Report
IN-031/2018

Incident involving several aircraft in the airspace of the Madrid CTR (control zone) on 27 May 2018

Please note that this report is not presented in its final layout and therefore it could include minor errors or need type corrections, but not related to its content. The final layout with its NIPO included (Identification Number for Official Publications) will substitute the present report when available.

GOBIERNO DE ESPAÑA
MINISTERIO DE TRANSPORTES, MOVILIDAD Y AGENDA URBANA
SUBSECRETARÍA
COMISIÓN DE INVESTIGACIÓN DE ACCIDENTES E INCIDENTES DE AVIACIÓN CIVIL

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) nº 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.

CONTENTS

ABBREVIATIONS

° ‘ “	Sexagesimal degrees, minutes and seconds
%	Percent
°C	Degrees centigrade
ACC	Area control center
ACP	Area control procedural rating
ACS	Area control surveillance rating
ADI	Aerodrome control instrument rating
ADV	Aerodrome control visual rating
AEMET	National Weather Agency
AESA	National Aviation Safety Agency
AIP	Aeronautical information publication
AIR	Air control endorsement
ANAC	Portuguese National Civil Aviation Authority
APP	Approach control
APS	Approach control surveillance rating
ATC	Air traffic control
ATIS	Automated terminal information system
ATPL	Airline transport pilot license
ATS	Air traffic service
CPL	Commercial pilot license
ATCO	Air traffic controller
CTR	Control zone
DME	Distance measuring equipment
EAT	Estimated approach time
EMA	Air Force Staff
FIR	Flight information region
FL	Flight level
ft	Feet
GMC	Ground movement control endorsement
GMS	Ground movement surveillance endorsement
h	Hours
hPa	Hectopascals
IAA	Irish Aviation Authority
IAS	Indicated airspeed
IFR	Instrument flight rules
ILS	Instrument landing system
INAC	Portuguese National Civil Aviation Institute
IR	Instrument rating
km	Kilometers
kt	Knots

LECM	Madrid FIC/ACC
LEMD	Adolfo Suárez Madrid-Barajas Airport
LETO	Madrid-Torrejón Airport
LOC	Localizer
m	Meters
ME	Multi-engine rating
METAR	Aerodrome routine meteorological report
MLS	Microwave landing system
NDB	Non-directional beacon
NM	Nautical miles
ICAO	International Civil Aviation Organization
OCN	Oceanic control endorsement
PAR	Precision approach radar endorsement
RAD	Radar endorsement
RWY	Runway
s	Seconds
SACTA	Automated Air Traffic Control System
SPECI	Special aerodrome weather report
SRA	Surveillance radar approach endorsement
STAR	Standard terminal arrival route
TA	Traffic alert
TACC	Terminal area control center
TAF	Terminal area forecast
TCAS	Traffic collision avoidance system
TCL	Terminal control endorsement
TMA	Terminal control area
TREND	Trend forecast
TWR	Control tower
UCATM	ATM central unit
UCS	Sector control unit
UTC	Coordinated universal time
VOR	VHF Omni-directional range
W	West

Synopsis

Aircraft #1:

Owner:	Wells Fargo Bank Northwest
Operator:	TAP Air Portugal
Aircraft:	Airbus A-320, registration CS-TNQ
Persons on board:	6 crew and 166 passengers, no injuries
Type of flight:	Commercial air transport – Scheduled – International – Passenger
Phase of flight:	Approach
Type of operation:	**I**FR

Aircraft #2:

Owner:	ACY SN 19003 Limited
Operator:	Air Nostrum
Aircraft:	Bombardier CL600 2E25, registration EC-LJS
Persons on board:	4 crew and 80 passengers, no injuries
Type of flight:	Commercial air transport – Scheduled – Domestic – Passenger
Phase of flight:	Approach
Type of operation:	IFR

Aircraft #3:

Owner:	Ryanair Designated Activity Company
Operator:	Ryanair
Aircraft:	Boeing 737-800, registration EI-FZR
Persons on board:	# of crew N/A, 170 passengers, no injuries
Type of flight:	Commercial air transport – Scheduled – International – Passenger
Phase of flight:	Approach
Type of operation:	**I**FR

Aircraft #4:

Owner:	ACY SN 19002 Limited
Operator:	Air Nostrum
Aircraft:	Bombardier CL600 2E25, registration EC-LJR
Persons on board:	4 crew and 93 passengers, no injuries
Type of flight:	Commercial air transport – Scheduled – International – Passenger
Phase of flight:	Approach
Type of operation:	IFR

Aircraft #5:

Owner:	SMBC Aviation Capital Limited
Operator:	Iberia Express
Aircraft:	Airbus A-320, registration EC-LYM
Persons on board:	6 crew and 169 passengers, no injuries
Type of flight:	Commercial air transport – Scheduled – International – Passenger
Phase of flight:	Approach
Type of operation:	**I**FR

Aircraft #6:

Owner:	Ryanair Designated Activity Company
Operator:	Ryanair
Aircraft:	Boeing 737-800, registration EI-FTY
Persons on board:	# of crew N/A, 176 passengers, no injuries
Type of flight:	Commercial air transport – Scheduled – International – Passenger
Phase of flight:	Approach
Type of operation:	IFR

Aircraft #7:

Owner:	N/A
Operator:	Air Europa Líneas Aéreas
Aircraft:	Boeing 737-800, registration EC-LXV
Persons on board:	6 crew and 136 passengers, no injuries
Type of flight:	Commercial air transport – Scheduled – Domestic – Passenger
Phase of flight:	Approach
Type of operation:	**I**FR

Aircraft #8:

Owner:	N/A
Operator:	Air Europa Líneas Aéreas
Aircraft:	Airbus A330-200, registration EC-LVL
Persons on board:	10 crew and 208 passengers, no injuries
Type of flight:	Commercial air transport – Scheduled – International – Passenger
Phase of flight:	Approach
Type of operation:	IFR

Date and time of incident: 27 May 2018, 21:30 – 22:00[1]

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

Site of incident: In the airspace of the Madrid CTR (control zone)
Date of approval: **18 December 2019**

Summary of the event:

On Sunday, 27 May 2018, from 21:30 to 22:00, there were several losses of separation between aircraft in the Madrid CTR (control zone) as they were approaching the airport.

Before that, between 20:47 and 20:57, seven consecutive go-arounds occurred due to weather conditions; specifically, a sudden convective current that caused tailwind and wind shear. Due to the sudden change in wind speed and direction, the airport's configuration was changed. The airport, which had been in a North Configuration before the event, changed to a South Configuration at 20:54.

The aforementioned seven go-arounds, the adverse weather conditions and the change in the airport's configuration complicated the air traffic management and gave rise to these losses of separation, which are analyzed in this report.

None of the crews and passengers of the aircraft involved in the various losses of separation received any kind of injury.

The aircraft did not sustain damage of any kind.

The investigation has determined that these losses of separation were caused by the complex operational situation in the airspace of the Madrid TMA.

The following contributed to the incident:

- The unavailability of weather information tools that cover the entire airspace of the Madrid TMA.
- The sudden change in weather conditions, and specifically, in the wind speed and direction.
- The time needed to make the decision to change the runway configuration.

1. FACTUAL INFORMATION

1.1. History of the flight

On Sunday, 27 May 2018, between 20:47 and 20:57, seven consecutive go-arounds occurred at the Madrid-Barajas Adolfo Suárez Airport due to weather conditions:

- Aircraft with callsign RYR83BB executed a missed approach to runway 32R at 20:47.
- Aircraft with callsign RYR83BB executed a missed approach to runway 32R at 20:47.
- Aircraft with callsign EZY21VX executed a missed approach to runway 32L at 20:48.
- Aircraft with callsign EZY78EV executed a missed approach to runway 32L at 20:50.
- Aircraft with callsign DLH64K executed a missed approach to runway 32R at 20:54.
- Aircraft with callsign IBE32EC executed a missed approach to runway 32L at 20:54
- Aircraft with callsign WZZ6UC executed a missed approach to runway 32R at 20:55
- Aircraft with callsign ENT565 executed a missed approach to runway 32R at 20:57

The aircraft had to execute a missed approach due to the sudden change in wind speed and direction.

Due to the sudden change in wind speed and direction originated the airport's configuration was changed.

The airport, which had been in a North Configuration before the event, changed to a South Configuration at 20:54.

Subsequently, from 21:30 to 22:00, there were several losses of separation between aircraft in the Madrid CTR (control zone) as they were approaching the airport. The aforementioned seven go-arounds, the adverse weather conditions and the change in the airport's configuration complicated the air traffic management and gave rise to these losses of separation, which are analyzed in this report.

None of the crews and passengers of the aircraft involved in the various losses of separation received any kind of injury.

The aircraft did not sustain damage of any kind.

1.2. Injuries to persons

Injuries to persons on board the Airbus A320, registration CS-TNQ

Injuries	**Crew**	**Passengers**	**Total in the aircraft**	**Other**
Fatal				
Serious				
Minor				N/A

None	6[2]	166	172	N/A
TOTAL	6	166	172	

Injuries to persons on board the Bombardier CL600 2E25, registration EC-LJS

Injuries	**Crew**	**Passengers**	**Total in the aircraft**	**Other**
Fatal				
Serious				
Minor				N/A
None	4[3]	80	84	N/A
TOTAL	4	80	84	

Injuries to persons on board the Boeing 737-800, registration EI-FZR

Injuries	**Crew**	**Passengers**	**Total in the aircraft**	**Other**
Fatal				
Serious				
Minor				N/A
None	N/A	170	N/A	N/A
TOTAL	N/A	170	N/A	

Injuries to persons on board the Bombardier CL600 2E25, registration EC-LJR

Injuries	**Crew**	**Passengers**	**Total in the aircraft**	**Other**
Fatal				
Serious				
Minor				N/A
None	4[4]	93	97	N/A
TOTAL	4	93	97	

Injuries to persons on board the Airbus A-320, registration EC-LYM

Injuries	**Crew**	**Passengers**	**Total in the aircraft**	**Other**
Fatal				
Serious				
Minor				N/A
None	6[5]	169	175	N/A

[2] 2 flight crew and 4 cabin crew

[3] 2 flight crew and 2 cabin crew

[4] 2 flight crew and 2 cabin crew

[5] 2 flight crew and 4 cabin crew

TOTAL	6	169	175	

Injuries to persons on board the Boeing 737-800, registration EI-FTY

Injuries	**Crew**	**Passengers**	**Total in the aircraft**	**Other**
Fatal				
Serious				
Minor				N/A
None	N/A	176	N/A	N/A
TOTAL	N/A	176	N/A	

Injuries to persons on board the Boeing 737-800, registration EC-LXV

Injuries	**Crew**	**Passengers**	**Total in the aircraft**	**Other**
Fatal				
Serious				
Minor				N/A
None	6[6]	136	142	N/A
TOTAL	6	136	142	

Injuries to persons on board the Airbus A330-200, registration EC-LVL

Injuries	**Crew**	**Passengers**	**Total in the aircraft**	**Other**
Fatal				
Serious				
Minor				N/A
None	10[7]	208	218	N/A
TOTAL	10	208	218	

1.3. Damage to aircraft

The aircraft were not damaged.

1.4. Other damage

There was no other damage.

1.5. Personnel information

Information on the crew of the Airbus A320, registration CS-TNQ

[6] 2 flight crew and 4 cabin crew

[7] 2 flight crew and 8 cabin crew

The pilot, a 48-year-old Portuguese national, had an airline transport pilot license (ATPL(A)) issued on 2 June 2009 by INAC, the Portuguese civil aviation authority, and A320 and IR(ME) ratings, which were valid until 31 March 2019.

The pilot had a class-1 medical certificate that was valid until 24 February 2019.

The copilot, a 39-year-old Portuguese national, had an airline transport pilot license (ATPL(A)) issued on 1 September 2016 by ANAC, the Portuguese civil aviation authority, and A320 and IR(ME) ratings, which were valid until 28 February 2019.

The copilot had a class-1 medical certificate that was valid until 1 March 2019.

Information on the crew of the Bombardier CL600 2E25, registration EC-LJS

The pilot, a 47-year old Spanish national, had several licenses, including an airline transport pilot license (ATPL(A)) issued on 16 April 2002 by AESA and CRJ100 and IR(A) ratings, which were valid until 30 June 2019.

The pilot had a class-1 medical certificate that was valid until 10 July 2019.

The copilot, a 43-year old Spanish national, had several licenses, including an airline transport pilot license (ATPL(A)) issued on 11 May 2012 by AESA and CL65 and IR(A) ratings, which were valid until 28 February 2019.

The copilot had a class-1 medical certificate that was valid until 28 February 2019

Information on the crew of the Boeing 737-800, registration EI-FZR

This information was requested during the investigation into the incident but was not provided.

Information on the crew of the Bombardier CL600 2E25, registration EC-LJR

The pilot, a 47-year old Spanish national, had several licenses, including an airline transport pilot license (ATPL(A)) issued on 1 December 2003 by AESA and CL65 and IR(A) ratings, which were valid until 31 May 2019.

The pilot had a class-1 medical certificate that was valid until 6 April 2019.

The copilot, a 42-year old Spanish national, had several licenses, including an airline transport pilot license (ATPL(A)) issued on 16 February 2009 by AESA and CL65 and IR(A) ratings, which were valid until 31 January 2019.

The pilot had a class-1 medical certificate that was valid until 22 February 2019.

Information on the crew of the Airbus A-320, registration EC-LYM

The pilot, a 37-year old Spanish national, had several licenses, including an airline transport pilot license (ATPL(A)) issued on 22 December 2009 by AESA and A320 and IR(A) ratings, which were valid until 28 February 2019.

The pilot had a class-1 medical certificate that was valid until 26 April 2019.

The copilot, a 40-year old Spanish national, had a commercial pilot license CPL(A) issued on 9 December 2010 by AESA and A320 and IR(A) ratings, which were valid until 31 December 2018.

The copilot had a class-1 medical certificate that was valid until 6 June 2019.

Information on the crew of the Boeing 737-800, registration EI-FTY

This information was requested during the investigation into the incident but was not provided.

Information on the crew of the Boeing 737-800, registration EC-LXV

The pilot, a 48-year old Spanish national, had several licenses, including an airline transport pilot license (ATPL(A)) issued on 25 October 2001 by AESA and B737 300-900/IR(A) ratings, which were valid until 31 December 2018.

The pilot had a class-1 medical certificate that was valid until 27 September 2018.

The copilot, a 36-year old Spanish national, had a commercial pilot license (CPL(A)) issued on 16 January 2013 by AESA and B737 300-900/IR(A) ratings, which were valid until 30 April 2019.

The copilot had a class-1 medical certificate that was valid until 6 April 2018. It is not known if the copilot had a valid medical certificate at the time of the incident.

Information on the crew of the Airbus A330-200, registration EC-LVL

The pilot, a 46-year old Spanish national, had several licenses, including an airline transport pilot license (ATPL(A)) issued by AESA and A-330 and IR(A) ratings, which were valid until 30 June 2019.

The pilot had a class-1 medical certificate that was valid until 14 March 2019.

The copilot, a 45-year old Spanish national, had several licenses, including an airline transport pilot license (ATPL(A)) issued on 18 February 2004 by AESA and A-330 and IR(A) ratings, which were valid until 31 May 2019.

The copilot had a class-1 medical certificate that was valid until 12 October 2018.

Information on the executive controller in the Madrid LEMDAFS sector

The executive controller, a 46-year-old Spanish national, had a license with an initial issue date of 12 December 2002, with the following ratings: ADV, ADI (with AIR, GMC, TWR, GMS and RAD endorsements), APP, APS (with PAR, SRA and TCL endorsements), ACP (with OCN endorsement) and ACS (with TCL and OCN endorsements). For the LECM unit, he had an APS rating with an expiration date of 3 January 2019.

He had a class-3 medical certificate with an expiration date of 22 March 2019.

Information on the planning controller in the Madrid LEMDAFS sector

The planning controller, a 49-year-old Spanish national, had a license with an initial issue date of 16 June 2000, with the following ratings: ADV, ADI (with AIR, GMC, TWR, GMS and RAD endorsements), APP, APS (with PAR, SRA and TCL endorsements), ACP (with OCN endorsement) and ACS (with TCL and OCN endorsements). For the LECM unit, he had an APS rating with an expiration date of 22 September 2019.

He had a class-3 medical certificate with an expiration date of 8 July 2019.

1.6. Aircraft information

Information on the Airbus A320-214, registration CS-TNQ

The Airbus A-320-214, registration CS-TNQ and serial number 3769, was recorded in INAC's registry on 10 February 2009.

It has an airworthiness review certificate that was valid until 27 September 2018.

Information on the Bombardier CL600 2E25, registration EC-LJS

The Bombardier CL-600-2E25, registration EC-LJS and serial number 19003, was built in 2010 and recorded in AESA's registry on 28 April 2011. It has two General Electric CF34-8C5 engines.

It has a certificate of airworthiness issued by AESA and an airworthiness review certificate that was valid until 14 December 2018.

Information on the Boeing 737-800, registration EI-FZR

The Boeing 737-800, registration EI-FZR and serial number 44792, was built in 2017 and recorded in the registry of the Irish Aviation Authority (IAA) on 10 May 2017. It has two CFM CFM56-7B26E engines.

It has a certificate of airworthiness issued by IAA and an airworthiness review certificate that was valid until 9 May 2019.

Information on the Bombardier CL600 2E25, registration EC-LJR

The Bombardier CL-600-2E25, registration EC-LJR and serial number 19002, was built in 2010 and recorded in AESA's registry on 25 April 2011. It has two General Electric CF34-8C5 engines.

It has a certificate of airworthiness issued by AESA and an airworthiness review certificate that was valid until 14 December 2018.

Information on the Airbus A-320-216, registration EC-LYM

The Airbus A-320-216, registration EC-LYM and serial number 5815, was built in 2013 and recorded in AESA's registry on 27 February 2014. It has two CFM CFM-56-5B6/3 engines.

It has a certificate of airworthiness issued by AESA and an airworthiness review certificate that was valid until 30 October 2018

Information on the Boeing 737-800, registration EI-FTY

The Boeing 737-800, registration EI-FTY and serial number 44772, was built in 2017 and recorded in the registry of the Irish Aviation Authority (IAA) on 22 February 2017. It has two CFM CFM56-7B26E engines.

It has a certificate of airworthiness issued by IAA and an airworthiness review certificate that was valid until 21 February 2019.

Information on the Boeing 737-800, registration EC-LXV

The Boeing 737-800, registration EC-LXV and serial number 36594, was built in 2013 and recorded in the AESA registry on 27 January 2014. It has two CFM CFM56-7B26/E engines.

It has a certificate of airworthiness issued by Spain's Civil Aviation General Directorate and an airworthiness review certificate that was valid until 30 October 2018.

Information on the Airbus A330-200, registration EC-LVL

The Airbus A330-200, registration EC-LVL and serial number 0461, was built in 2003 and recorded in the AESA registry on 7 June 2013. It has two Rolls Royce Corporation Trent 772-B60 engines.

It has a certificate of airworthiness issued by Spain's Civil Aviation General Directorate and an airworthiness review certificate that was valid until 2 May 2019.

1.7. Meteorological information

Information provided in the METARs:

METAR LEMD 272130Z 06004KT 020V110 9999 FEW045 BKN070 16/13 Q1015 NOSIG=

METAR LEMD 272100Z 12009KT 9999 FEW045 BKN070 17/12 Q1015 NOSIG=

METAR LEMD 272030Z 12009KT 080V150 9999 FEW047CB BKN070 17/12 Q1014 NOSIG=

METAR LEMD 272000Z 13012KT 9999 FEW047CB BKN070 18/13 Q1014 NOSIG=

METAR LEMD 271930Z 13012KT 9999 FEW047CB BKN070 18/13 Q1013 NOSIG=

METAR LEMD 271900Z 12007G17KT 9999 VCTS FEW050CB BKN070 20/12 Q1013 BECMG NSW=

METAR LEMD 271830Z 30011KT 270V330 9999 VCTS FEW050CB BKN070 22/10 Q1012 TEMPO TS=

SPECI LEMD 271819Z 29011KT 270V330 9999 VCTS FEW060CB BKN070 22/10 Q1012 TEMPO TS=

SPECI LEMD 271815Z 29011KT 9999 FEW060CB SCT075 22/10 Q1012 NOSIG=

METAR LEMD 271800Z 27011KT 9999 FEW060 SCT075 23/09 Q1012 NOSIG=

METAR LEMD 271730Z 27013KT 9999 FEW060 SCT077 23/10 Q1012 NOSIG=

METAR LEMD 271700Z 28009G20KT 240V330 9999 FEW060 SCT077 25/10 Q1011 NOSIG=

The aerodrome forecast in effect was as follows:

TAF LEMD 271700Z 2718/2824 25006KT 9999 FEW045 TX24/2718Z TN13/2824Z TEMPO 2718/2818 SCT025TCU ***PROB40 TEMPO 2718/2724 VRB15G27KT 4000 TS SHRA SCT025CB*** *TEMPO 2800/2818 4000 RA SHRA FEW025 SCT030TCU PROB40 TEMPO 2811/2818 VRB15G27KT 4000 TS SHRA SCT025CB=*

The METARs indicate that from 19:00 (17:00 UTC) until 20:30 (18:30 UTC), the wind direction ranged from 270º to 330º. The 21:00 (19:00) METAR shows that the wind underwent a large, 120º swing in direction. In later METARs, the wind direction varied slightly, and was from 130º. In other words, starting at 21:00 (19:00 UTC), the surface wind changed direction, having previously been from the west and then shifting to the southeast due to storm activity to the east (over Cuenca).

During the time interval shown, the wind speed ranged from 4 to 13 knots. Two of the METARs, one of them from 21:00 (19:00 UTC), warned of gusts.

The stormy activity only approached the airport between 20:19 and 20:30, which correspond to the SPECI and METAR with TREND pointing out the possibility that the surrounding storms would approach the airport. Which did not happen, although the gust front coming from the storms mentioned affected it. Specific, at 20:19, a SPECI[8] message was issued

[8] In Spain, as indicated in the AIP, aerodromes with half-hourly METARs will issue a SPECI (special aerodrome report) for visibility, significant weather phenomena, altitude of base clouds and number of cloud layers using the criteria included in the AIP. However, for a sudden change in wind speed or direction, a SPECI is not issued.

TREND report is appended at the end of the METAR o SPECI report to inform of the expected significant changes in the aerodrome meteorological conditions. It is a tendency forecast for landing. It is valid for 2 hours. The TREND report is issued when:

warning of broken clouds at 7,000 feet and thunderstorms in the vicinity of the airport. Starting at 21:30 (19:30 UTC), the METARs stopped warning of storms, although they still warned of broken clouds at 7,000 ft. As a result, at the time of the incident, cumulonimbus clouds were still present. Remote imaging showed storm activity to the southeast and, to a lesser degree, to the northeast (in the province of Guadalajara and the Guadarrama mountains).

The 19:00 (17:00 UTC) TAF indicated a 40% probability of rainstorms, a surface wind speed of 15 knots, gusting to 27 knots, and scattered cumulonimbus at 2,500 feet.

