it was not until he heard the voice recordings that he was sure of his mistake.

One of the measures proposed by ENAIRE to avoid repeat lapses in concentration and to ensure that the controllers' situational awareness is correct at all times is to consider generating strips showing all arrivals at all ground control posts, regardless of the specific locations they are occupying and of the airplane's final destination after landing, but doing so exclusively prior to a configuration change. This would provide more information to ground controllers about the traffic that will pass through their areas and that they will have to take into consideration.

Also worth noting is the important task performed by the Supervisor and how essential their coordination efforts are. In this case the Supervisor admitted that the aircraft's movements seemed strange, but that he did not take any specific steps to ensure that the aircraft had received proper instructions.

To conclude, it should be noted that the stop bar lighting system worked perfectly and that the crew of the aircraft with callsign AFR1449 reacted as expected. Their actions helped ensure that the event remained no more than an incident.

3. CONCLUSIONS

3.1. Findings

- The Barcelona-El Prat Airport operates using two different configurations every day, one during the day (07:00-23:00) and another at all other times. This is due to concerns involving noise pollution and its effects in certain areas of nearby towns.
- During the daytime or nighttime interval, operations are carried out in different configurations, depending on the wind.
- There have been two similar prior incidents that have been investigated, as a result of which the CIAIAC issued preliminary safety recommendations to ENAIRE, which have been satisfactorily addressed.
- Three preliminary recommendations were issued at the start of the investigation to make AESA and ENAIRE aware of the problem and to have them undertake joint activities to avoid potentially dangerous situations. These recommendations were implemented and are closed out.
- At 06:53 the airplane with callsign AFR1449 was cleared to cross runway 02 by the Central Ground controller, which the crew acknowledged.
- At 06:55, when the crew of AFR1149 requested confirmation upon seeing the stop bars on, the Central Ground controller told them to hold short of the runway. It was then that the airplane with callsign TAY421J landed, passing in front of AFR1449.
- At 06:56, the airplane with callsign AFR1449 was again cleared to cross runway 02.
- At 06:57 the pilot of the airplane with callsign AFR1449 informed that he would report the incident.

3.2. Causes/Contributing factors

The investigation has concluded that the cause of the incident was that the airplane with callsign AFR1449 was cleared to cross the runway due to an oversight by the Central Ground controller.

4. SAFETY RECOMMENDATIONS

No recommendations are made in addition to the three preliminary recommendations issued in June 2015, REC 16/15, REC 17/15 and REC 18/15, all of which have been resolved satisfactorily and closed out.