20 UTC low-level map is included:

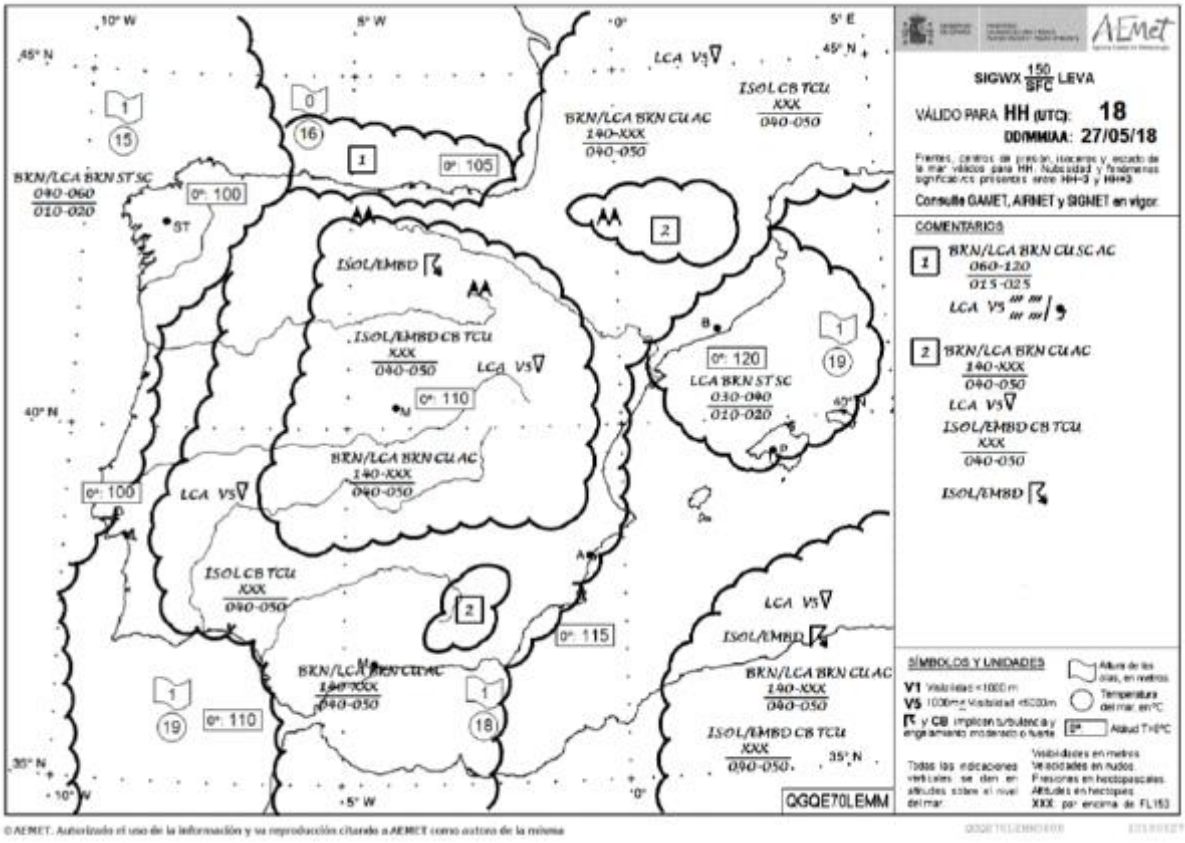


Ilustración 1: 18 UTC Low-level map

AEMET thinks it likely that given these conditions over the area, there would have been at least moderate turbulence associated with the proximity to the storm area. Therefore, turbulence could have contributed to the incident, according to AEMET.

1. Surface wind:

a) A change in the mean wind direction of 60º or more, the mean speed before and/or after the change being 5 m/s (10 kt) or more;

b) A change in the mean wind speed of 5 m/s (10 kt) or more;

c) Changes in the wind through values of operational significance.

In addition, with the LEMD airport in North configuration, it is forecast that the tail component in the runway direction of the mean wind speed and/or wind gusts shall change to 10 kt or more 32 and/or 36 on thresholds.

1.8. Aids to navigation

The most significant moments from the radar tracks for the aircraft involved in the various losses of separation are provided below.

Loss of Separation A.

Loss of separation A involved the Airbus A-320, with registration CS-TNQ and callsign TAP1018, and the Bombardier CL600 2E25, with registration EC-LJS and callsign ANE99DJ.

The image below shows the position of the two aircraft at 21:33:30. At that time, both aircraft were descending to land, TAP1018 on runway 18R and ANE99DJ on runway 18L.

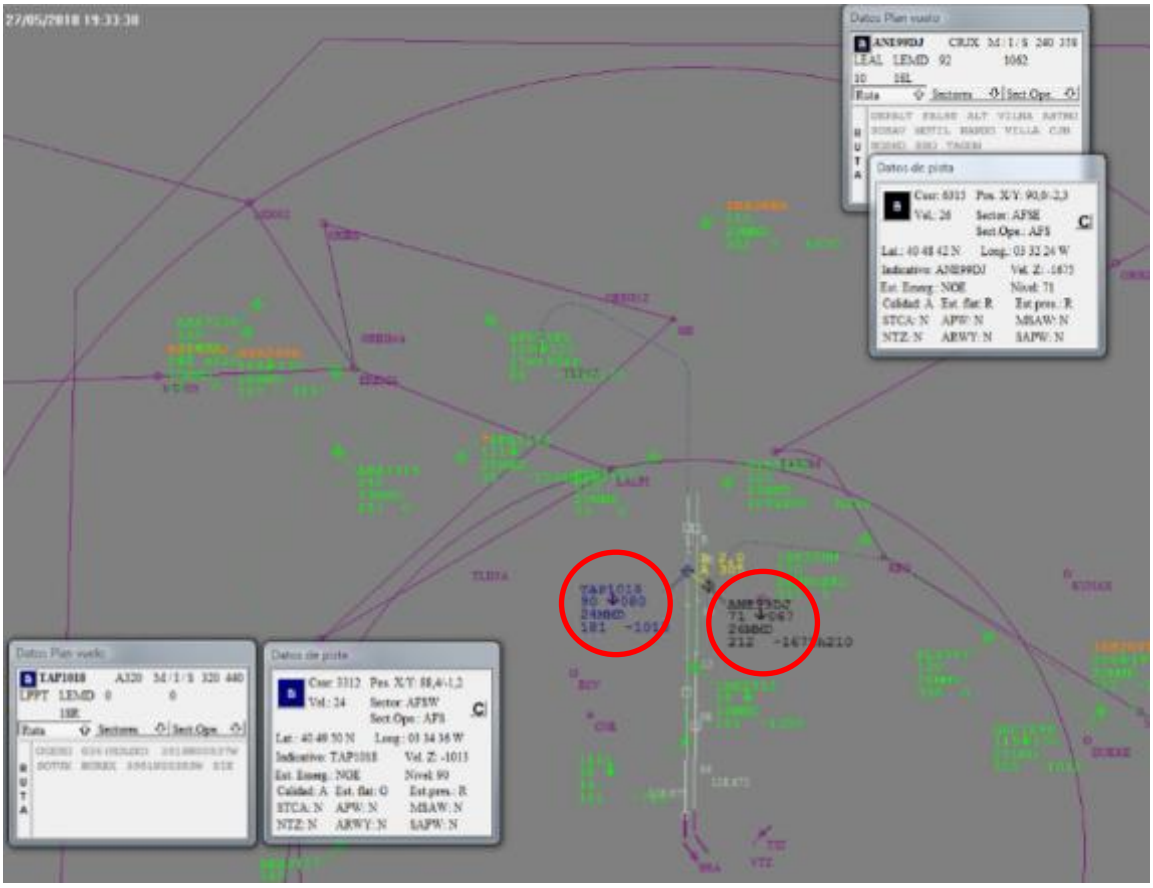


Illustration 2: Positions of the aircraft with callsigns TAP1018 and ANE99DJ at 21:33

At 21:34:06, the aircraft were still descending to land. The horizontal distance between them was 1.3 NM. The aircraft with callsign TAP1018 was flying at a ground speed of 240 knots, and the aircraft with callsign ANE99DJ had a ground speed of 250 knots. Both aircraft had been instructed to reduce their IAS to 180 knots:

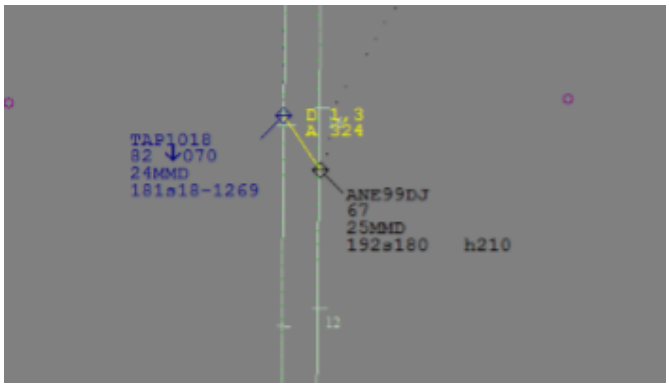


Illustration 3: Positions of the aircraft with callsigns TAP1018 and ANE99DJ at 21:34

At 21:34:43, the aircraft with callsign TAP1018 was instructed to reduce its IAS to 160 knots.

By 21:35:58, the horizontal distance between the aircraft had been reduced to 0.9 NM and the vertical distance was 900 feet. The aircraft with callsign TAP1018 had a ground speed of 190 knots and the aircraft with callsign ANE99DJ had a ground speed of 170 knots:

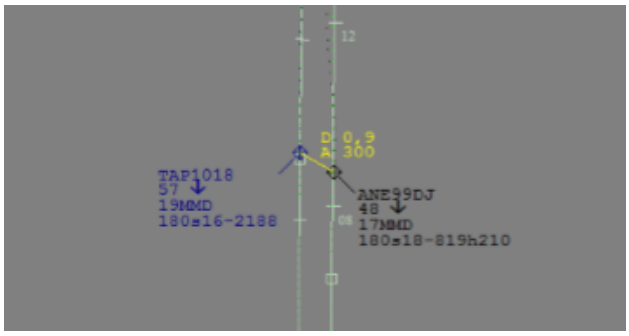


Illustration 4: Positions of the aircraft with callsigns TAP1018 and ANE99DJ at 21:35

At 21:36:59, the horizontal distance between the aircraft was 0.8 NM and the vertical separation was 200 feet. Both aircraft had been instructed to reduce their IAS to 160 knots. The aircraft with callsign TAP1018 had a ground speed of 160 knots and the aircraft with callsign ANE99DJ had a ground speed of 170 knots:

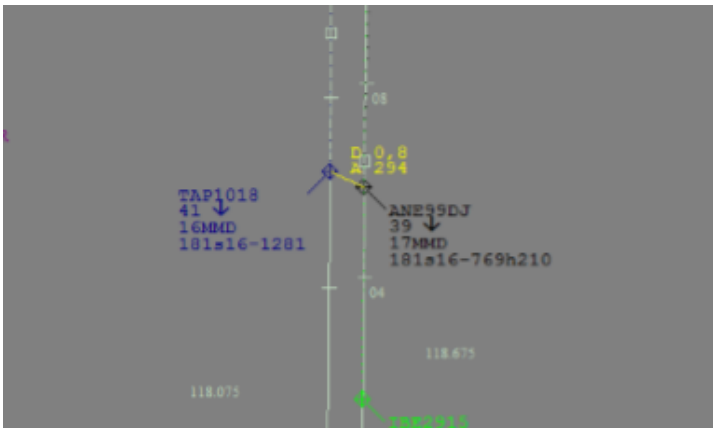


Illustration 5: Positions of the aircraft with callsigns TAP1018 and ANE99DJ at 21:36

Subsequently, the vertical distance between the two increased. At 21:37:58, seconds before landing, the positions of the aircraft were:

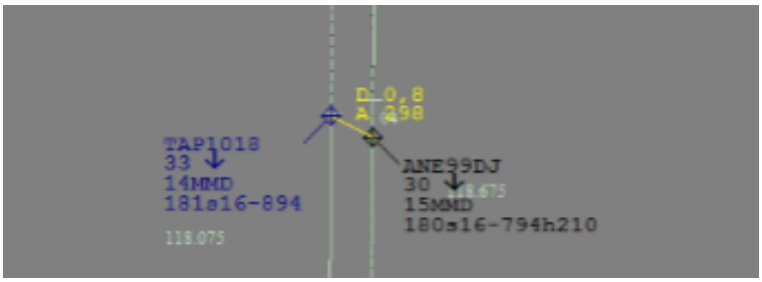


Illustration 6: Positions of the aircraft with callsigns TAP1018 and ANE99DJ at 21:37

Loss of Separation B.

Loss of separation B involved the Boeing 737-800, with registration EI-FZR and callsign RYR290B, and the Bombardier CL600 2E25, with registration EC-LJR and callsign ANE8825.

The image below shows the position of the two aircraft at 21:46:11. At that time, both aircraft were descending to land, RYR290B on runway 18R and ANE8825 on runway 18L.

Illustration 7: Positions of the aircraft with callsigns RYR290B and ANE8825 at 21:46:11

At 21:48:48, the aircraft were separated horizontally by 4.1 NM. The ground speed of the aircraft with callsign RYR290B was 250 knots, and the aircraft with callsign ANE8825 had a ground speed of 200 knots.

The aircraft with callsign RYR290B had been instructed to reduce its IAS to 180 knots, and the aircraft with callsign ANE8825 had been instructed to reduce its IAS to 160 knots:

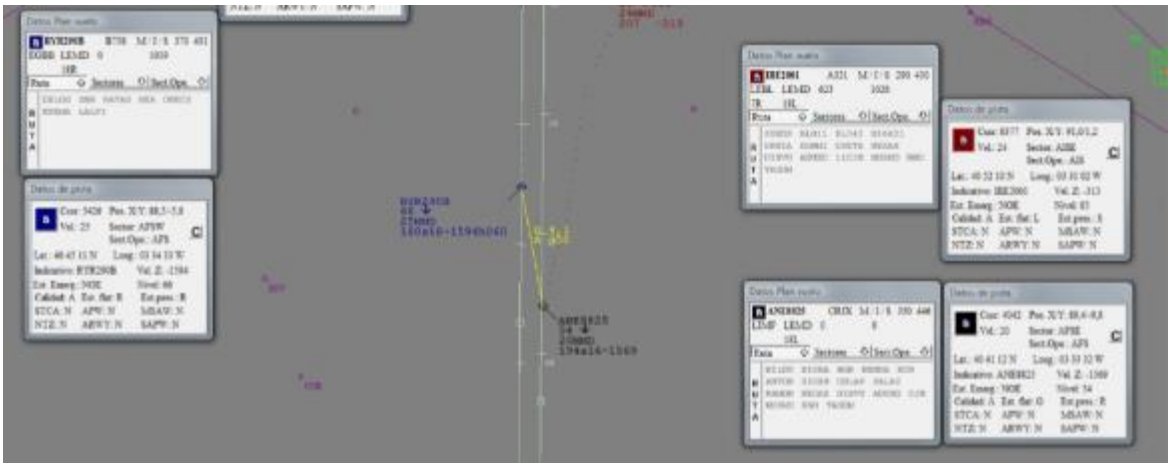


Illustration 8: Positions of the aircraft with callsigns RYR290B and ANE8825 at 21:48:48

Subsequently, by 21:50:33, the horizontal distance between the two aircraft had fallen to 1.9 NM and the vertical distance to 600 feet. The aircraft with callsign RYR290B had been instructed to reduce its IAS to 160 knots:

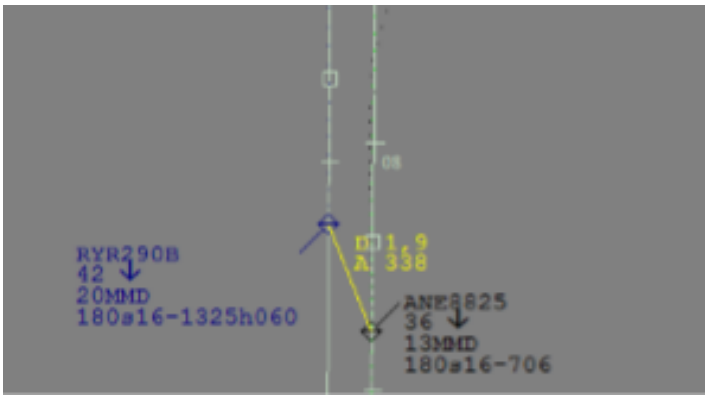


Illustration 9: Positions of the aircraft with callsigns RYR290B and ANE8825 at 21:50:33

At 21:51:38, the horizontal distance between the two aircraft was 1.4 NM and the vertical distance was 500 feet:

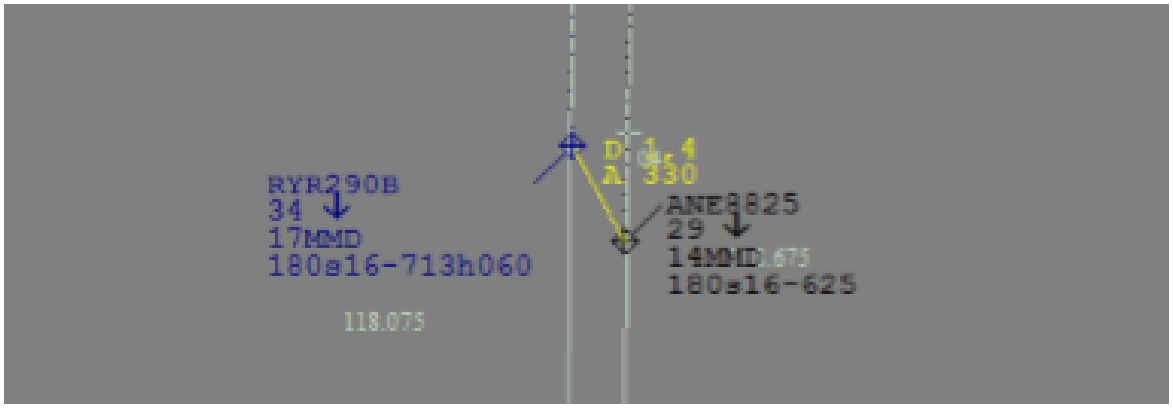


Illustration 10: Positions of the aircraft with callsigns RYR290B and ANE8825 at 21:51:38

The separation between the aircraft continued to fall until seconds before the landing of the aircraft with callsign ANE8825, at which time the horizontal distance was 1.2 NM and the vertical distance was 325 feet.

Loss of Separation C.

Loss of separation C involved the Airbus A-320-216, with registration EC-LYM and callsign IBS36BK, and the Boeing 737-800, with registration EI-FTY and callsign RYR54AH.

The image below shows the position of the two aircraft at 21:52:03. A few seconds later, the aircraft with callsign RYR54AH had requested to change course from 205º to 180º for 6 NM. Both aircraft had been instructed to maintain an IAS of 180 knots:

Illustration 11: Positions of the aircraft with callsign RYR54AH and IBS36BK at 21:52:03

At 21:52:30, the positions of the aircraft were as follows:

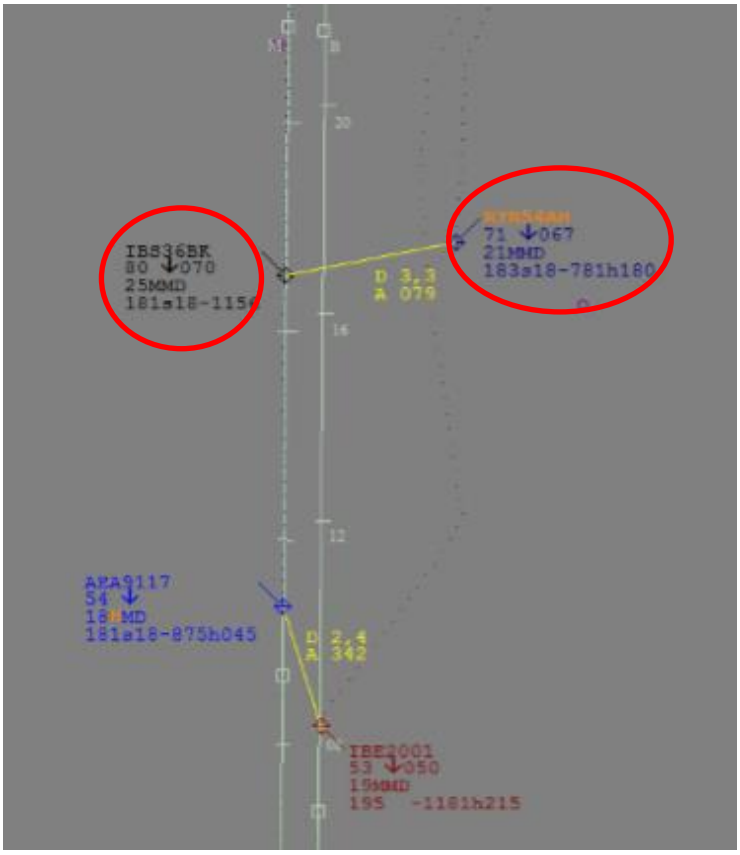


Illustration 12: Positions of the aircraft with callsign RYR54AH and IBS36BK at 21:52:30

At 21:55:19, the aircraft with callsign RYR54H, despite having been cleared to make the ILS-Z approach to 18L, had not yet intercepted the localizer. It was separated horizontally from the other aircraft by 1.9 NM. It had been instructed to reduce its IAS to 165 knots.

The aircraft with callsign IBS36BK had initially been instructed to reduce its IAS to 170 knots, and then to reduce it as much as possible to avoid the loss of separation with the preceding aircraft:

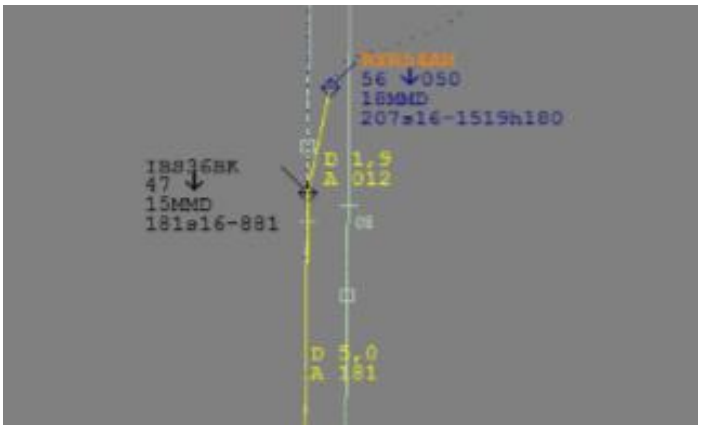


Illustration 13: Positions of the aircraft with callsign RYR54AH and IBS36BK at 21:55:19

By 21:55:45, the aircraft with callsign RYR54AH had intercepted the localizer for the 18L ILS-Z approach. The horizontal distance between the two aircraft had fallen to 1.8 NM.

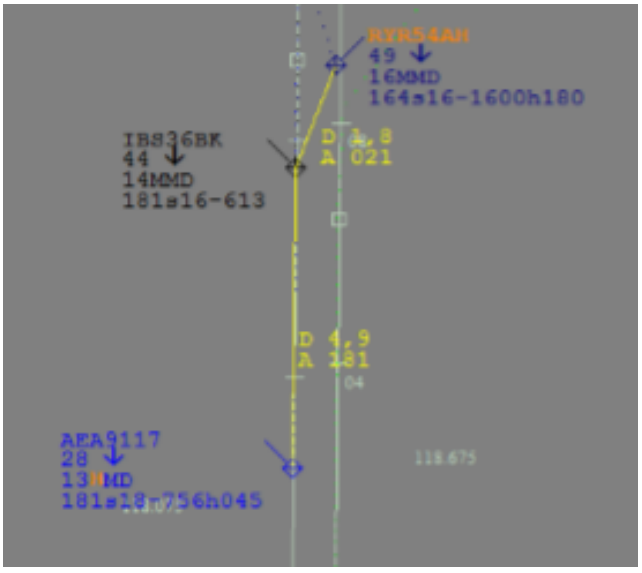


Illustration 14: Positions of the aircraft with callsign RYR54AH and IBS36BK at 21:55:45

By 21:56:54, the horizontal distance between the two aircraft had fallen to 1.3 NM:

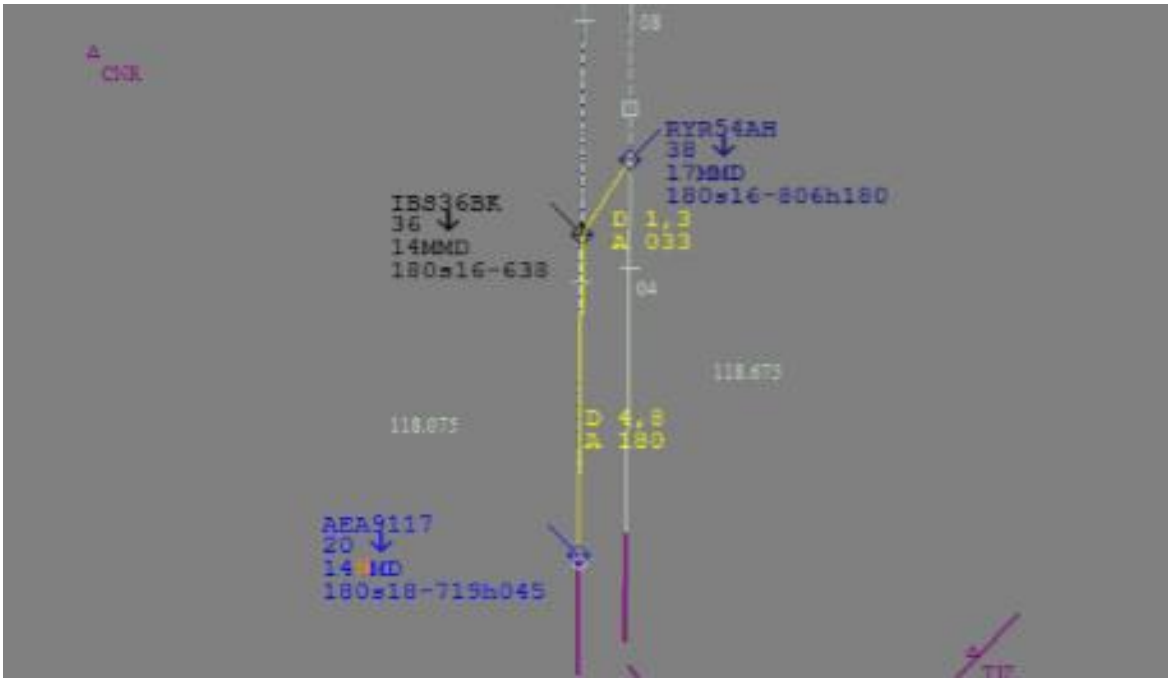


Illustration 15: Positions of the aircraft with callsign RYR54AH and IBS36BK at 21:56:54

By 21:57:31, the horizontal distance between the two aircraft had again fallen, this time to 1.1 NM:

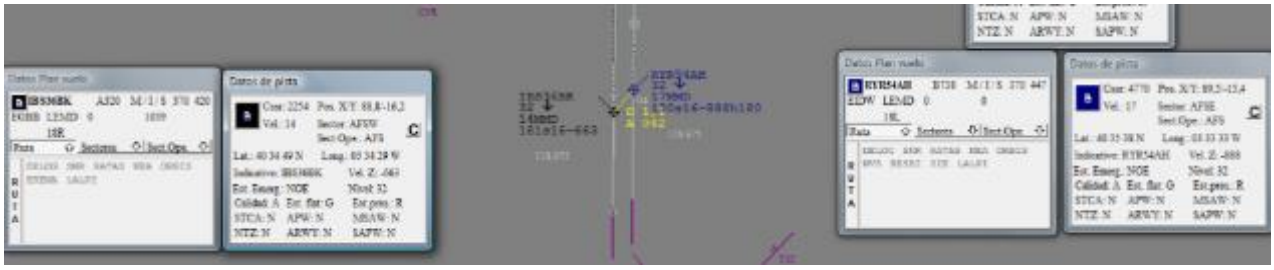


Illustration 16: Positions of the aircraft with callsign RYR54AH and IBS36BK at 21:57:31

Seconds before landing, at 21:58:24, the horizontal distance between the two aircraft was 0.9 NM. Both aircraft were at the same altitude:

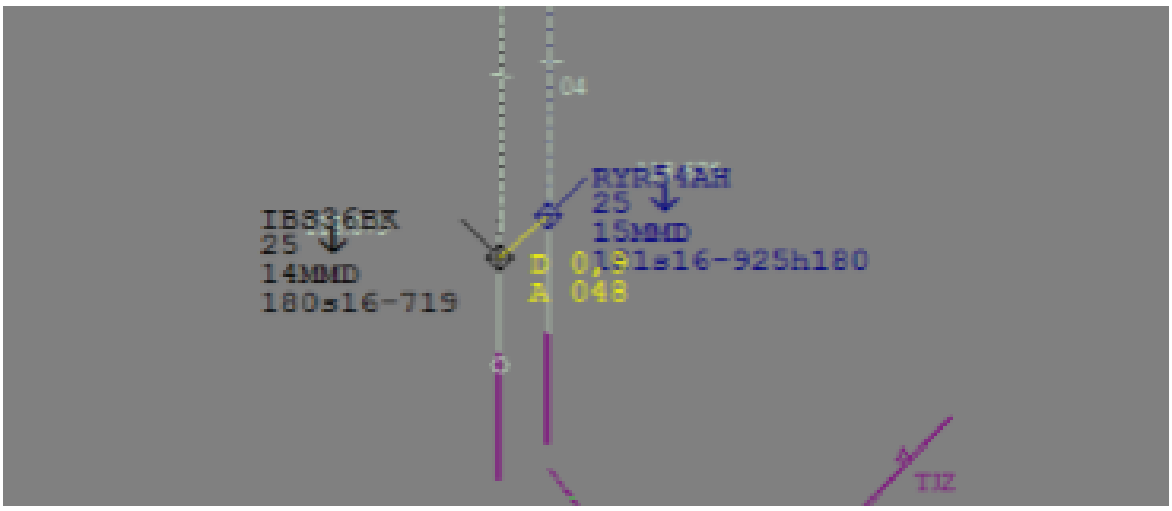


Illustration 17: Positions of the aircraft with callsign RYR54AH and IBS36BK at 21:58:24

Loss of Separation D.

Loss of separation D refers to that involving the Boeing 737-800, registration EC-LXV and callsign AEA5BN, and the Airbus A330-200, registration EC-LVL and callsign AEA7EY.

The image below shows the position of the aircraft at 21:57:31. The aircraft with callsign AEA5BN had been instructed to maintain an IAS of 180 knots:

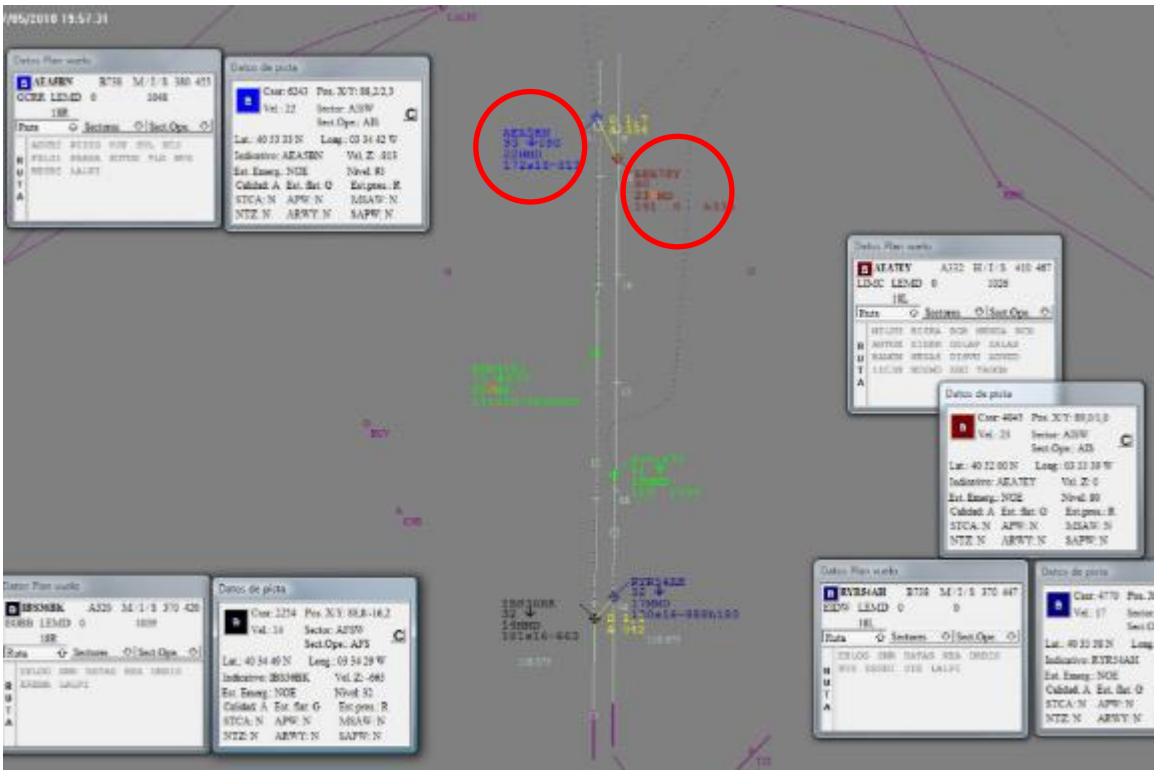


Illustration 18: Positions of the aircraft with callsigns AEA5BN and AEA7EY at 21:57:31

Subsequently, at 21:58:24, the positions of the aircraft were as follows:

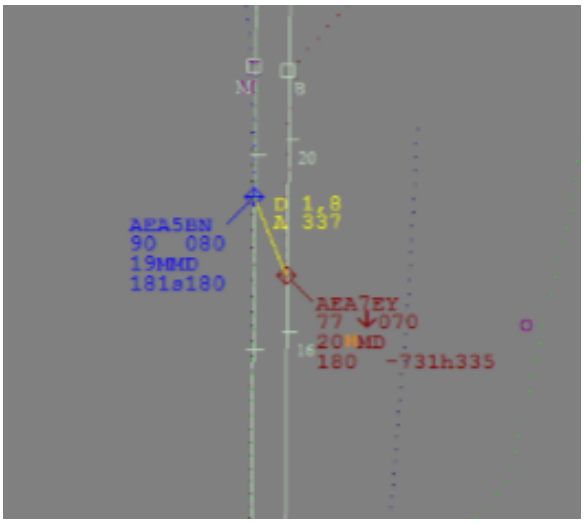


Illustration 19: Positions of the aircraft with callsigns AEA5BN and AEA7EY at 21:58:24

Later, at 22:00:49, the situation was as shown below:

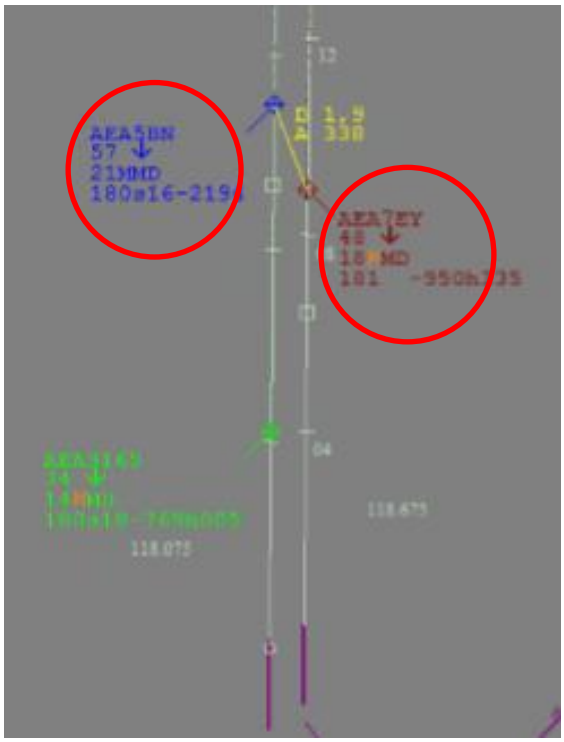


Illustration 20: Positions of the aircraft with callsigns AEA5BN and AEA7EY at 22:00:49

A few seconds later, the aircraft with callsign AEA5BN was instructed to reduce its speed, and subsequently, the aircraft with callsign AEA7EY was instructed to maintain its speed:

At 22:03:14, the two aircraft were separated by 1.0 NM horizontally and 400 feet vertically.

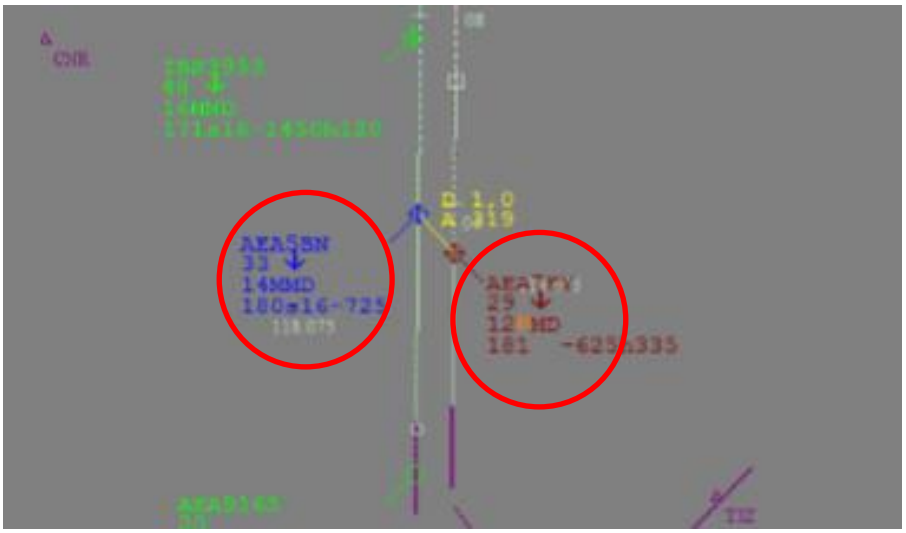


Illustration 21: Positions of the aircraft with callsigns AEA5BN and AEA7EY at 22:03:14

The separation between the aircraft continued to close until seconds before the landing of the aircraft with callsign AEA7EY.

1.9. Communications

The most signification communications between the pilots and controllers are provided here for the subsequent analysis of the incident.

Loss of Separation A.

As noted in the previous section, loss of separation A involved the Airbus A-320, with registration CS-TNQ and callsign TAP1018, and the Bombardier CL600 2E25, with registration EC-LJS and callsign ANE99DJ.

At 21:28:30, the controller in sector LECM TMA 5 (LEMDAIS) asked the aircraft with callsign TAP1018 to intercept the runway 18R localizer. He would subsequently clear it to descend to 9,000 feet. At 21:32:44, he transferred control of the aircraft to the controller in sector LECM TMA 6 (LEMDAFS).

At 21:29:35, the controller in sector LECM TMA 5 (LEMDAIS) asked the aircraft with callsign ANE99DJ to turn left heading 280º. He then cleared it to descend to 8,000 feet. At 21:32:05, the controller asked the crew of the aircraft if they could turn to heading 230º to intercept the localizer. The crew did so and were cleared to descend to 7,000 feet. At 21:32:24, the controller again asked the crew of the aircraft if they could turn, this time to heading 210º. At 21:32:36, he transferred control of the aircraft to the controller in sector LECM TMA 6 (LEMDAFS).

At 21:32:49, the controller in sector LECM TMA 6 (LEMDAFS) instructed the aircraft with callsign ANE99DJ to descend to 6,700 feet, and cleared it to complete the ILS-Z approach to 18L. He also informed it that the traffic at its 3 o'clock would intercept the other localizer (for runway 18R).

The controller in sector LECM TMA 6 (LEMDAFS) instructed the aircraft with callsign TAP1018 to descend to 8,000 feet at 21:33:13, and later, to 7,000 ft at 21:33:47.

At 21:33:29, the controller instructed the aircraft with callsign ANE99DJ to reduce its speed to 180 knots. He informed it that he asked the preceding traffic to increase its speed.

At 21:33:52, he informed the aircraft with callsign TAP1018 that the traffic at its 10 o'clock is tracking the other localizer (for runway 18L) and instructed it to reduce its speed to 180 knots. Later, at 21:34:43, he instructed it to reduce its speed to 160 knots.

At 21:34:22, the controller instructed the aircraft with callsign ANE99DJ to leave 7,000 ft. The crew informed him they were already tracking the localizer and the glideslope.

At 21:34:54, the crew of the aircraft with callsign TAP1018 requested to descend further. The controller cleared them to descend to 6,000 feet.

At 21:35:17, the controller cleared the aircraft with callsign TAP1018 for the ILS-Z approach to 18R.

At 21:36:13, the controller instructed the aircraft with callsign ANE99DJ that when at 4 NM from the airport, to reduce its speed to 160 knots and contact the tower controller.

At 21:37:32, he transferred control of the aircraft with callsign TAP1018.

Loss of Separation B.

Loss of separation B involved the Boeing 737-800, with registration EI-FZR and callsign RYR290B, and the Bombardier CL600 2E25, with registration EC-LJR and callsign ANE8825.

At 21:41:35, the controller in LECM TMA 5 (LEMDAIS) asked the aircraft with callsign RYR290B to turn right heading 150º to intercept the runway 18R localizer. He later cleared it to descend to 9,000 ft. At 21:45:28, he transferred control of the aircraft to the LECM TMA 6 (LEMDAFS) controller.

At 21:43:15, the controller in LECM TMA 5 (LEMDAIS) asked the aircraft with callsign ANE8825 to descend to 9,000 ft, and asked if it could turn left heading 240º. He later instructed it to descend to 8,000 feet.

At 21:44:28, the controller again contacted the aircraft with callsign ANE8825 to ask if it could turn to heading 220º to intercept the localizer. He later asked if it could turn to 210º, and instructed it to intercept the 18L localizer. At 21:45:16, he transferred control of the aircraft to the LECM TMA 6 (LEMDAFS) controller.

At 21:45:27, the LECM TMA 6 (LEMDAFS) controller asked the aircraft with callsign ANE8825 to descend to 7,000 feet, and cleared it for the ILS-Z approach to 18L. Then, at 21:45:56, the controller again asked it to descend to 7,000 feet.

At 21:46:01, the LECM TMA 6 (LEMDAFS) controller asked the aircraft with callsign RYR290B to descend to 8,000 feet. He then cleared it to make the ILS-Z approach to 18 R.

At 21:46:37, the aircraft with callsign ANE8825 asked the controller to change heading to 185º to intercept the localizer. Then, at 21:47:18, the controller instructed the aircraft to reduce its speed to 200 knots. Later, at 21:48:23, he instructed it to reduce its speed to 160 knots.

At 21:48:19, the controller asked the aircraft with callsign RYR290B to reduce its speed to 180 knots. Then, at 21:49:22, he asked it to lower its speed to 160 knots.

At 21:49:30, the controller informed the aircraft with callsign ANE8825 of a light aircraft 5.6 NM ahead of it, that this traffic was 1 NM out on final and its speed was 110 knots. He instructed it to reduce its speed at its discretion and to contact the controller in the control tower.

At 21:50:05, the controller contacted the aircraft with callsign RYR290B to transfer its control to the tower controller. At that moment, the aircraft asked if the traffic ahead of it was going to land on the same runway. The controller replied that there was no traffic ahead of it, and that the traffic at its 11 o'clock was going to land on the other runway.

Loss of Separation C.

Loss of separation C involved the Airbus A-320-216, with registration EC-LYM and callsign IBS36BK, and the Boeing 737-800, with registration EI-FTY and callsign RYR54AH.

At 21:26:50, the aircraft with callsign RYR54AH contacted the controller in LECM TMA 5 (LEMDAIS) to report that it was at 13,000 feet circling over point Somosierra. Then, at 21:28:54, the crew of the aircraft again contacted the controller to ask how much longer they would have to wait. The controller cleared them to proceed on heading to the runway 18R localizer and instructed them to reduce their speed to 200 knots.

At 21:30:19, the controller contacted the aircraft with callsign RYR54AH to cancel its previous clearance, since he needed to increase the distance with the preceding traffic. He asked it to turn left heading 120º and to descend to FL120.

At 21:31:47, the controller again contacted the aircraft with callsign RYR54AH to instruct it to turn right heading 210º and intercept the runway 18R localizer. But, at 21:33:09, the controller informed it that it would be landing on runway 18L.

At 21:34:09, the controller instructed the aircraft with callsign RYR54AH to descend to 9,000 ft and to contact the controller in the control tower. But at 21:35:40, the controller contacted the crew of the aircraft to instruct them to turn left heading 160º to intercept the runway 18L

localizer. The pilot reported they were in severe turbulence at that time and requested to hold. Then, at 21:36:08, the crew asked to descend, and the controller replied by asking them to contact the controller in the control tower.

At 21:36:25, the aircraft with callsign RYR54AH contacted the controller in LECM TMA 6 (LEMDAFS) and requested to descend from 9,000 feet. The controller instructed it to descend to 5,000 feet and informed it that the cleared approach was ILS-Z to 18L. The crew replied that they were too high to make that approach, after which the controller instructed them to maintain 9,000 feet and turn left heading 090º. He then again transferred control to the LECM TMA 5 (LEMDAIS) controller.

Later, at 21:38:50, the crew of the aircraft with callsign RYR54AH again contacted the LECM TMA 5 (LEMDAIS) controller to inform him they were flying on heading 090º at 9,000 feet. The controller instructed them to turn left heading North.

At 21:40:04, the controller instructed the aircraft with callsign RYR54AH to turn left heading 280º; however, at 21:40:21, the controller canceled its clearance and asked it to head North. The crew replied that they could not due to severe turbulence. The controller asked if they could turn left heading 250º to intercept the runway 18L localizer. Seconds later, the controller instructed them to turn left heading 020º. The crew asked how long they would be there, and the controller replied 5 NM. The crew informed the controller that they were surrounded by storms and requested information.

At 21:41:35, the controller contacted the aircraft with callsign RYR54AH and instructed it to turn right heading 150º and intercept the runway 18R localizer. He then asked it to descend to flight level 10,000 feet. At 21:42:01, the controller asked the crew if they could proceed heading 050º. The crew replied that they could follow that heading for 3 NM, then they had to turn North.

At 21:45:33, the aircraft with callsign IBS36BK contacted the LECM TMA 5 (LEMDAIS) controller to report it was at 13,000 feet and holding over point Somosierra. The controller informed it that he would soon give it a vector. Then, at 21:46:35, the controller asked it if it could turn heading 100º to then intercept the localizer on the right. At 21:47:29, the controller instructed it to turn right heading 210º and intercept the 18R localizer. He then instructed it to descend to FL100. At 21:48:27, he instructed it to turn to heading 230º, and later to descend to 7,000 feet and follow the 18R localizer. At 21:51:27, he transferred control to the LECM TMA 6 (LEMDAFS) controller.

At 21:46:46, the aircraft with callsign RYR54AH contacted the controller to report they were heading toward point TAGOM[9]. At 21:47:41, the controller instructed it to turn left heading 280º, and at 21:48:42, the controller asked it to descend to 8,000 feet.

At 21:50:04, the crew of the aircraft with callsign RYR54AH contacted the controller, requesting to turn left due to weather. The controller cleared them to turn left heading 205º.

[9] Point on the STAR to RWY 18L/18R (South Configuration)

At 21:51:07, the controller contacted the crew of the aircraft with callsign RYR54AH and asked them to descend to 7,000 feet. The crew requested heading 180º. The controller authorized it, and asked how long they would be flying on this course. The crew replied that they would do so for 6 NM and then they would return to the localizer. This was cleared by the controller, who instructed them to descend to 6,700 feet and fly at a speed of 180 knots.

At 21:51:53, the controller in LECM TMA 6 (LEMDAFS) informed the aircraft with callsign IBS36BK that its speed was 180 knots, that 7 NM ahead was a heavy aircraft, to hold 200 knots and that they were cleared to make the ILS-Z approach to 18R. Later, at 21:52:56, he instructed it to reduce its speed to 170 knots and informed it of traffic 6 NM ahead of it. Then, at 21:54:29, the controller again informed it of heavy traffic ahead, at a distance of 5.2 NM, with a ground speed of 130 knots, and to reduce its own speed as much as it could. At 21:55:36, the controller informed it that the preceding traffic was 3 miles out, 5 NM ahead of it, and that it could be affected by its wake turbulence, though he did not think this very likely due to the wind conditions. He then transferred control to the control tower.

At 21:52:37, the LECM TMA 5 (LEMDAIS) controller informed the aircraft with callsign RYR54AH that it would be landing on runway 18R, and instructed it to reduce its speed to 165 knots. Later, at 21:53:40, he transferred control to the LECM TMA 6 (LEMDAFS) controller.

At 21:53:49, the crew of the aircraft with callsign RYR54AH contacted the LECM TMA 6 (LEMDAFS) controller to report that they were descending to 6,700 feet and to request to turn right to the localizer. The controller replied that if it was possible, to turn right heading 250º and descend to 5,000 feet. He informed them that they would be landing on runway 18L and that there was traffic on the other runway. At 21:54:47, the crew asked the controller if they were cleared to intercept the localizer, and the controller cleared them to make the ILS-Z approach to 18L. Later, at 21:56:22, he transferred control to the control tower.

Loss of Separation D.

As noted in the previous section, loss of separation D refers to that involving the Boeing 737-800, registration EC-LXV and callsign AEA5BN, and the Airbus A330-200, registration EC-LVL and callsign AEA7EY.

At 21:50:13, the aircraft with callsign AEA5BN contacted the LECM TMA 5 (LEMDAIS) controller to report it was descending to 12,000 feet. Then, at 21:52:19, the controller asked it to proceed to point MANCO[10], descend to 11,000 feet and follow the 18R localizer. Later, at 21:54:36, the controller instructed it to descend to 9,000 feet and reduce its speed to 180 knots, and informed it that the preceding traffic was a heavy. At 21:55:57, he transferred control to the LECM TMA 6 (LEMDAFS) controller.

At 21:53:31, the aircraft with callsign AEA7EY contacted the LECM TMA 5 (LEMDAIS) controller to report its status as a heavy. The controller asked it to proceed to point BERUC,

[10] Point on ILS Z instrument approach to RWY 18R

descend to 8,000 feet and intercept the 18L localizer. At 21:54:24, he transferred control to the LECM TMA 6 (LEMDAFS) controller.

At 21:55:09, the aircraft with callsign AEA7EY was able to contact the LECM TMA 6 (LEMDAFS) controller to report that it was heavy. The controller instructed it to maintain 8,000 feet and cleared it for the ILS-Z approach to 18L.

At 21:56:08, the aircraft with callsign AEA5BN contacted the LECM TMA 6 (LEMDAFS) controller to report that it was descending to 9,000 feet. The controller instructed it to follow the localizer.

At 21:58:00, the aircraft with callsign AEA5BN again contacted the controller to report it was at 9,000 feet and that it had intercepted the localizer. The controller acknowledged the information and asked the other traffic, AEA7EY, to descend to 7,000 feet. The crew of the aircraft with callsign AEA7EY replied that they were established on the 18L ILS.

At 21:58:18, the controller instructed the aircraft with callsign AEA5BN to descend to 8,000 feet, and informed it that he would give separation from the other traffic (of the same airliine). He later instructed it to descend to 7,000 feet, and then to 6,000 feet. At 21:59:43, the controller informed it that the preceding traffic was 7 NM away and was heavy. At 22:01:03, the controller informed it that the preceding traffic was 6.3 NM away and asked it to reduce its speed.

At 22:01:21, the controller instructed the crew of the aircraft with callsign AEA7EY to hold their speed and asked them to contact the controller in the control tower.

At 22:02:27, the controller instructed the crew of the aircraft with callsign AEA5BN to contact the control tower controller and informed them that the preceding traffic was practically at the threshold, 5.5 NM ahead.

1.10. Aerodrome information

The Adolfo Suárez Madrid-Barajas Airport (ICAO code LEMD) is 13 km northeast of the city of Madrid, at an elevation of 609 m. It has four runways: 14L/32R, 14R/32L, 18L/36R and 18R/36L. The configurations published in the AIP are as follows:

- From 07:00 to 23:00:
  - Preferred: North Configuration
    Landings: 32L/32R
    Takeoffs: 36L/36R
  - Non-preferred: South Configuration
    Landings: 18L/18R
    Takeoffs: 14L/14R
- From 23:00 to 07:00:
  - Preferred: North Configuration
    Landings: 32R
    Takeoffs: 36L

- Non-preferred: South Configuration
  Landings: 18L
  Takeoffs: 14L

The preferential configurations will be maintained until wind components are produced, including 10 kt gusts of tailwind and/or 20 kt crosswind, except for safety reasons, the inoperativeness of any runway or air navigation aid disabling any of the approved standard instrument departures or arrivals, or when one or more of the following weather conditions prevail or are forecast:

- runway surface conditions adversely affected and/or with breaking action below good,
- cloud ceiling lower than 500 ft above aerodrome elevation.
- visibility less than 1.9 km (1 NM),
- wind shear notified or forecast, or storms on approach or departure,
- other meteorological phenomena that may prevent it.

On 27 May, the airport configuration was changed from North to South due to weather. The losses of separation analyzed in this report occurred once the airport was in a South configuration, meaning that aircraft were landing on runways 18L and 18R.

A map of the Adolfo Suárez Madrid-Barajas Airport is provided below:

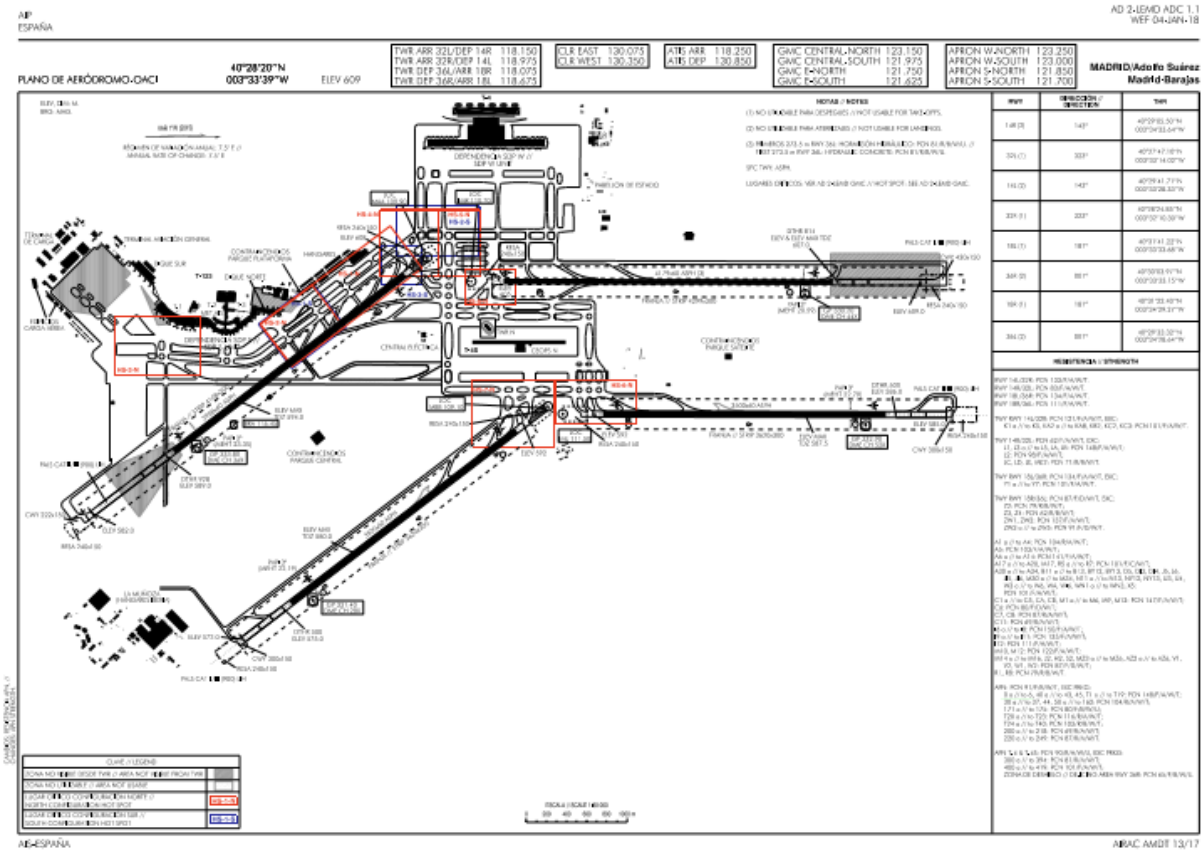


Illustration 22: Map of the Adolfo Suárez Madrid-Barajas Airport

1.11. Flight recorders

The aircraft involved in this incident had flight recorders, but the data contained in them were not deemed relevant to the analysis of this incident.

1.12. Wreckage and impact information

The aircraft involved in the incident did not sustain any damage.

1.13. Medical and pathological information

There were no indications that physiological factors or impairments affected the performance of any of the flight crew members or air traffic controllers.

1.14. Fire

There was no fire in the aircraft or in the environment.

1.15. Survival aspects

Not applicable.

1.16. Tests and research

Statement from the crew of the Airbus A320, registration CS-TNQ

The crew stated that they experienced adverse weather conditions during the initial approach. ATC changed their assigned landing runway on the initial approach.

The crew noticed that the controller was stressed.

They received a TCAS-TA while stable and descending on the runway 18R ILS due to a nearby traffic on the runway 18L ILS.

Statement from the crew of the Bombardier CL600 2E25, registration EC-LJS

There was a violent storm that day at the Adolfo Suárez Madrid-Barajas Airport. They were aware of the bad weather and had sufficient fuel on board.

After numerous vectors and holds, they found a slot to land safely. At no time did they lower the safety altitude or experience a separation with a nearby traffic outside the limits. The entire operation was controlled by ATC.

Statement from the crew of the Boeing 737-800, registration EI-FZR

Requested during the investigation into this incident but not provided.

Statement from the crew of the Bombardier CL600 2E25, registration EC-LJR

Weather conditions were quite bad that evening.

The crew did not recall having experienced a loss of separation either with respect to the ground or other aircraft.

They were assigned the ADUXO 4B STAR, but the controller instructed them to hold at CJN[11]. The route on this STAR does not fly over reporting point CJN, which they explained to the controller; however, the controller insisted, and the crew again explained that holding at CJN was not applicable because they were not flying over the VOR. The controller instructed them to hold wherever allowed by the weather. The crew circled over ADUXO[12].

They then flew to TAGOM and began the approach to runway 18L without incident.

Statement from the crew of the Airbus A-320, registration EC-LYM

The crew stated that they began their descent into the Adolfo Suárez Madrid-Barajas Airport and approximately upon reaching FL250, the controller instructed them to stop and make a 360º turn due to traffic saturation in the Madrid TMA. They asked the controller for information on the expected delay, which was not provided. After several 360º turn maneuvers, they were instructed to continue the standard arrival.

Upon changing frequencies, they were instructed to hold over the next waypoint. Once they reached it, they reported that it was not possible to comply with the published hold due to the storms, after which ATC instructed them to fly away a few miles and hold in a suitable location. They requested an approach time and, once elapsed, they were sent to point "Somosierra".

Once over point "SIE" [13], they again asked for an approach time. The new time provided was again inaccurate.

Since the crew were not given a realistic approach time, they were forced to make various calculations and estimated approach times based on different scenarios, significantly increasing their workload and stress level.

When they began the approach, they were given instructions to maintain a specific speed. When they changed frequencies, they were instructed to hold a different speed. This required the crew to be vigilant of the preceding traffic and adjust to its speed in order to avoid a go-around maneuver.

Statement from the crew of the Boeing 737-800, registration EI-FTY

[11] Point on the STAR for RWY 18L/18R (South Configuration)

[12] Point on the STAR for RWY 18L/18R (South Configuration)

[13] Point on the STAR to RWY 18L/18R (South Configuration)

Requested during the investigation into this incident but not provided.

Statement from the crew of the Boeing 737-800, registration EC-LXV

The crew stated that the flight had been quiet. The ATIS at the Adolfo Suárez Madrid-Barajas Airport indicated that the weather was good at the destination for runway 32L, but with storms in the vicinity.

They did the briefing for the approach to runway 32L with the SOTUK 2C STAR. Upon starting the descent, the controller changed the runway to 18R and SOTUK 5A, so they held a new briefing, noting that since the approach was for runway 18R, they would no doubt be too high. They commented that according to the Flight Crew Training Manual, they would have to intercept the glide slope from above.

They noticed that the weather conditions were complicated and while on heading North toward RESBI[14], on the downwind leg, ATC informed them “rate zero” at the airport due to storms and because the latest arrivals had gone around due to windshear. Because of this, they held a briefing for windshear and predicted windshear.

The weather was worsening and they had to request different vectors to separate from and avoid other traffic. They were initially vectored on headings from 280º to 350º. Traffic started to increase considerably, and they could hear them all requesting vectors. Given the situation, they kept a close eye on the TCAS to stay away from other traffic. They recalled that after being on different headings, they were vectored North and ATC asked if they would be ready to intercept the localizer, to which they replied in the affirmative.

The ATIS kept reporting good weather. They heard another crew reprimand the controller for not changing the data provided by ATIS so that crews could be aware of the actual situation, since the rate at the airport was still zero. The controller replied that it would be a good idea to update the ATIS information.

They circled. Since they could not do it at RESBI due to the weather, they held at a point that is undefined on the chart. Because of this, they kept a close eye on TCAS to stay away from other traffic. When they were finally given a landing time, they were given headings from RESBI to LALPI[15] to proceed to the approach, since they could not proceed from the published route due to the weather. Before reaching LALPI, they were given vectors to proceed to MANCO and intercept the localizer. Once they did so, they were too high, so they asked to descend as per the flight plan, but they were told they would be cleared to descend soon. They captured the glide slope, noticing that the weather radar showed a red area where the runway 18R localizer was located, and inside, an inbound A320. They said that if the A320 did not report anything, they would continue their approach; otherwise, they would go around.

[14] Point on the STAR to RWY 18L/18R (South Configuration)

[15] Point on the STAR to RWY 18L/18R (South Configuration)

Once established on the 18R ILS, parallel to their 9-10 o'clock position, they saw a heavy aircraft (specifically, the Air Europa A330) was making the approach to runway 18L with the wind from the west, which they thought was very strange because ATC in Madrid always avoids having two aircraft fly parallel ILS (both 18L/R or both 32L/R), especially with different wake characteristics and in storms.

They eventually landed without any problem on runway 18R.

Statement from the crew of the Airbus A330-200, registration EC-LVL

Requested during the investigation into this incident but not provided.

Statement from the executive controller of Madrid sector LEMDAFS

At 21:00, he was the executive controller for sector LEMDWDN. The airport was in a North configuration, although there was a tail wind with various storms hampering operations. At that time, nine aircraft went around, which were transferred by the controller in the control tower and cleared to fly missed approach procedure Z and climb to 5,000 and 6,000 feet, all of them to GE[16] (identifier for the Getafe NDB).

The first problem was coordinating the different altitudes with sector LEMDRSN that would be compatible with the aircraft heading to TOBEK to start the approach. The workload in both sectors was very high, and it increased even further when it was confirmed that the South configuration would be going into effect. He had to direct inbound traffic to hold at EREMA[17] and LALPI.

The area was full of storm clouds and communications with aircraft increased as he diverted them to other holding locations, in addition to coordinating a hole for traffic from sector LEMDRSN.

The sectors of responsibility had to be changed almost instantly. He was assigned LEMDWSS and LEMDWNS was transferred to a colleague, with all that entails in terms of coordination, information on non-standard instructions and the transfer of communications. This would all have been safer if the west of the TMA were managed using separate sectors, and not combined, as they always are. This means that at one point, he had to manage nine aircraft executing go-arounds, separate them from one another at altitudes from 5,000 to 7,000 feet in the area of GE, and handle traffic between FL200 and FL240 between NVS[18], AVILA and ORBIS[19].

At 21:15, he relieved the executive controller in sector LEMDAFS. The configuration had already been changed. The storms prevented the controller in sector LEMDAIS from routing traffic to the localizers while ensuring sufficient separation, so he could only try to ensure

[16] Point on the ILS Z instrument approaches for RWY 18R and 18L

[17] Point on the STAR to RWY 18L/18R (South Configuration)

[18] Point on the STAR to RWY 18L/18R (South Configuration)

[19] Point on the STAR to RWY 18L/18R (South Configuration)

vertical separation until they intercepted the localizers. Once established, he cleared them for the approach. In those cases where he could not ensure sufficient separation, he instructed the aircraft to leave the localizer and stop the descent. At one point, traffic on approach to runway 18L was unable to follow this localizer and they were placed in parallel to said localizer to the East, and routed in when there was a break in the weather. But this made it impossible to provide sufficient separation with traffic on approach to 18R. As a result, he asked the supervisors to have approaches made to just one localizer, which improved the situation considerably.

There was a lot of pressure since several aircraft, especially those that had gone around, had declared they could not hold any longer due to fuel. He did not recall if any of them declared an emergency.

In summary, given the highly adverse weather, which had been forecast hours earlier:

- measures should have been taken to limit traffic,
- the control tower at the airport should not force a North configuration until crews refuse to take off or break off the approach, and
- an investigation should be conducted into why the weather office systematically states that storms will dissipate by early evening on stormy days, even though this does not happen and a large number of aircraft arrive relying on this forecast.

Statement from the planning controller in Madrid sector LEMDAFS

At 21:15, he relieved the planning controller in sector LEMDAFS. The configuration had been changed a few minutes earlier, and he faced a complex situation due to the storms: diversions, traffic on hold, emergencies, traffic aborting approaches, etc.

Starting at 21:40, the approach to runway 18L became almost impossible, and traffic intercepted the localizer at mile 8/10 with the ensuing danger. After several losses of separation at the localizers, they stopped using runway 18L and all the aircraft were routed to runway 18R until approximately 22:20, when both runways were again used.

The planning controller is of the opinion that the procedure for changing configurations should be revised, since the configuration is not changed until weather conditions are almost impossible. In fact, in this case, eight aircraft had to go around before it was decided to change configurations, which hampered the change enormously.

Even though the weather conditions were very complicated, they were not mentioned during the briefing. Even worse, in the controller's opinion, the regulations were made late and were probably misapplied. He proposes regulating very low and raising it as the weather situation improves, instead of regulating at zero rate and endangering aircraft.

Statement from the supervisory controller in the Madrid TMA

The workload in the sector was high due to the repeated go-arounds and because the sectors were combined[20]. The adverse weather also increased the complexity enormously.

The storm activity at the airport also appeared suddenly. There was a sudden change in wind direction. He believes that given the weather situation, the airport control tower delayed the decision to change the airport's configuration.

Since nine airplanes had to frustrated by the weather conditions, there were no free levels at GE point. They had to give them vectors outside the standard procedure and use alternative routes that were not planned.

There were aircraft holding at points GE, RESBI, EREMA and ORBIS. Other aircraft stated they were low on fuel and others opted to divert to their alternate airports.

The following technical issues also posed problems:

- The frequency coverage was particularly affected by the weather.
- Absence of missed approaches on SACTA, meaning SACTA does not display the path aircraft will take after going around.
- The change in configuration requires re-centering the display, giving rise to a loss of situational awareness at a time that is critical to operations. This affects the west of the TMA most of all, since the configuration change (which involves a change in frequency, geographic area, transferring aircraft, etc.) affects two combined sectors.

He added that after the configuration change, the first aircraft to make the approach maneuver reported storm activity that prevented it from following the localizer. It had to divert several times before finally intercepting on final. The aircraft following it in the sequence also made non-standard maneuvers, which complicated the controller's job enormously, forcing him to resort to vertical separation as the only means to separate the aircraft.

As a mitigation measure, he proposes having a reliable weather radar that can be used to provide vector guidance in these circumstances.

Statement from the executive controller in Madrid LEMDRSN

Initial situation:

- There were strong storms in the Madrid TMA in the afternoon.
- The North configuration, although in use, was unnatural, since aircraft had a tail wind of almost 10 knots.
- The TMA was set up into seven sectors, meaning the entire western part of the TMA was combined into two sectors.

[20] The TMA is designed for 10 sectors, which are regulated as dictated by the control room supervisor. Before the incident, the TMA was configured into seven sectors. LEMDRWN and LEMDWSN were combined, as were LEMDDWN and LEMDWNN.

At one point, at around 21:15, several consecutive aircraft missed their approaches to both runway 32L and 32R. As the executive controller in sector LEMDRNS, he received these aircraft, which circled at point GE. He was also responsible for the aircraft in the sequence for the initial fixes.

The situation was made exponentially more complex by the nine consecutive go-arounds and the highly adverse weather. He also believes that the change to a south configuration was made too late.

Traffic kept arriving. The first three aircraft that went around decided to divert to their alternate airports. The frequency was very saturated and all the crews were very nervous. Some were low on fuel. On top of this is the fact that the configuration change in the west, with four sectors combined into two, is already chaotic.

In summary, the weather factor and the inflexibility of the parameters for changing to the South configuration give rise to situations like those described, which turn an approach into a very real and dangerous chaos.

Statement from the planning controller in Madrid sector LEMDRSN

The wind on runways 32L and 32R suggested a change in the configuration.

At one point, he seemed to recall that three aircraft in a row went around. The aircraft that did so went to GE to fly the missed approach procedure. The large number of aircraft that went around resulted in congestion at GE, with traffic proceeding to GE between 5,000 and 8,000 feet.

As these go-arounds were taking place, they proceeded to change the configuration from North to South. This configuration change, since we were working with two sectors combined in the North configuration (LEMDRWN and LEMDWSN) results in having to change frequencies to adapt to the new combination of sectors in the South configuration involving LEMDRWS and LEMDWNS. This change in frequencies means that aircraft that before were on one frequency, and which are being handled by one controller, are now transferred to another controller, who is unaware that these aircraft are on his frequency.

Having several aircraft executing the missed approach procedure, in combination with the configuration change and having to change frequencies, the displays on the screens, as well as the traffic flows, led to a situation of veritable disarray. The aircraft that were waiting at GE had to redirect to RESBI to complete the approach to RWY18. Transferring traffic from GE to RESBI is complicated because they have to climb to clear the minimums.

Thanks to the fact that three aircraft at GE declared they were proceeding to the alternate, the situation was not complicated further. One crew stated they had just enough fuel and urgently asked for an estimated approach time.

The late change in configuration, as well as the runway change procedure with a change in frequencies, gave rise to a situation that was potentially very dangerous, and that from his point of view, was one of the most chaotic he recalled in his 15-year career as a controller. The go-arounds and the decision to change runways led to a truly unsettling and chaotic situation.

ATC Logbook. Unit: LECM control room.

The entries of most relevance to the investigation into this incident were extracted from the logbook:

18:10. The forecaster[21] at the Weather Monitoring Office in Valencia[22] is called, who confirms the accuracy of both the 11:00 UTC TAF[23] and the forecast in the AEMET's Harmonie model. The forecaster states that the situation is complicated in the east and northeast of the TMA, in Guadalajara and Cuenca. After 22:00, he thinks the storm activity will move from the east to the northwest, and that by 01:00 the following morning, it will all dissipate.

20:38. A warning, valid from 20:20 until 22:00, is received for TS (storm) FCST (forecast) WKN (weakening).

20:38. The TMA supervisor requests a reduction in the TMA's capacity, regulation 42/60[24], until 22:20.

21:00. The airport changes to a South configuration.

21:05 – 21:47. Approval request for takeoffs activated at every airport in the peninsula LE**.

21:05. The TMA supervisor asks to lower capacity to regulation 38/60 until 22:20.

[21] A weather professional qualified to provide weather forecasts. Predicts the most likely future condition of the atmosphere by analyzing its current state.

[22] The AEMET has two Weather Monitoring Offices, one in Las Palmas de Gran Canaria, which services the Canaries FIR, and another in Valencia, which services the Barcelona and Madrid FIRs.

[23] The 11 UTC TAF was similar to the one issued at 17 UTC, pointing out the possibility that there would be temporarily cumulus congestus (TCU) and a 40% probability of rainstorms or variable wind direction between 16 UTC and 24 UTC, and that this situation be repeated on day 28

TAF LEMD 271100Z 2712/2818 22010KT 9999 FEW045 TX26/2715Z TN13/2806Z TEMPO 2713/2818 SCT025TCU PROB40 TEMPO 2716/2724 VRB15G27KT 4000 TS SHRA SCT025CB TEMPO 2800/2818 4000 RA SHRA FEW025 SCT030TCU PROB40 TEMPO 2811/2818 VRB15G27KT 4000 TS SHRA SCT025CB=

[24] The arrivals capacity of the TMA, not the airport, is 51.

21:10. 20/60 regulation requested, since the supervisor does not know how the situation would evolve.

21:10. Seven aircraft go around due to sudden convective currents, which cause tailwinds and windshear.

21:13. Three aircraft divert to the alternate airport, one of them declares a MAYDAY due to minimum fuel.

21:15. The massive diversion procedure specified by ENAIRE is activated.

21:15. Regulation 0 requested from UCATM.

21:20 and 21:26. Two aircraft divert to alternate airports.

21:35 – 21:58. Takeoffs on runways 18R/L one minute and a half apart.

21:40. According to the TMA supervisors, the UCATM is asked to increase regulation to 20/60.

21:40. AEMET forecaster called, who confirms that the situation described in the TAF would hold. Convective structures will improve in the north of LETO and LEMD. The situation in the field is very unsettled and would continue for 2 hours.

21:58. Airport configured for single takeoff sequence until 23:00.

22:10. Arrivals increased to 38/60.

22:23. RWYs 18R/L for arrivals until 24:00 for safety reasons.

22:30. Aircraft landing without incident on both runways.

00:06. Airport changed to North configuration.

1.17. Organizational and management information

Information on the operator of the Airbus A320, registration CS-TNQ

The operator of the Airbus A320-214, registration CS-TNQ, is TAP Air Portugal, which has an Air Operator Certificate issued by ANAC to engage in the commercial air transport of passengers and cargo.

Information on the operator of the Bombardier CL600 2E25, registrations EC-LJS and EC-LJR

The operator of both Bombardier CL600 2E25 aircraft is Air Nostrum, which has an Air Operator Certificate issued by AESA to engage in the commercial air transport of passengers and cargo.

Information on the operator of the Boeing 737-800, registrations EI-FZR and EI-FTY

The operator of both Boeing 737-800 aircraft is Ryanair, which has an Air Operator Certificate issued by the Irish Aviation Authority (IAA) to engage in the commercial air transport of passengers and cargo.

Information on the operator of the Airbus A-320-216, registration EC-LYM

The operator of the Airbus A320-216 is Iberia Express, which has an Air Operator Certificate issued by AESA to engage in the commercial air transport of passengers and cargo.

Information on the operator of the Boeing 737-800, registration EC-LXV and Airbus A330-200, registration EC-LVL

The operator of the Boeing 737-800 and Airbus A330-200 is Air Europa Líneas Aéreas, which has an Air Operator Certificate issued by AESA to engage in the commercial air transport of passengers and cargo

1.18. Additional information

Airspace of the Madrid TMA

Prior to the incidents analyzed in this report, the Madrid TMA was in North Configuration CNF8DN. The west sectors were combined, such that sectors LEMDDWN and LEMDWNN were combined into LEMDWDN, and sectors LEMDRWN and LEMDWSN were combined into LEMDRSN. As a result, the west of the Madrid TMA was controlled through two sectors:

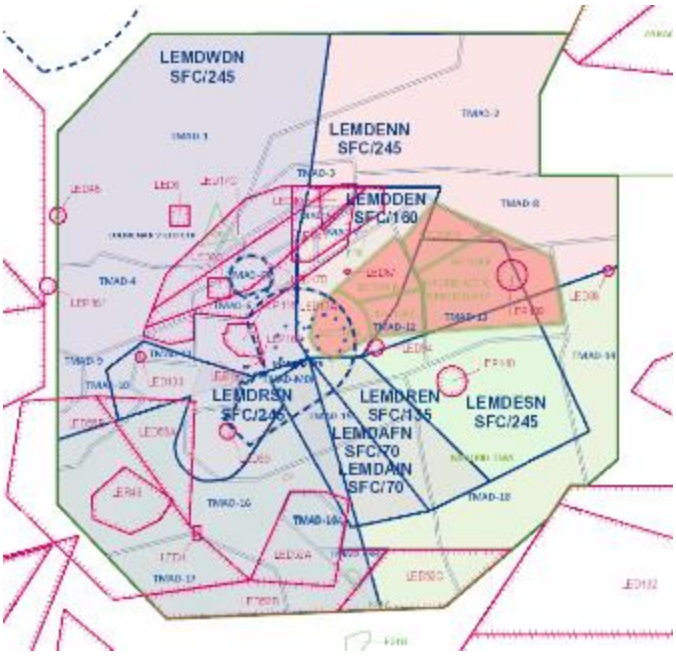


Illustration 23: Sectors in the CNF8DN configuration

LEMDWDN and LEMDRSN[25]. The image shows the sectors in the CNF8DN configuration.

Starting at approximately 21:00, it was decided to change to the South CNF8BS configuration.

The procedure for changing configurations states that the controllers in the outer sectors remain at the posts where they were initially.

As concerns the inner sectors, whenever sectors are combined during a North to South configuration change, the LEMDDWN and LEMDRWN sectors are swapped first.

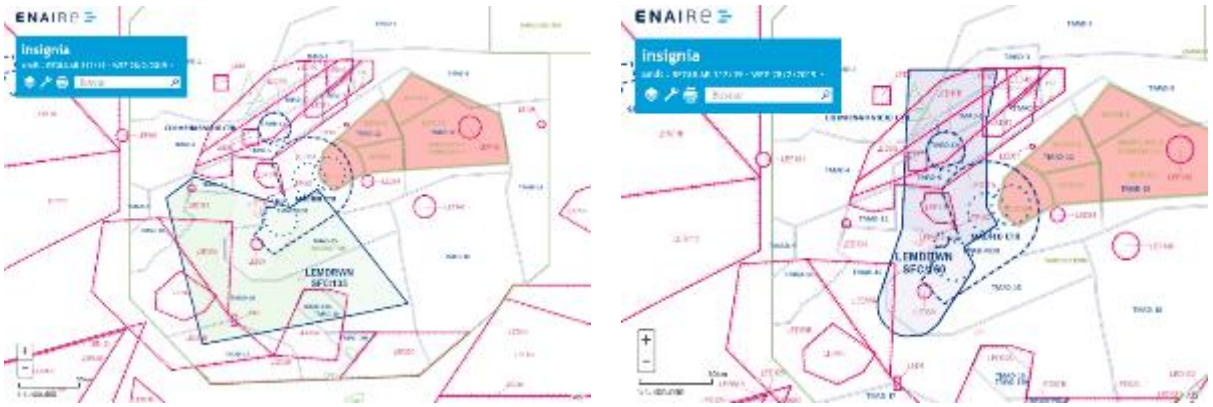


Illustration 24: Combined sectors to swap when changing from a North to South configuration

This swapping of sectors means that the controller of the combined LEMDWDN sector now controls sectors LEMDWNN and LEMDRWN.

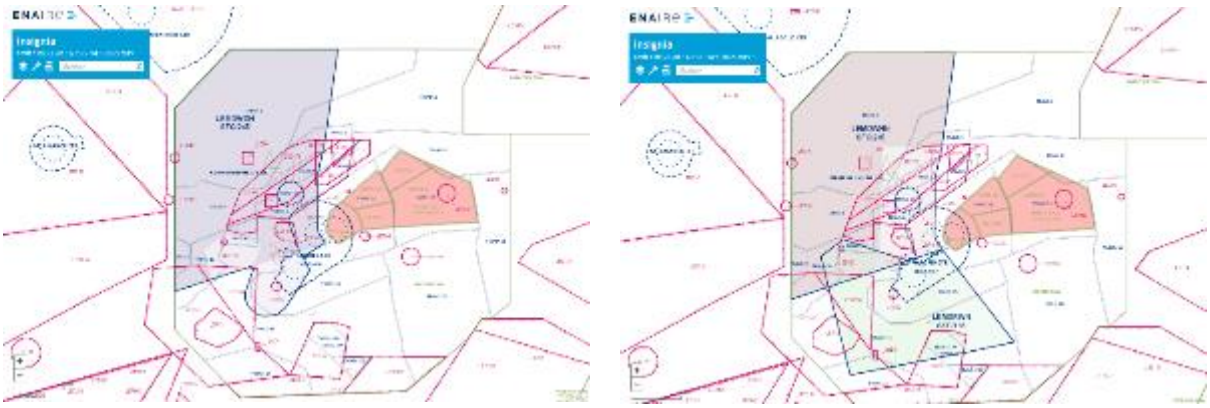


Illustration 25: Changing combined sectors

[25] The TMA consists of 10 sectors. The Control Room Supervisor determines the best configuration, meaning which sectors are combined and which are kept separate. The configuration is decided based on the number of controllers, which determines the maximum number of sectors, and on the expected traffic flow. However, the sectors can be combined differently in the tactical phase than previously configured.

And the controller of the combined sector LEMDRSN now controls sectors LEMDDWN and LEMDWSN.

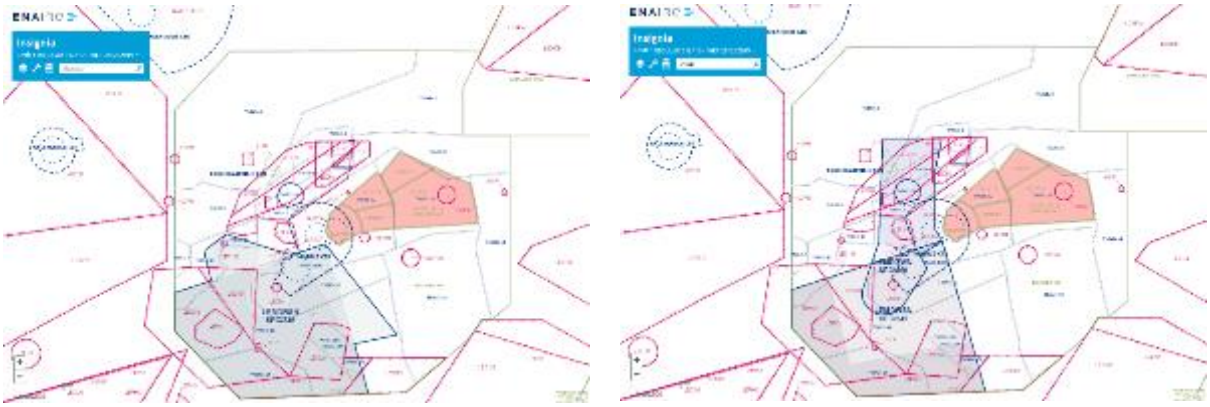
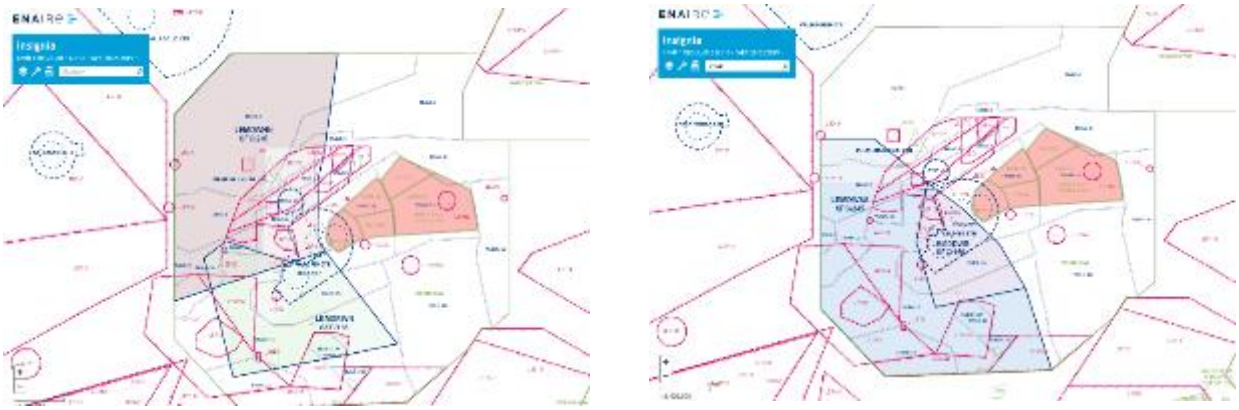
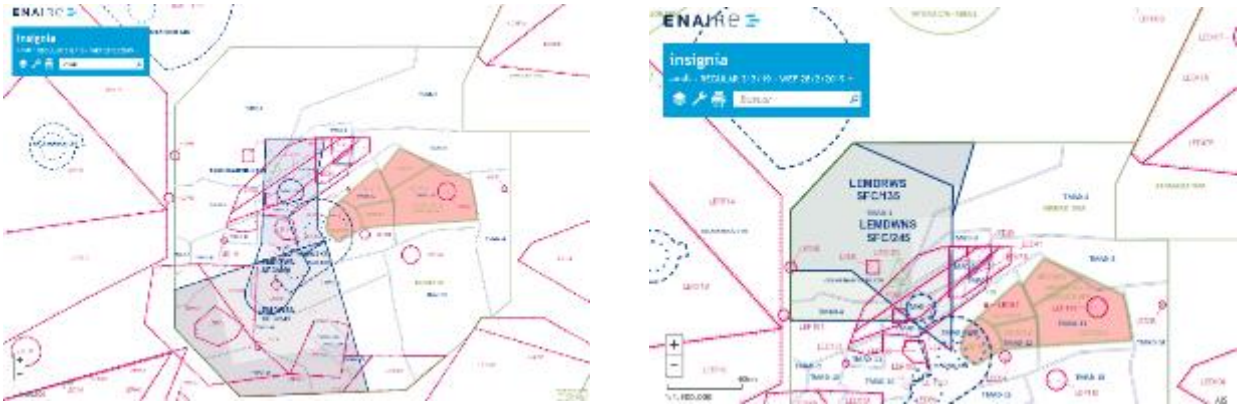


Illustration 26: Changing combined sectors

In the South configuration, the western sectors of the Madrid TMA remain combined, such that the controller of the combined LEMDWDN sector now controls sectors LEMDDWS and LEMDWSS, combined into sector LEMDWDS.



And the controller of the combined sector LEMDRSN now controls sectors LEMDRWS and LEMDWNS, combined into sector LEMDRNS:



The image below shows the sectors in the TMA in South configuration CNF8BS:

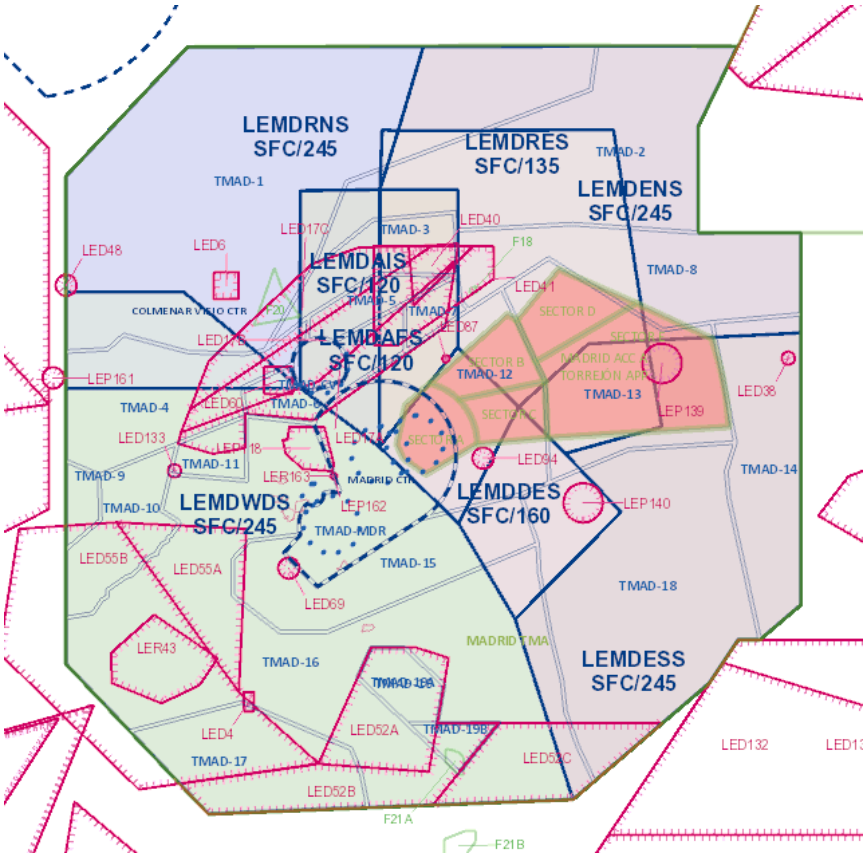


Illustration 27: Sectors in south configuration CNF8BS

As the aircraft descend, they are transferred from the outer sectors (LEMDRNS, LEMDWDS, LEMDENS, LEMDESS) to the feeder sectors (LEMDRES and LEMDDES), and from there to the initial approach sector (LEMDAIS).

In a South configuration, feeder sector W is tasked with receiving inbound traffic from EREMA and RESBI and directing to LALPI, whereas feeder sector E is tasked with routing traffic from OBIKI[26] and NOSKO[27] toward TAGOM.

The controller in the initial approach sector LEMDAIS directs traffic toward the localizer and transfers it to final approach sector LEMDAFS.

The incidents occurred in the final approach sector.

Also provided below are two standard terminal arrival route (STAR) charts for runways 18L/18R in a South configuration, which show the speed limitations published in the AIP:

[26] Point on the STAR to RWY 18L/18R (South Configuration)

[27] Point on the STAR to RWY 18L/18R (South Configuration)

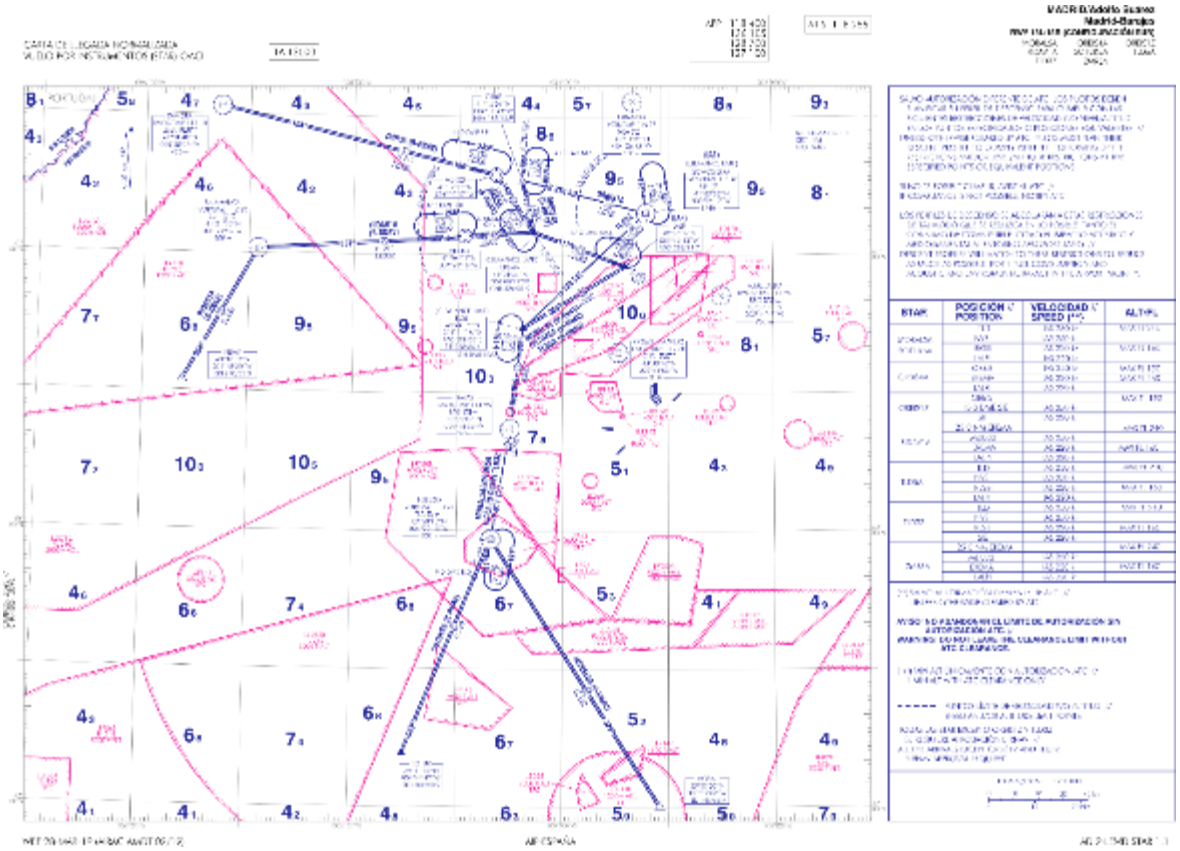


Illustration 29: STAR 1. RWY 18L/18R (South Configuration)

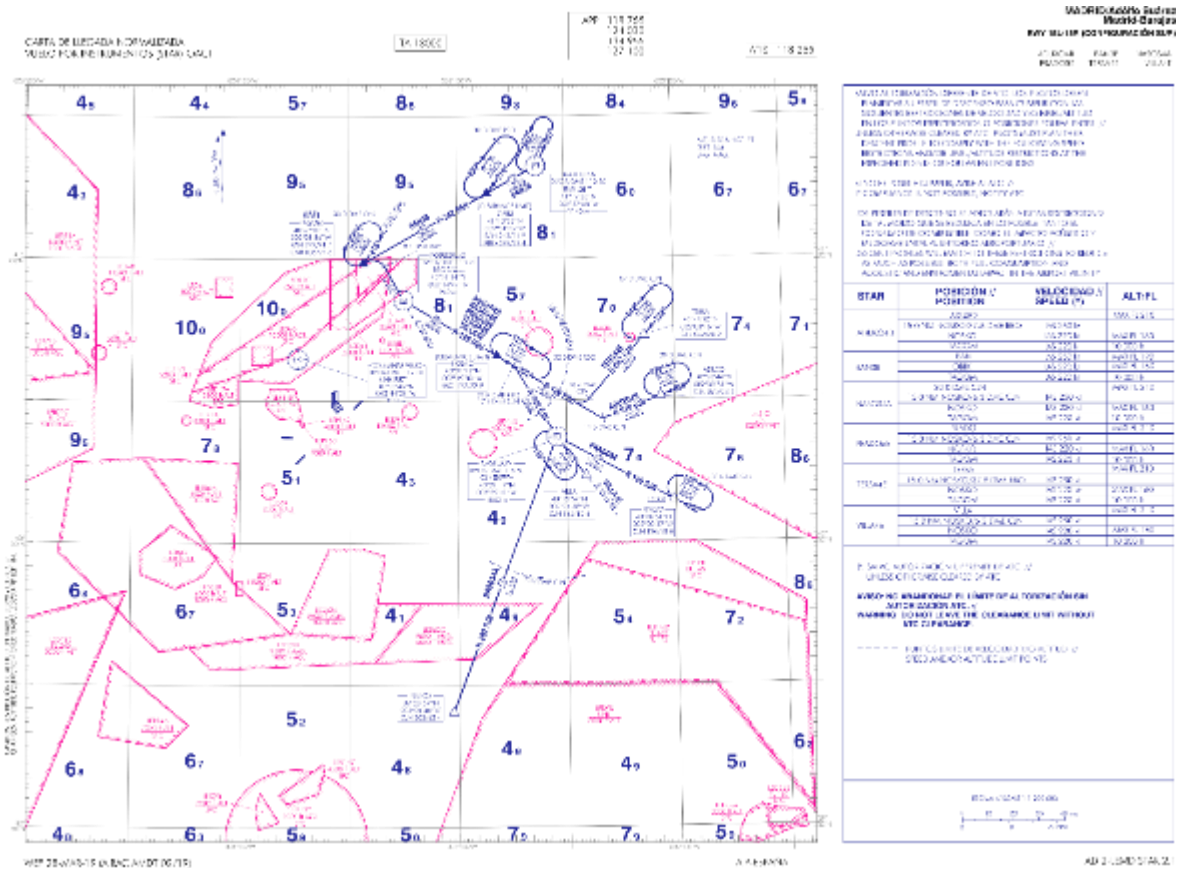
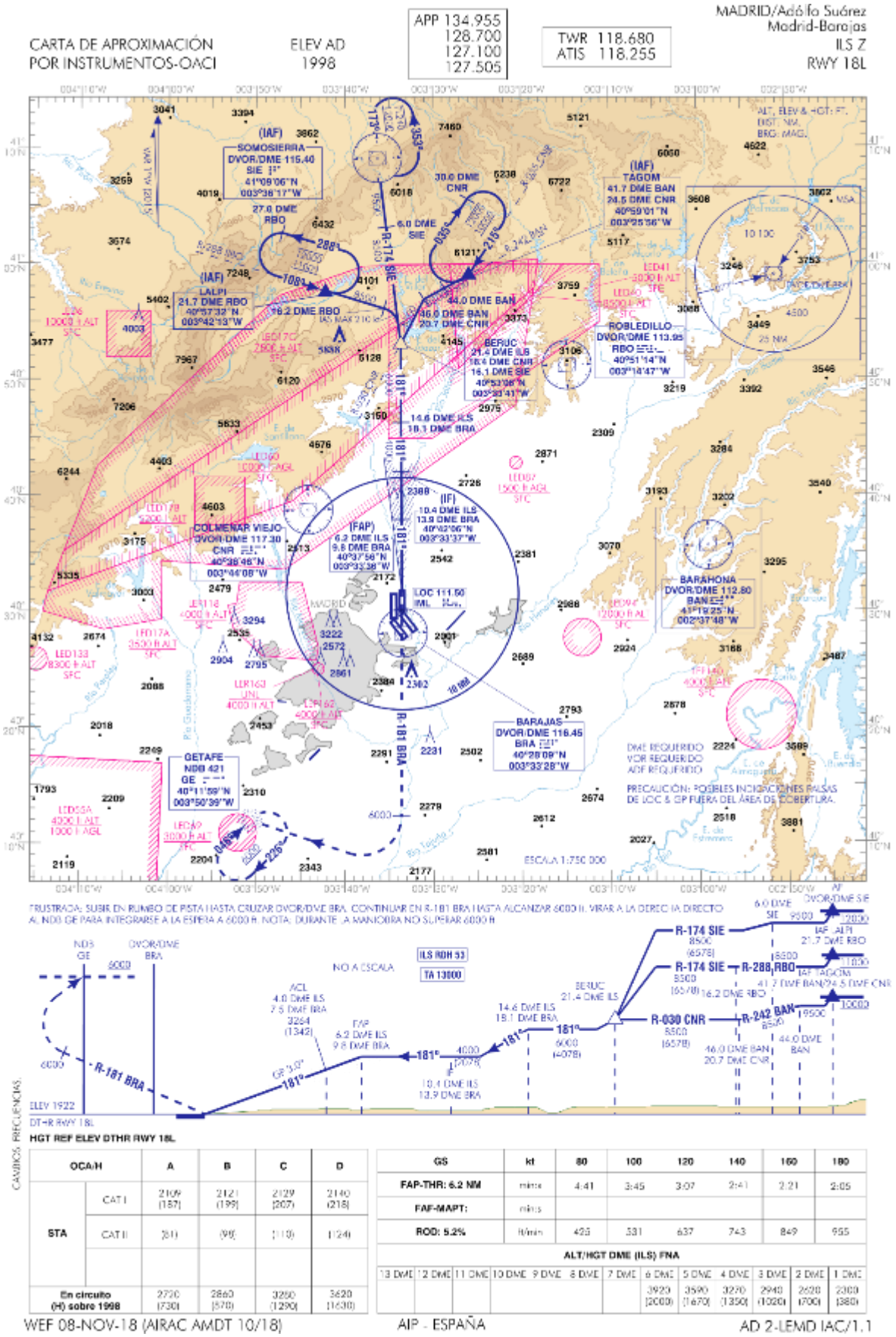


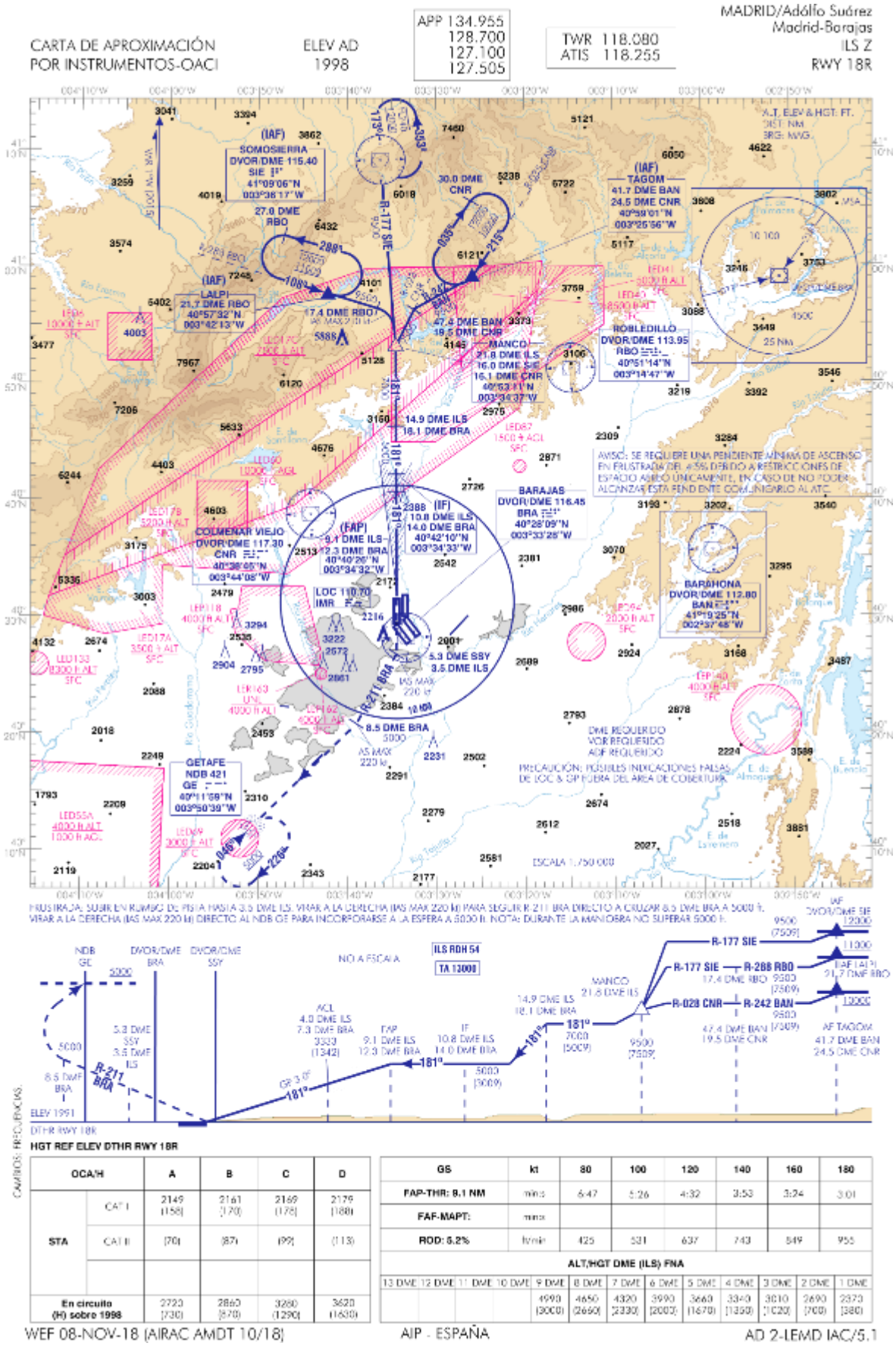
Illustration 28: STAR 2. RWY 18L/18R (South Configuration)

The AIP also states that pilots must plan their descent profiles to comply with the following speed and/or altitude restrictions at the specified points, unless ATC authorizes otherwise, as they approach runways 18L/18R. If this is not possible, they must notify ATC.

Position	Speed	Altitude
TAGOM or equivalent position	IAS 220 kt	9,500 ft
LALPI or equivalent position	IAS 220 kt	10,500 ft or higher
Upon intercepting LOC	IAS 200 kt	-
9 DME ILS or equivalent position	IAS 180 kt	-
6 DME ILS or equivalent position	IAS 160 kt	-
4 DME ILS or equivalent position	IAS 160 kt	-

Also included are the charts for the ILS Z approach to runways 18L and 18R.


CARTA DE APROXIMACIÓN
POR INSTRUMENTOS-OACI
ELEV AD
1998
APP 134.955
128.700
127.100
127.505
TWR 118.680
ATIS 118.255
MADRID/Adolfo Suárez
Madrid-Barajas
ILS Z
RWY 18L
SOMOSIERRA
DVOR/DME 115.40
SIE
41°08'06"N
003°36'17"W
LALPI
21.7 DME RBO
40°57'32"N
003°42'13"W
TAGOM
41.7 DME BAN
24.5 DME CNR
40°59'01"N
003°25'56"W
ROBLEDILLO
DVOR/DME 113.95
RBO
40°51'14"N
003°14'47"W
BERUC
21.4 DME IUB
18.4 DME CNR
16.1 DME SIE
40°53'08"N
003°33'41"W
COLMENAR VIEJO
DVOR/DME 117.30
CNR
40°38'46"N
003°44'08"W
BARAJAS
DVOR/DME 116.45
BRA
40°28'09"N
003°33'28"W
BARAHONA
DVOR/DME 112.80
BAN
41°18'25"N
002°37'48"W
GETAFE
NDB 421
GE
40°11'59"N
003°50'39"W
(IAF)
(IF)
(FAP)
LOC 111.50
IML
14.6 DME ILS
18.1 DME BRA
10.4 DME ILS
13.9 DME BRA
6.2 DME ILS
9.8 DME BRA
30.0 DME CNR
27.0 DME RBO
6.0 DME SIE
18.2 DME RBO
44.0 DME BAN
46.0 DME BAN
20.7 DME CNR
R-174 SIE
R-288 RBO
R-030 CNR
R-242 BAN
R-181 BRA
ILS IRDH 53
TA 13000
NO A ESCALA
ACL
4.0 DME ILS
7.5 DME BRA
3264
(1342)
FAP
6.2 DME ILS
9.8 DME BRA
GP 3.0°
ELEV 1922
DT-R RWY 18L
ESCALA 1:750 000
DME REQUERIDO
VOR REQUERIDO
ADF REQUERIDO
PRECAUCIÓN: POSIBLES INDICACIONES FALSAS
DE LOC & GP FUERA DEL ÁREA DE COBERTURA.
TRUSTRADA: SUBIR EN RUMBO DE PISTA HASTA CRUZAR DVOR/DME BRA. CONTINUAR EN R-181 BRA HASTA ALCANZAR 6000 ft. VIRAR A LA DERECHA DIRECTO
AL NDB GE PARA INTEGRARSE A LA ESPERA A 6000 ft. NOTA: DURANTE LA MANIOBRA NO SUPERAR 6000 ft
HGT REF ELEV DTHR RWY 18L
CAMBIOS, PRECAUCIONES:
OCA/H
A
B
C
D
STA
CAT I
CAT II
En circuito
(H) sobre 1998
2160 (187)
2120 (199)
2120 (207)
2140 (218)
2720 (730)
2860 (870)
3260 (1290)
3620 (1630)
GS
kt
80
100
120
140
160
180
FAP-THR: 6.2 NM
mins
4:41
3:45
3:07
2:41
2:21
2:05
FAF-MAPT:
mins
ROD: 5.2%
ft/min
425
531
637
743
849
955
ALT/HGT DME (ILS) FNA
13 DME
12 DME
11 DME
10 DME
9 DME
8 DME
7 DME
6 DME
5 DME
4 DME
3 DME
2 DME
1 DME
3920 (2000)
3590 (1670)
3270 (1350)
2940 (1020)
2620 (700)
2300 (380)
WEF 08-NOV-18 (AIRAC AMDT 10/18)
AIP - ESPAÑA
AD 2-LEMD IAC/1.1



OCA/H		A	B	C	D
STA	CAT I	2149 (158)	2161 (170)	2169 (178)	2179 (188)
	CAT II	(70)	(87)	(99)	(113)
En circuito (H) sobre 1998		2720 (730)	2860 (870)	3280 (1290)	3620 (1630)

GS	kt	80	100	120	140	160	180
FAP-THR: 9.1 NM	min:	6:47	5:26	4:32	3:53	3:24	3:01
FAF-MAPT:	min:						
ROD: 5.2%	ft/min	425	531	637	743	849	955

ALT/HGT DME (ILS) FNA										
13 DME	12 DME	11 DME	10 DME	9 DME	8 DME	7 DME	6 DME	5 DME	4 DME	3 DME	2 DME	1 DME
				4990 (3000)	4650 (2660)	4320 (2330)	3990 (2000)	3660 (1670)	3340 (1350)	3010 (1020)	2690 (700)	2373 (380)

Minimum separation on approach to the Adolfo Suárez Madrid-Barajas Airport

The approaches to the Adolfo Suárez Madrid-Barajas Airport are parallel dependent. As the Air Traffic Regulation states, in this case:

"A minimum vertical separation of 300 m (1000 ft) or a minimum radar separation of 5.6 km (3 NM) is required between the two aircraft when turning onto parallel headings on the ILS localizer and/or onto final MSL approach tracks.

The minimum radar separation required for aircraft established on the ILS localizer heading and/or the final MLS approach track shall be:

a) 5.6 km (3 NM) between aircraft on the same ILS localizer heading or on the final MLS approach track, unless greater longitudinal separation is required due to turbulent wake, and
b) 3.7 km (2 NM) between successive aircraft on adjacent ILS localizer headings or adjacent final MLS approach tracks".

Stormy weather procedure

ENAIRE has a procedure for coordinating actions and conveying information during severe adverse situations caused by storms.

The procedure provides guidelines in the event of adverse weather phenomena en route or in the TMA. Since the scenarios are highly diverse, ENAIRE states that the final decision involving the steps to take in a specific case always rests with the Control Room Supervisor in the ACC/TACC (Area Control Center/Terminal Area Control Center) and with the Supervisor/ATCO (air traffic controller) in the TWR (aerodrome control tower).

The procedure differentiates between operations en route, in the TMA and in airport environments.

In the case at hand, operations in the TMA and airport environment, a **pre-alert status** is declared in the following cases:

a) A TAF is available with the following codes and information:
   - TS (thunderstorm) with a probability of PROB30 or higher
   - CB (cumulonimbus) present in more than 3 oktas (SCT, BKN or OVC) with a probability of PROB30 or higher
   - Variable winds gusting to more than 25 knots (in this case, confirm with forecaster the trend and the probability of holding or worsening, request his interpretation)
b) A weather briefing is held that raises the possibility of adverse weather, checking with the forecaster in this regard and having him confirm the information issued as more than likely.

During the pre-alert status, no measures are usually taken unless the Control Room Supervisor decides to take them based on his experience.

If the Control Room Supervisor expects, based on the information available, the pre-alert status to evolve to an alert status, he will check the "Coordination procedure for massive diversions to alternate aerodromes" for potential activation. He will also coordinate with the TWR supervisor to update the ATIS message if necessary, and will inform collateral sectors, including the airport manager, of a potential severe adverse weather situation due to storms in order to alert them to this possibility.

The **alert phase** is initiated in the following cases:

a) A TREND forecast (or notification from the forecaster anticipating the event as very likely, even if not specified in a TREND) is available with the codes:
   - TS (thunderstorm) with a probability of PROB30 or higher
   - CB (cumulonimbus) present in more than 3 oktas (SCT, BKN or OVC)
   - TCU (towering cumulus) present in more than 6 oktas (BKN, OVC)

   In such a situation, the sector's capacity will be reduced by 10 to 20%, approximately.

b) A METAR report (or notification from the forecaster anticipating the event as very likely, even if not specified in a METAR) is available with the codes:
   - CB (cumulonimbus) present in more than 3 oktas (SCT, BKN or OVC)
   - TCU (towering cumulus) present in more than 6 oktas (BKN, OVC)
   - TS (thunderstorm)

   In this situation, the Control Room Supervisor will apply the inflow control measure deemed most adequate.

c) Pilots have systematically requested flight level changes and/or diversions to their aerodrome approach flight paths.

   In such a situation, the sector's capacity will be reduced by 10 to 30%, approximately.

In addition, for the alert phase, the procedure details a series of actions for the different work stations.

Prior incident

On 29 April 2016, while on approach to the Adolfo Suárez Madrid-Barajas Airport, an incident occurred due to a severe storm, as described in CIAIAC report IN-015/2016 and CEANITA file 058/2016.

The report written by CIAIAC did not contain any safety recommendations, since the measures considered by CEANITA and taken by the organizations involved in the incident were deemed appropriate.

The **measures proposed by CEANITA** are listed below:

IMPROVED PRODUCTS AND SERVICES

REC058/16_01. It is recommended that ENAIRE:
Analyze and update, in collaboration with AEMET, the dangers associated with the events of 29 April 2016 and other similar events that may have occurred in other ATS units, and conduct the relevant assessment of the associated risk and produce a catalog of mitigation measures, specifically those involved in the provision of aviation weather information services.

REC058/16_02. It is recommended that ENAIRE:
Analyze jointly with AEMET the improvement of methods to forecast, track and warn of adverse weather conditions, paying specific attention to:

- *The availability of information from AEMET weather radars at the supervisor's post in ACCs and APPs.*
- *Sharing storm warnings and lightning strikes among ACCs and APPs.*
- *Modifying the geographic scope of the weather information products so as to cover areas critical to operations.*

REVISION OF PROCEDURES

REC058/16_03. It is recommended that ENAIRE:
Revise the "Severe Adverse Weather Procedure" in order to incorporate the lessons learned from this event. Specifically, and other aspects notwithstanding, the following should be revised:

- *Compatibility of the procedure with the implementation of local instructions that take into account conditions and circumstances specific to the airspace under the responsibility of the ATS units.*
- *Relationship to other procedures at the airport (Changing the Configuration of the Runways in Use) that have to be carried out sufficiently far in advance for the mitigation measures in the event of adverse weather to be effective.*
- *Identify the areas to consider in every stage of the procedure (preparatory and tactical). Specifically, identify all those tasks that have to be transferred to the pre-alert period to unburden the tactical period, such as managing available parking stands at alternate airports, preparing automated radio messages (ATIS), coordinating with other ATS units, coordinating with airline operations centers, etc.*
- *Prepare records and checklists that allow the procedure to be executed in a standard manner, and guidelines for their application. Keep them flexible enough that complementary measures can be taken based on the experience of supervisory personnel and on the nature of the situation.*

REC058/16_04. It is recommended that ENAIRE:
Revise the scope of the Operational Briefing of air traffic controllers by improving the weather information of interest to the conduct of their activity, specifically as it concerns storm forecasts.

REC058/16_05. It is recommended that EMA and ENAIRE:
Inform controllers at the Torrejón Air Base and the Madrid ACC that the use of the Torrejón Air Base by civil aircraft is limited to emergency situations only.

REC058/16_06. It is recommended that ENAIRE and Aena:
Jointly write a procedure for managing available parking stands at alternate airports in the event of massive diversions of aircraft from a large airport when required by exceptional and/or emergency situations.

REC058/16_07. It is recommended that ENAIRE and Aena:
Once the procedures stemming from recommendations Rec058/16_03 and Rec058/16_06 are written and reviewed, conduct simulation exercises to practice their applications, and take advantage of, for example, the simulation sessions involving exceptional and/or emergency situations.

The **following actions were taken in response to the measures proposed in the CEANITA study**, as detailed in the CIAIAC report published in October 2018:

AEMET Action Plan.

In response to recommendations 58/16_01 and 2, an ENAIRE-AEMET working group was created, which drafted an *AEMET Action Plan* that proposes a set of activities through which AEMET collaborates with ENAIRE to, on the one hand, further the analysis of weather risks and the measures to implement to mitigate them, and on the other, to develop new weather information products and services to enhance the safety of operations.

It should be noted that as concerns *REC058/16_07*, action #3 in the plan states: “Design simulation exercises with adverse weather”.

It also enhances a mutual collaborative mechanism involving operational safety as part of a Joint Commission resulting from the Specific Agreement between the two organizations.

Actions by ENAIRE.

ENAIRE developed an *Action Plan for Severe Adverse Weather Conditions*, which contains the set of actions stemming from the recommendations arising from the various investigations and analyses of the circumstances that occurred in the LECM ACC as a result of the severe adverse weather that took place in the Madrid TMA on 29 April 2016.

Before 29 April 2016, ENAIRE had a *Procedure in the Event of Severe Adverse Weather Due to Storms*, which contained guidelines for responding to adverse weather phenomena en ROUTE and in the TMA, including how to handle any diversions that may occur as a result.

As part of the tasks included in the action plan, the general content of this document was revised, the applicable procedures were combined and the part on diversions was deleted from it.

The circumstances that occurred on the day of the incident highlighted the limitations of the actions considered for managing diversions contained in the procedure in the event of storms. The possibility was also considered that mass diversions could be required by situations other than weather events.

As a consequence, it was deemed necessary to have a document containing the actions for ENAIRE, Aena and EMA to manage mass diversions from busy airports to alternate aerodromes for any reason that prevented the normal operation of the former. The document that resulted from this process was called *Procedure for Coordinating Mass Diversions to Alternate Aerodromes.*

Actions proposed by ENAIRE in its internal reports

To analyze these incidents, ENAIRE prepared two internal reports. In one, it analyzed the "various losses of separation on final approach to LEMD after changing the configuration from North to South", and in the other, "the complex weather situation in the Madrid TMA with the traffic load and the configuration change in LEMD".

In both reports, it proposed the same actions to improve safety:

1. Share the report to evaluate the possibility of conducting simulation exercises in situations similar to those in this event.
2. Analyze the possibility of relaxing the decision-making process for configuration changes so as to take into account not only the surface wind components, but also the weather effect on traffic in the different phases of the approach.
3. Share the report to evaluate the possibility of setting up specific preventive measures for situations like the one described in this event.
4. Analyze in detail the operation of the weather information shown on the radar displays in the UCS in order to determine if this information can be improved.

1.19. Useful or effective investigation techniques

No special investigation techniques were used.

2. ANALYSIS

In addition to analyzing the losses of separation, other factors that led to these losses were analyzed, such as:

- The decision to change configurations at the airport.
- The impact of the configuration change at the airport on the Madrid TMA.
- The stormy weather procedure.
- The suitability of the weather information available to the controllers in the Madrid TMA.
- The weather information broadcast via ATIS.

There were also several non sequiturs in the statements provided by the crews and controllers.

2.1. Analysis of the decision to change the airport configuration

The METAR and SPECI aerodrome weather reports and the statements from the controllers involved in the incident were used to analyze the decision to change the airport's configuration.

For a sudden change in wind speed or direction, as happened in this case, giving rise to the incident, a SPECI is not issued. Thus, although the METAR and SPECI reports include the time when the weather situation at the airport is observed, these reports cannot be used to conclude the exact time when the sudden change in wind direction took place that prompted the configuration change at the airport.

However, before the 19:00 UTC (21:00 local) METAR was issued, between 20:45 and 20:58, seven consecutive go-arounds took place due to the weather conditions. As a result, the change in wind direction must have occurred before 20:45 local time, and therefore prior to the issuance of the METAR that warned of this event.

The communications between the LECM and LEMD supervisors indicate a sudden change in the wind speed and direction. The supervisors spoke with each other about the presence of the storm and the windshear and tail wind reported by crews on short final. The supervising controller in the control tower decided to wait about 5 minutes, in case the wind direction changed again.

The control tower supervisor checked the weather condition with the forecaster, who explained that it involved convective currents of variable direction, and that he estimated they would dissipate in one hour.

Eventually, the decision to change the airport configuration was made at 20:54; that is, 9 minutes after the first aircraft was forced to go around due to the weather conditions.

According to the statements of the supervisory controller in the Madrid TMA and other controllers involved in the incident, they thought that, in light of the weather situation, the

supervisor in the control tower at the airport delayed the decision to change configurations. However, the weather information available to the supervisor in the control tower did not allow him to make a decision. It is therefore recommended that ENAIRE and AEMET work together to improve the weather prediction available in the airport control tower and in the airport's weather office regarding the meteorological conditions at Adolfo Suarez Madrid-Barajas airport.

Moreover, changing the configuration is a critical situation. ENAIRE estimates that following such a change, it takes about 10 minutes to return to normal operations again. And, as the controllers described, the situation was further complicated in this case by the grouping of sectors and a series of technical problems. Therefore, it is necessary that the decision to change configurations involve the supervisor of the Madrid TMA, because of the operational implications of this decision. A recommendation will be issued to ENAIRE to have it review the procedure used to decide whether to change configurations, and to have the supervisor of the Madrid TMA involved in this decision due to the effect of such decision on traffic in the different phases of approximation.

2.2. Analysis of the impact of the airport configuration change on the Madrid TMA

According to the ENAIRE procedure, when the configuration is changed from North to South, the LEMDDWN and LEMDRWN are swapped when working with combined sectors: LEMDDWN/LEMDWNN and LEMDRWN/LEMDWSN. As a result, the controller of the combined LEMDDWN/LEMDWNN sector takes over sectors LEMDWNN/LEMDRWN, and later, in the South configuration, this same controller will take over sectors LEMDDWS/LEMDWSS.

However, the executive controller of the combined LEMDDWN/LEMDWNN sector said in his statement that after the configuration change, he had to swap sectors LEMDWSS and LEMDWNS with a colleague, with him taking over sector LEMDWSS and transferring LEMDWNS.

It is therefore necessary to issue a safety recommendation to ENAIRE to train its air traffic controllers on the procedure for swapping sectors when changing configurations.

2.3. Analysis of the stormy weather procedure

According to the stormy weather procedure, the pre-alert status should have been declared when the 05:00 UTC (07:00 local), 11:00 UTC (13:00 local) and 17:00 UTS (19:00 local) TAFs were received, as these forecast, with a 40% probability, rain storms, variable surface winds of 15 knots, gusting to 27 knots, and scattered cumulonimbus clouds at 2,500 feet.

It is not known when the pre-alert status was declared, since this was not recorded in the logbook. What was reflected in the logbook at LECM is that at 18:10, the forecaster was consulted, and he confirmed that the 11:00 UTC TAF was accurate and that weather conditions would not improve until 01:00 the following day.

Later, prior to the 19:00 UTC METAR, a SPECI report was issued at 18:19 UTC warning of storms and abundant clouds at 7,000 feet.

As recorded in the logbook, personnel requested a reduction in the sector's capacity, which is 51/60. This capacity was lowered to 42/60 for 2 hours. It is therefore deduced that ENAIRE should have declared the pre-alert status after receiving this SPECI. The capacity was changed several times over the course of a few minutes, first to 38/60, then 20/60, followed later by a one-hour period with zero capacity.

This procedure also lays out specific actions for the different work stations; namely, the air controllers, among other actions, have to prioritize vertical separation over lateral and/or longitudinal separation to the extent possible, and to relay the information available to those aircraft that could be affected by storm phenomena, as well as the EAT, and keep them updated. When an EAT cannot be calculated due to the situation present, crews will be notified of this fact and the reason.

During this incident, the controllers should have provided more information to the crews, one of which mentioned that the controller did not properly inform them of the expected delay. The controllers were unable to calculate the EAT due to the prevailing conditions on the day of the incident. The sections that follow analyze the suitability of the weather information available to the controllers in the Madrid TMA, and that was provided to the aircraft via ATIS.

Finally, given that the procedure established by ENAIRE is generic and therefore it does not take into account the operational and geographical context of the Adolfo Suárez Madrid-Barajas airport, ENAIRE is recommended to specify the stormy weather procedure taking into account the operational and geographical features of Adolfo Suarez Madrid-Barajas airport.

2.4. Analysis of the suitability of the weather information available to the air traffic controllers in the Madrid TMA

Having a weather forecast that is as accurate as possible in the Madrid TMA is essential to improving safety during complex weather situations. Having this information would make it possible, for example, for the pre-alert phase in the stormy weather procedure to be more efficient, since now, the pre-alert phase only considers monitoring weather information whose scope is limited to the vicinity of the airport.

In accordance with Annex 3 of the Convention on International Civil Aviation, the METAR and TAF messages inform about the existing meteorological conditions within a radius of 8 kilometers from the airport. As the geographical scope of the TAF is restricted to the vicinity of the airport, it is therefore insufficient to predict storms outside the 8-kilometer environment. In this incident, the TAF forecast temporary intervals of presence of cumulus congestus and, with a 40% probability, gusty winds of variable direction from 20 h.

As AEMET itself acknowledges, although the aerodrome and area prediction products were quite accurate, other type of products, not defined in Annex 3 of the ICAO Convention, are needed. AEMET in cooperation with ENAIRE is working on this issue.

It is therefore proposed that ENAIRE and AEMET continue working together to produce weather measurement and forecasting products that cover the entire volume of the Madrid TMA airspace.

In addition, weather radar is a very valuable tool in adverse weather conditions, and it could have been useful to the controllers in the Madrid TMA in this case. As a result, it is recommended that ENAIRE improves the presentation of meteorological data on the TMA's screen so that the entire Madrid TMA airspace is covered.

2.5. Analysis of the weather information relayed via ATIS

According to the Air Traffic Regulation, the preparation and dissemination of the ATIS message is an air traffic services' responsibility. They need AEMET, as the provider of meteorological services for air navigation, to provide them with accurate and up-to-date information on the weather conditions at the airport.

The ATIS message automatically transmits the METAR message. Storms outside the 8-kilometer environment are not included in METAR or TAF in accordance with Annex 3 of the Convention on International Civil Aviation. As indicated in section 1.7 Meteorological information, until 20:19, METAR did not warn of storms around the airport and as of 21:30 h (19:30 UTC) stopped warning them.

However, the air traffic services provider can manually modify the meteorological information transmitted in the ATIS message. In this sense, the stormy weather procedure specifies that the TWR / CTA supervisor has to update the information provided via ATIS "in order to give pilots information on the current conditions at the aerodrome and its approach that is as reliable as possible".

Information transmitted during this incident via ATIS is in Annex II. It is noted that the ATIS message is normally generated automatically; however, at certain times it is manually modified. In particular, it is observed that:

- At 18:50:26 UTC (20:50:26 h local) the ATIS message is modified manually to inform, among other aspects, that the runways in use are 32R and 32L, that the wind direction is 180º and that moderate wind shear has been reported.

  That is, the air traffic services provider anticipated the METAR that was issued at 19:00 UTC, which reported the wind direction change from 300º, half an hour earlier, to 120º.

  At that time, three go-arounds had already occurred by weather conditions.

- At 18:51:56 UTC (20:51:56 local time) the ATIS message is modified again to inform, among other aspects, that the runways in use are 32R and 32L, that the wind direction is of 180º and that high “wind shear” has been reported.

  At that moment, seven go-arounds had already occurred by weather conditions.

- At 18:59:17 UTC (20:59:17 local) the ATIS message is modified again to inform, among other aspects, that the runways in use are 18L and 18R, that the wind direction is of 140º and high “wind shear” has been reported.

  The change from North Configuration to South Configuration occurred at 20:54 h; whereupon, there were about 5 minutes in which the information provided via ATIS was not updated, as indicated by one of the pilots involved in the incident.

Due to aerodrome observation products (METAR, SPECI, lightning alerts and various weather data measured at sensors) do not cover the entire airspace of Madrid TMA, it is needed to supplement them with new weather products covering beyond 8 kilometers around the airport as recommended in the previous section in order to be able to transmit reliable information to pilots about the situation at the aerodrome and its approach.

2.6. Analysis of the approaches to the Adolfo Suárez Madrid-Barajas Airport

The seven consecutive go-arounds, along with the configuration change at the airport, impeded the management of the sectors. This, along with the adverse weather conditions throughout the Madrid TMA, led to various losses of separation involving the aircraft arriving at the Adolfo Suárez Madrid-Barajas Airport.

The approaches to the airport are parallel dependent, meaning that according to the applicable rule, the minimum radar separation between successive aircraft on adjacent headings to the ILS localizer is 2 NM.

All the losses of separation analyzed below occurred between aircraft that were preparing to land on adjacent tracks, one to runway 18L and the other to runway 18R.

In three of the four losses of separation analyzed, the aircraft were separated by less than 2 NM when they intercepted the localizer. This separation gradually decreased since the aircraft, which were probably intercepting the localizers at a speed in excess of that published in the AIP, were unable to adjust either to the published speed restrictions or to the instructions provided by the controller, if any.

Also, in three of the four losses of separation analyzed, the controller provided traffic information to the aircraft involved in the incident.

However, the controllers are judged to have taken the most suitable tactical actions in an effort to mitigate the situation caused by the adverse weather conditions.

These losses of separation between aircraft are analyzed in the sections below.

2.7. Analysis of loss of separation A

Loss of separation A involved the Airbus A-320, with registration CS-TNQ and callsign TAP1018, and the Bombardier CL600 2E25, with registration EC-LJS and callsign ANE99DJ.

As the radar tracks show, the aircraft intercepted the localizers with a diagonal separation below 2 NM, which is the minimum radar separation between aircraft established on adjacent localizers.

The ground speed of both aircraft when they intercepted the localizer was in excess of 200 knots. The aircraft's IAS is not known, but considering the wind speed at the time of the incident, it is likely that the aircraft were not complying with the speed restriction published in the AIP. The controller instructed both aircraft, when they were 16 NM away from the airport, to lower their speed to 180 knots.

Subsequently, the aircraft with callsign TAP1018, which had a higher speed and was flying behind the aircraft with callsign ANE99DJ, was instructed to reduce its speed to 160 knots. However, this speed restriction did not keep the aircraft from closing even more, since TAP1018 needed some time to adjust its speed to that instructed by the controller.

The controller provided information to the two aircraft, such that both crews were aware that the other aircraft was intercepting the localizer on the parallel runway.

2.8. Analysis of loss of separation B

Loss of separation B involved the Boeing 737-800, with registration EI-FZR and callsign RYR290B, and the Bombardier CL600 2E25, with registration EC-LJR and callsign ANE8825.

As the radar tracks show, the aircraft intercepted the localizers with a diagonal separation below 2 NM. Both aircraft had a ground speed in excess of 200 knots when they intercepted the localizers. As stated in the previous section, the IAS of the aircraft are not known, but considering the wind speed at the time of the incident, it is likely that the aircraft were not complying with the speed restriction published in the AIP.

The controller instructed both aircraft to lower their speed to 160 knots. The controller later informed the aircraft with callsign ANE8825 that it had a light aircraft ahead of it, and instructed it to reduce its speed at its discretion.

By the time the horizontal distance between them had fallen below 2 NM, the ground speed of the aircraft with callsign ANE8825 was 130 knots, and the ground speed of the aircraft with callsign RYR290B was 200 knots. In other words, the horizontal separation between the two aircraft was lost due to the large difference in their speeds.

The aircraft with callsign RYR290B also asked the controller if the traffic that was ahead of it was going to land on the same runway. The controller replied that there was no traffic ahead of it, and that the traffic at its 11 o'clock was going to land on the other runway. And so, even though the controller did not take the initiative to provide traffic information to both aircraft, at least one of the crews was aware that the other aircraft was intercepting the localizer for the parallel runway.

2.9. Analysis of loss of separation C

Loss of separation C involved the Airbus A-320-216, with registration EC-LYM and callsign IBS36BK, and the Boeing 737-800, with registration EI-FTY and callsign RYR54AH.

The controller informed the aircraft with callsign IBS36BK that the traffic ahead of it was heavy and gave it instructions to reduce its speed in order to maintain the distance between them.

By the time the aircraft with callsign RYR54AH intercepted the runway 18L localizer, it was already separated by less than 2 NM from the other aircraft. The controller informed it that there was traffic on the other runway, so at least one of the crews was aware of the presence of the other aircraft.

As in the previous losses of separation, the ground speed of both aircraft upon intercepting the localizer was in excess than 200 knots. In this loss of separation, the controller did not provide any type of instruction to the aircraft involved regarding what speed to maintain. Since one aircraft was making the approach faster than the other, the distance between them gradually decreased.

2.10. Analysis of loss of separation D

Loss of separation D involved the Boeing 737-800, registration EC-LXV and callsign AEA5BN, and the Airbus A330-200, registration EC-LVL and callsign AEA7EY.

As the two aircraft intercepted the runway localizers, they were separated by less than 2 NM.

The controller informed the crew of the aircraft with callsign AEA5BN of the traffic ahead of it; however, at no time did the controller inform the aircraft involved in the incident that they were each intercepting the localizer for their respective parallel runway.

During this loss of separation, the controller did not provide any type of instruction to the aircraft involved on what speed to maintain. Since one aircraft was approaching at a higher speed than the other one, the distance between them gradually grew closer.

3. CONCLUSIONS

3.1. Findings

- The crews of most the aircraft involved in the incident had valid licenses and medical certificates[28].
- The controllers in the units involved in the incident had valid licenses, unit endorsements and medical certificates.
- The aircraft's documents were valid and they were airworthy.
- At 20:19, a SPECI report was issued warning of storms in the vicinity of the airport and broken clouds at 7,000 feet.
- At 20:30, a METAR was issued that was similar to the SPECI.
- At 20:38, the TMA supervisor requested that capacity be lowered to 42/60 due to multiple diversions because of storms.
- At 20:45, the first go-around took place.
- At 20:54, the control tower supervisor informed the Madrid TMA supervisor of the change in configuration from North to South. By that point, four aircraft had gone around.
- In all, seven[29] aircraft executed go-arounds due to the weather conditions.
- In the South configuration, four loss of separation events took place.
- The information provided by ATIS on the weather situation at the airport was outdated.
- The air controllers did not have adequate weather information.

3.2. Causes/Contributing factors

The investigation has determined that these losses of separation were caused by the complex operational situation in the airspace of the Madrid TMA.

The following contributed to the incident:

- The unavailability of weather information tools that cover the entire airspace of the Madrid TMA.
- The sudden change in weather conditions, and specifically, in the wind speed and direction.
- The time needed to make the decision to change the runway configuration.

[28] The status of the licenses of two crews could not be determined.

[29] Although the air traffic controllers involved in the incident indicate that there were 9 go-arounds, according to ENAIRE's internal report and the ATC logbook of the LECM unit there were 7 aircraft that executed go-arounds consecutively.

4. SAFETY RECOMMENDATIONS

The weather information available to the supervisor in the control tower at the aerodrome was not enough to make the decision to change the airport's configuration. In fact, in this incident, the airport configuration change decision was taken when several consecutive go-arounds had already occurred due to weather conditions.

REC 16/19 It is recommended that ENAIRE collaborate with AEMET to improve the weather forecast available at the airport control tower and at the airport's weather office of the weather conditions at the Adolfo Suarez Madrid-Barajas airport.

REC 17/19 It is recommended that AEMET collaborate with ENAIRE to improve the weather forecast available at the airport control tower and at the airport's weather office of the weather conditions at the Adolfo Suarez Madrid-Barajas airport

It is also necessary that the supervisor of the Madrid TMA be involved in the decision to change configurations, due to the operational implications of this decision. Therefore,

REC 18/19 It is recommended that ENAIRE revise the procedure in place for changing configurations and involve the supervisor of the Madrid TMA in this decision.

The investigation noted that the procedure for swapping sectors when changing configurations may have been misunderstood, therefore:

REC 19/19. It is recommended that ENAIRE train its air traffic controllers on the procedure for swapping sectors when changing configurations.

Since the established stormy weather procedure is generic and does not take into account the operational and geographical context of the Adolfo Suárez Madrid-Barajas airport, the following recommendation is proposed:

REC 20/19: It is recommended that ENAIRE specify the stormy weather procedure taking into account the operational and geographical features of Adolfo Suárez Madrid-Barajas airport.

Furthermore, the weather information available to controllers at the Madrid TMA is insufficient in situations like the one analyzed in this report, therefore:

REC 21/19 It is recommended that ENAIRE continue collaborating with AEMET to prepare weather measurement and forecasting products that cover the entire volume of the Madrid TMA airspace.

REC 22/19. It is recommended that AEMET continue collaborating with ENAIRE to prepare weather measurement and forecasting products that cover the entire volume of the Madrid TMA airspace.

In addition, a weather radar is a very valuable tool in adverse weather conditions, and it could have been useful to the controllers in the Madrid TMA. As a result:

REX 23/19. It is recommended that ENAIRE improve how weather data are displayed on the screen such that they span the entirety of the Madrid TMA airspace.

ANNEX I: ADDITIONAL WEATHER INFORMATION

The SIGMET messages issued for the FIR / UIR of Madrid, indicate the areas of stormy activity observed and forecasted throughout the day. During the previous night the activity areas correspond to the peninsular southeast. Throughout the morning and first hours of the afternoon, activity was developed in areas of the Pyrenees, Iberian System, Montes de Toledo, Cantabrian Mountains and Central System.

The SIGMET messages issued on the day of the incident were:

ZCZC
WSSP31 LEMM 270318
LECM SIGMET 1 VALID 270317/270700 LEVA-
LECM MADRID FIR/UIR EMBD TS OBS AT 0317Z WI N3706 W00340 - N3518 W00343 - N3509 W00208 - N3705 W00212 - N3706 W00340 TOP FL310 MOV N NC=NNNN

ZCZC
WSSP31 LEMM 270846
LECM SIGMET 2 VALID 270845/271100 LEVA-
LECM MADRID FIR/UIR EMBD TS FCST WI N3637 W00156 - N3644 W00355 - N3821 W00348 - N3822 W00203 - N3637 W00156 TOP FL340 MOV N NC=NNNN

ZCZC
WSSP31 LEMM 271045
LECM SIGMET 3 VALID 271100/271300 LEVA-
LECM MADRID FIR/UIR EMBD TS FCST WI N3956 W004 - N3956 W00059 - N3707 W00156 - N3707 W004 - N3956 W004 TOP FL340 MOV N NC=NNNN

ZCZC
WSSP31 LEMM 271214
LECM SIGMET 4 VALID 271208/271500 LEVA-
LECM MADRID FIR/UIR EMBD TS OBS AT 1208Z WI N4218 W00236 - N4155 W00114 - N3956 W00102 - N3957 W00242 - N4218 W00236 TOP FL340 STNR INTSF=NNNN

ZCZC
WSSP31 LEMM 271217
LECM SIGMET 5 VALID 271216/271500 LEVA-
LECM MADRID FIR/UIR EMBD TS OBS AT 1216Z WI N4259 W00103 - N4210 W00113 - N4204 W00016 - N4246 W00001 - N4259 W00103 TOP FL360 STNR INTSF=NNNN

ZCZC
WSSP31 LEMM 271234
LECM SIGMET 6 VALID 271300/271500 LEVA-
LECM MADRID FIR/UIR EMBD TS FCST WI N3956 W004 - N3956 W00059 - N3707 W00156 - N3707 W004 - N3956 W004 TOP FL340 MOV N NC=NNNN

ZCZC

WSSP31 LEMM 271447
LECM SIGMET 7 VALID 271500/271800 LEVA-
LECM MADRID FIR/UIR EMBD TS FCST E OF LINE N4249 W00530 - N3718 W00723 TOP FL380 MOV NE NC=NNNN

ZCZC
WSSP31 LEMM 271716
LECM SIGMET 8 VALID 271800/272000 LEVA-
LECM MADRID FIR/UIR EMBD TS FCST WI N4133 W00611 - N4301 W00127 - N4237 W00001 - N3657 W00152 - N3716 W00456 - N3843 W00650 - N4133 W00611 TOP FL380 STNR NC=NNNN

ZCZC
WSSP31 LEMM 271951
LECM SIGMET 9 VALID 272000/272200 LEVA-
LECM MADRID FIR/UIR EMBD TS FCST WI N4303 W00127 - N4157 W00624 - N3759 W00617 - N3935 W00106 - N4235 W00003 - N4303 W00127 TOP FL380 STNR NC=NNNN

ZCZC
WSSP31 LEMM 272141
LECM SIGMET 10 VALID 272200/280100 LEVA-
LECM MADRID FIR/UIR EMBD TS FCST WI N4246 W00047 - N4131 W00616 - N3801 W00554 - N4051 W00041 - N4234 W00007 - N4246 W00047 TOP FL380 STNR NC=NNNN

ZCZC
WSSP31 LEMM 272349
LECM SIGMET 11 VALID 272349/280100 LEVA-
LECM MADRID FIR/UIR CNL SIGMET 10 VALID 272200/280100=NNNN

ZCZC
WSSP31 LEMM 272352
LECM SIGMET 12 VALID 272352/280300 LEVA-
LECM MADRID FIR/UIR EMBD TS OBS AT 2350Z E OF LINE N4259 W00118 - N4025 W00122 TOP FL380 MOV N NC=NNNN

Los GAMET emitidos recogen una situación similar a la recogida en los mapas de Baja Cota, destacando la nubosidad convectiva presente en las zonas señaladas, y no proporcionando valores previstos significativos de vientos en altura.

Se muestra a continuación los mensajes **GAMET** emitidos el día del incidente fueron:

ZCZC
FASP40 LEMM 270500
LECM GAMET VALID 270900/271500 LEVA-

LECM MADRID FIR/1 BLW FL150
SECN I
SFC VIS: LCA S OF LINE N42 W009 - N4330 W007 - N4330 W00140 - N4250 W00010 2000-4000M SHRA
SIGWX: C CANTABRICA, MT LEON ; E OF LINE N4320 W00150 - N39 W00520 ISOL/EMBD TS
SIG CLD: S OF LINE N42 W009 - N4330 W007 - N4330 W00140 - N4250 W00010 ISOL CB TCU 03000-04000/ABV 15000FT AMSL C CANTABRICA, MT LEON ; E OF LINE N4320 W00150 - N39 W00520 ISOL/EMBD CB TCU 03000-04000/ABV 15000FT AMSL
SECN II
PSYS: 12 AZORES AREA H 1028HPA STNR NC 12 N40 E003 L 1012HPA STNR NC

WIND/T:	LA CORUNA	MADRID	SANTANDER	ZARAGOZA
	N4330 W00838	N4049 W00359	N4342 W00382	N4166 W00101
02000FT	282/009KT PS11	247/003KT PS23	006/005KT PS12	029/003KT PS19
05000FT	237/011KT PS06	245/004KT PS13	218/011KT PS11	019/008KT PS14
10000FT	254/012KT MS01	208/011KT PS01	210/013KT PS00	210/006KT PS01
15000FT	251/010KT MS10	193/019KT MS08	197/020KT MS09	197/015KT MS07

CLD: W OF LINE N42 W00850 - N4340 W007 - N4450 W007 AND N OF LINE N4330 W007 - N4320 W00150 BKN/LCA BKN CU SC AC 01500-03000/04000-10000FT AMSL S OF LINE N42 W009 - N4330 W007 - N4330 W00140 - N4250 W00010 BKN/LCA BKN CU SC AC AS 02500-05000/10000-13000FT AMSL
FZLVL: 09300FT AMSL 10800FT AMSL 09900FT AMSL 10700FT AMSL
MNM QNH:1013 HPA=NNNN

ZCZC
FASP40 LEMM 270500
LECM GAMET VALID 270900/271500 LEVA-
LECM MADRID FIR/1 BLW FL150
SECN I
SFC VIS: LCA S OF LINE N42 W009 - N4330 W007 - N4330 W00140 - N4250 W00010 2000-4000M SHRA
SIGWX: C CANTABRICA, MT LEON ? E OF LINE N4320 W00150 - N39 W00520 ISOL/EMBD TS
SIG CLD: S OF LINE N42 W009 - N4330 W007 - N4330 W00140 - N4250 W00010 ISOL CB TCU 03000-04000/ABV 15000FT AMSL C CANTABRICA, MT LEON ? E OF LINE N4320 W00150 - N39 W00520 ISOL/EMBD CB TCU 03000-04000/ABV 15000FT AMSL
SECN II
PSYS: 12 AZORES AREA H 1028HPA STNR NC 12 N40 E003 L 1012HPA STNR NC

WIND/T:	LA CORUNA	MADRID	SANTANDER	ZARAGOZA
	N4330 W00838	N4049 W00359	N4342 W00382	N4166 W00101
02000FT	282/009KT PS11	247/003KT PS23	006/005KT PS12	029/003KT PS19
05000FT	237/011KT PS06	245/004KT PS13	218/011KT PS11	019/008KT PS14
10000FT	254/012KT MS01	208/011KT PS01	210/013KT PS00	210/006KT PS01

15000FT 251/010KT MS10 193/019KT MS08 197/020KT MS09 197/015KT MS07
CLD: W OF LINE N42 W00850 - N4340 W007 - N4450 W007 AND N OF LINE N4330 W007 - N4320 W00150 BKN/LCA BKN CU SC AC 01500-03000/04000-10000FT AMSL S OF LINE N42 W009 - N4330 W007 - N4330 W00140 - N4250 W00010 BKN/LCA BKN CU SC AC AS 02500-05000/10000-13000FT AMSL
FZLVL: 09300FT AMSL 10800FT AMSL 09900FT AMSL 10700FT AMSL
MNM QNH:1013 HPA=NNNN

ZCZC
FASP40 LEMM 271100
LECM GAMET VALID 271500/272100 LEVA-
LECM MADRID FIR/1 BLW FL150
SECN I
SFC VIS: LCA N OF LINE N4330 W00610 - N4310 W002 0800-4000M DZ/RA LCA S OF LINE N4330 W00630 - N4310 W00120 - N4250 00000 2000-4000M SHRA
SIGWX: S OF LINE N4310 W00540 - N43 W002 - N41 W00050, PIRINEOS ISOL/EMBD TS
MT OBSC: CORDILLERA CANTABRICA, PIRINEOS, SISTEMA IBERICO
SIG CLD: S OF LINE N4330 W00630 - N4310 W00120 - N4250 00000 ISOL CB TCU 04000-05000/ABV 15000FT AMSL S OF LINE N4310 W00540 - N43 W002 - N41 W00050, PIRINEOS ISOL/EMBD CB TCU 04000-05000/ABV 15000FT AMSL W OF LINE N4440 W006 - N4340 W006 - N42 W007 BKN/LCA BKN ST SC 01000-02000/04000-06000FT AMSL
SECN II
PSYS: 18 MEDITERRANEO L 1012HPA STNR NC 18 AZORES H 1028HPA STNR NC
WIND/T: LA CORUNA MADRID SANTANDER ZARAGOZA
N4330 W00838 N4049 W00359 N4342 W00382 N4166 W00101
02000FT 277/008KT PS11 253/007KT PS22 333/006KT PS12 334/008KT PS20
05000FT 289/008KT PS06 247/010KT PS14 076/007KT PS09 016/007KT PS13
10000FT 253/010KT PS00 180/005KT PS01 213/007KT PS01 084/006KT PS03
15000FT 220/009KT MS10 290/009KT MS08 219/013KT MS08 136/008KT MS07
CLD: N OF LINE N4330 W00610 - N4310 W002 BKN/LCA BKN CU SC AC 01500-02500/06000-12000FT AMSL S OF LINE N4330 W00630 - N4310 W00120 - N4250 00000 BKN/LCA BKN CU AC 04000-05000/14000-ABV 15000FT AMSL
FZLVL: 10000FT AMSL 10800FT AMSL 10500FT AMSL 11600FT AMSL
MNM QNH:1011 HPA=NNNN

ZCZC
FASP40 LEMM 271700
LECM GAMET VALID 272100/280300 LEVA-
LECM MADRID FIR/1 BLW FL150
SECN I

SFC VIS: LCA WI N42 W00250 - N43 W00610 - N4210 W00640 - N41 W003 3000M RA/SHRA LCA E OF LINE N44 W003 - N39 W003 3000M SHRA LCA W OF LINE N44 W00310 - N4210 W003 - N43 W00610 - N42 W00650 0800-3000M FG/BR

SIGWX: E OF LINE N44 W003 - N39 W003 OCNL/EMBD TS

MT OBSC: SISTEMA IBERICO, PIRINEOS, MONTES DE LEON AND CANTABRICO

SIG CLD: WI N42 W00250 - N43 W00610 - N4210 W00640 - N41 W003 ISOL TCU 02500-03000/ABV15000FT AMSL E OF LINE N44 W003 - N39 W003 OCNL CB TCU 04000-06000/ABV15000FT AMSL

SECN II

PSYS: 00 MEDITERRANEO L 1012HPA STNR NC 00 AZORES H 1028HPA STNR NC

WIND/T:	LA CORUNA	MADRID	SANTANDER	ZARAGOZA
	N4330 W00838	N4049 W00359	N4342 W00382	N4166 W00101
02000FT	334/004KT PS10	249/007KT PS16	350/007KT PS11	325/016KT PS15
05000FT	021/004KT PS06	292/011KT PS11	099/009KT PS07	073/009KT PS12
10000FT	180/003KT MS01	254/010KT PS01	153/007KT PS01	101/013KT PS03
15000FT	152/010KT MS11	116/008KT MS08	155/011KT MS08	119/018KT MS08
FZLVL:	09500FT AMSL	10800FT AMSL	10700FT AMSL	11500FT AMSL

MNM QNH:1011 HPA=NNNN

ZCZC
FASP40 LEMM 272300
LECM GAMET VALID 280300/280900 LEVA-
LECM MADRID FIR/1 BLW FL150
SECN I:

SFC VIS: N OF N4020 2000-4000M SHRA/RA

SIG WX: E OF LINE N44 W00230 - N40 W003 ISOL/EMBD TSRA

MT OBSC: LCA CORDILLERA CANTABRICA, PIRINEOS, MT GALICIA AND SISTEMA IBERCO

SIG CLD: E OF LINE N44 W00230 - N40 W003 ISOL/EMBD TCU CB 02500-05000/ABV 15000FT AMSL N OF LINE N41 W00720 - NN40 00000 BKN/LCA BKN ST CU AC AS 02500-05000/12000-ABV 15000FT AMSL W OF LINE N45 W006 N42 W008 LCA BKN ST SC 01500- 03500/04000-06000FT AMSL

SECN II:

PSYS: 06 E PENINSULA IBERICA L 1014HPA STNR WKN 06 AZORES H 1028HPA EXTD W PENINSULA IBERICA STNR NC

WIND/T:	LA CORUNA	MADRID	SANTANDER	ZARAGOZA
	N4330 W00838	N4049 W00359	N4342 W00382	N4166 W00101
02000FT	002/013KT PS10	301/001KT PS14	335/006KT PS11	008/010KT PS13
05000FT	014/010KT PS06	024/011KT PS10	022/007KT PS06	126/018KT PS10
10000FT	203/003KT PS00	327/011KT PS00	080/011KT PS00	094/018KT PS02
15000FT	145/010KT MS10	001/010KT MS09	143/011KT MS08	094/021KT MS08
FZLVL:	09800FT AMSL	10200FT AMSL	10200FT AMSL	11000FT AMSL

MNM QNH:1012 HPA=NNNN

There was not any AIRMET.

ANEXO II: INFORMATION TRANSMITTED VÍA ATIS

26/11/2019 5:22:17

Aena Aeropuertos Españoles y Navegación Aérea

Fecha y Hora	Usuario	Generación	Tipo	Mensaje
27/05/2018 16:40:31		automatico	ATIS_ARRIVAL	LEMD INFO ARR I TIME 1640 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 TWY A26 A27 CLSD FLOCK OF LARGE BIRDS IN FNA WIND 320 DEG 7 KT VRB BTN 270 AND 350 DEG VIS 10 KM OR MORE CLD FEW 6000 FT BKN 8000 FT T 25 DP 9 QNH 1011 NOSIG
27/05/2018 16:40:35		automatico	ATIS_DEPARTURE	LEMD INFO DEP X TIME 1630 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 280 DEG 10 KT VRB BTN 240 AND 310 DEG VIS 10 KM OR MORE CLD FEW 6000 FT BKN 8000 FT T 25 DP 8 QNH 1011 NOSIG
27/05/2018 16:50:32		automatico	ATIS_ARRIVAL	LEMD INFO ARR J TIME 1650 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 TWY A26 A27 CLSD FLOCK OF LARGE BIRDS IN FNA WIND 310 DEG 6 KT VRB BTN 270 AND 350 DEG VIS 10 KM OR MORE CLD FEW 6000 FT BKN 8000 FT T 25 DP 9 QNH 1011 NOSIG
27/05/2018 16:50:35		automatico	ATIS_DEPARTURE	LEMD INFO DEP Y TIME 1640 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 270 DEG 8 KT VRB BTN 250 AND 330 DEG VIS 10 KM OR MORE CLD FEW 6000 FT BKN 8000 FT T 25 DP 9 QNH 1011 NOSIG
27/05/2018 17:00:31		automatico	ATIS_ARRIVAL	LEMD INFO ARR K TIME 1700 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 TWY A26 A27 CLSD FLOCK OF LARGE BIRDS IN FNA WIND 290 DEG 8 KT VRB BTN 260 AND 330 DEG VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7700 FT T 24 DP 10 QNH 1011 NOSIG
27/05/2018 17:00:35		automatico	ATIS_DEPARTURE	LEMD INFO DEP Z TIME 1650 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 280 DEG 6 KT VIS 10 KM OR MORE CLD FEW 6000 FT BKN 8000 FT T 25 DP 9 QNH 1011 NOSIG
27/05/2018 17:10:31		automatico	ATIS_ARRIVAL	LEMD INFO ARR L TIME 1710 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 TWY A26 A27 CLSD FLOCK OF LARGE BIRDS IN FNA WIND 300 DEG 14 KT VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7700 FT T 24 DP 11 QNH 1012 NOSIG
27/05/2018 17:10:33		automatico	ATIS_DEPARTURE	LEMD INFO DEP A TIME 1700 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 280 DEG 11 KT VRB BTN 260 AND 320 DEG VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7700 FT T 24 DP 11 QNH 1011 NOSIG

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26/11/2019 5:22:17

Aena Aeropuertos Españoles y Navegación Aérea

Fecha y Hora	Usuario	Generación	Tipo	Mensaje
27/05/2018 17:20:32		automatico	ATIS_ARRIVAL	LEMD INFO ARR M TIME 1720 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 TWY A26 A27 CLSD FLOCK OF LARGE BIRDS IN FNA WIND 290 DEG 12 KT VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7700 FT T 24 DP 11 QNH 1012 NOSIG
27/05/2018 17:20:34		automatico	ATIS_DEPARTURE	LEMD INFO DEP B TIME 1710 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 270 DEG 14 KT VRB BTN 240 AND 300 DEG VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7700 FT T 24 DP 11 QNH 1012 NOSIG
27/05/2018 17:30:32		automatico	ATIS_ARRIVAL	LEMD INFO ARR N TIME 1730 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 TWY A26 A27 CLSD FLOCK OF LARGE BIRDS IN FNA WIND 300 DEG 9 KT VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7700 FT T 23 DP 10 QNH 1012 NOSIG
27/05/2018 17:30:34		automatico	ATIS_DEPARTURE	LEMD INFO DEP C TIME 1720 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 270 DEG 11 KT VRB BTN 250 AND 330 DEG VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7700 FT T 24 DP 11 QNH 1012 NOSIG
27/05/2018 17:40:33		automatico	ATIS_ARRIVAL	LEMD INFO ARR O TIME 1740 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 TWY A26 A27 CLSD FLOCK OF LARGE BIRDS IN FNA WIND 300 DEG 8 KT VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7700 FT T 23 DP 10 QNH 1012 NOSIG
27/05/2018 17:40:34		automatico	ATIS_DEPARTURE	LEMD INFO DEP D TIME 1730 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 270 DEG 14 KT VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7700 FT T 23 DP 10 QNH 1012 NOSIG
27/05/2018 17:42:50	torre2	manual	ATIS_ARRIVAL	LEMD INFO ARR P TIME 1742 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 WIND 300 DEG 8 KT VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7700 FT T 23 DP 10 QNH 1012 NOSIG
27/05/2018 17:50:32		automatico	ATIS_ARRIVAL	LEMD INFO ARR Q TIME 1750 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 WIND 310 DEG 10 KT VRB BTN 250 AND 330 DEG VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7700 FT T 23 DP 10 QNH 1012 NOSIG

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26/11/2019 5:22:17

Aena Aeropuertos Españoles y Navegación Aérea

Fecha y Hora	Usuario	Generación	Tipo	Mensaje
27/05/2018 17:50:34		automatico	ATIS_DEPARTURE	LEMD INFO DEP E TIME 1740 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 280 DEG 11 KT VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7700 FT T 23 DP 10 QNH 1012 NOSIG
27/05/2018 18:00:26		automatico	ATIS_ARRIVAL	LEMD INFO ARR R TIME 1800 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 WIND 310 DEG 12 KT VRB BTN 280 AND 340 DEG VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7500 FT T 23 DP 9 QNH 1012 NOSIG
27/05/2018 18:00:29		automatico	ATIS_DEPARTURE	LEMD INFO DEP F TIME 1750 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 290 DEG 10 KT VRB BTN 270 AND 330 DEG VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7700 FT T 23 DP 10 QNH 1012 NOSIG
27/05/2018 18:10:26		automatico	ATIS_ARRIVAL	LEMD INFO ARR S TIME 1810 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 WIND 320 DEG 11 KT VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7500 FT T 22 DP 10 QNH 1012 NOSIG
27/05/2018 18:10:29		automatico	ATIS_DEPARTURE	LEMD INFO DEP G TIME 1800 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 290 DEG 9 KT VRB BTN 270 AND 330 DEG VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7500 FT T 23 DP 9 QNH 1012 NOSIG
27/05/2018 18:17:02		automatico	ATIS_ARRIVAL	LEMD INFO ARR T TIME 1816 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 WIND 320 DEG 9 KT VIS 10 KM OR MORE CLD FEW CB 6000 FT SCT 7500 FT T 22 DP 10 QNH 1012 NOSIG
27/05/2018 18:17:05		automatico	ATIS_DEPARTURE	LEMD INFO DEP H TIME 1810 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 300 DEG 10 KT VIS 10 KM OR MORE CLD FEW 6000 FT SCT 7500 FT T 22 DP 10 QNH 1012 NOSIG
27/05/2018 18:20:26		automatico	ATIS_ARRIVAL	LEMD INFO ARR U TIME 1820 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 WIND 320 DEG 10 KT VIS 10 KM OR MORE CLD FEW CB 6000 FT SCT 7500 FT T 22 DP 10 QNH 1012 NOSIG
27/05/2018 18:20:29		automatico	ATIS_DEPARTURE	LEMD INFO DEP I TIME 1816 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 300 DEG 9 KT VIS 10 KM OR MORE CLD FEW CB 6000 FT SCT 7500 FT T 22 DP 10 QNH 1012 NOSIG

26/11/2019 5:22:17

Aena Aeropuertos Españoles y Navegación Aérea

Fecha y Hora	Usuario	Generación	Tipo	Mensaje
27/05/2018 18:23:04		automatico	ATIS_ARRIVAL	LEMD INFO ARR V TIME 1822 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 WIND 320 DEG 9 KT VIS 10 KM OR MORE VCTS CLD FEW CB 6000 FT BKN 7000 FT T 22 DP 9 QNH 1012 TEMPO TS WITHOUT PRECIPITATION
27/05/2018 18:23:06		automatico	ATIS_DEPARTURE	LEMD INFO DEP J TIME 1820 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 300 DEG 8 KT VIS 10 KM OR MORE CLD FEW CB 6000 FT SCT 7500 FT T 22 DP 10 QNH 1012 NOSIG
27/05/2018 18:30:28		automatico	ATIS_ARRIVAL	LEMD INFO ARR W TIME 1830 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 WIND 310 DEG 7 KT VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 22 DP 9 QNH 1012 TEMPO TS WITHOUT PRECIPITATION
27/05/2018 18:30:30		automatico	ATIS_DEPARTURE	LEMD INFO DEP K TIME 1822 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 300 DEG 9 KT VRB BTN 280 AND 340 DEG VIS 10 KM OR MORE VCTS CLD FEW CB 6000 FT BKN 7000 FT T 22 DP 9 QNH 1012 TEMPO TS WITHOUT PRECIPITATION
27/05/2018 18:40:11	torre2	manual	ATIS_ARRIVAL	LEMD INFO ARR X TIME 1840 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 FLOCK OF BIRDS IN FNA WIND 310 DEG 7 KT VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 22 DP 9 QNH 1012 TEMPO TS WITHOUT PRECIPITATION
27/05/2018 18:40:28		automatico	ATIS_ARRIVAL	LEMD INFO ARR Y TIME 1840 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 145 FLOCK OF BIRDS IN FNA WIND 330 DEG 4 KT VRB BTN 260 AND 010 DEG VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 22 DP 9 QNH 1012 TEMPO TS WITHOUT PRECIPITATION
27/05/2018 18:40:31		automatico	ATIS_DEPARTURE	LEMD INFO DEP L TIME 1830 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 300 DEG 7 KT VRB BTN 280 AND 340 DEG VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 22 DP 9 QNH 1012 TEMPO TS WITHOUT PRECIPITATION

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Fecha y Hora	Usuario	Generación	Tipo	Mensaje
27/05/2018 18:50:26	torre2	manual	ATIS_ARRIVAL	LEMD INFO ARR Z TIME 1850 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 140 FLOCK OF BIRDS IN FNA WIND 180 DEG 10 KT VRB BTN 120 AND 230 DEG VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 20 DP 12 QNH 1013 TEMPO TS WITHOUT PRECIPITATION MODERATE WIND SHEAR REPORTED IN FNA
27/05/2018 18:50:32		automatico	ATIS_DEPARTURE	LEMD INFO DEP M TIME 1840 RWY IN USE 36R AND 36L TRL 145 TWY N6 N9 CLSD WIND 280 DEG 6 KT VRB BTN 250 AND 330 DEG VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 22 DP 9 QNH 1012 TEMPO TS WITHOUT PRECIPITATION
27/05/2018 18:51:56	torre2	manual	ATIS_ARRIVAL	LEMD INFO ARR A TIME 1851 EXPECT ILS Z APCH RWY IN USE 32R AND 32L TRL 140 FLOCK OF BIRDS IN FNA WIND 180 DEG 10 KT VRB BTN 120 AND 230 DEG VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 20 DP 12 QNH 1013 TEMPO TS WITHOUT PRECIPITATION HVY WIND SHEAR REPORTED
27/05/2018 18:52:08	torre1	manual	ATIS_DEPARTURE	LEMD INFO DEP N TIME 1850 RWY IN USE 36R AND 36L TRL 140 TWY N6 N9 CLSD WIND 130 DEG 10 KT MAX 14 MNM 0 KT VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 20 DP 12 QNH 1013 TEMPO TS WITHOUT PRECIPITATION
27/05/2018 18:59:01	torre1	manual	ATIS_DEPARTURE	LEMD INFO DEP O TIME 1852 RWY IN USE 36R AND 36L TRL 140 TWY N6 N9 CLSD WIND 130 DEG 10 KT MAX 14 MNM 0 KT VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 20 DP 12 QNH 1013 TEMPO TS WITHOUT PRECIPITATION HVY WIND SHEAR REPORTED
27/05/2018 18:59:17	torre2	manual	ATIS_ARRIVAL	LEMD INFO ARR B TIME 1859 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 140 DEG 13 KT MAX 24 MNM 8 KT VRB BTN 110 AND 170 DEG VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 20 DP 12 QNH 1013 TEMPO TS WITHOUT PRECIPITATION HVY WIND SHEAR REPORTED

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Fecha y Hora	Usuario	Generación	Tipo	Mensaje
27/05/2018 19:00:28		automatico	ATIS_ARRIVAL	LEMD INFO ARR C TIME 1900 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 180 DEG 7 KT VRB BTN 130 AND 280 DEG VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 19 DP 13 QNH 1013 BECMG NSW HVY WIND SHEAR REPORTED
27/05/2018 19:00:31		automatico	ATIS_DEPARTURE	LEMD INFO DEP P TIME 1858 RWY IN USE 14L 14R TRL 140 TWY N6 N9 CLSD WIND 120 DEG 17 KT VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 20 DP 12 QNH 1013 TEMPO TS WITHOUT PRECIPITATION HVY WIND SHEAR REPORTED
27/05/2018 19:10:29		automatico	ATIS_ARRIVAL	LEMD INFO ARR D TIME 1910 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 140 DEG 9 KT VRB BTN 100 AND 170 DEG VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 18 DP 13 QNH 1013 BECMG NSW HVY WIND SHEAR REPORTED
27/05/2018 19:10:32		automatico	ATIS_DEPARTURE	LEMD INFO DEP Q TIME 1900 RWY IN USE 14L 14R TRL 140 TWY N6 N9 CLSD WIND 120 DEG 16 KT VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 19 DP 13 QNH 1013 BECMG NSW HVY WIND SHEAR REPORTED
27/05/2018 19:12:56	torre1	manual	ATIS_DEPARTURE	LEMD INFO DEP R TIME 1910 RWY IN USE 14L 14R TRL 140 TWY N6 N9 CLSD WIND 120 DEG 13 KT VRB BTN 100 AND 170 DEG VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 18 DP 13 QNH 1013 BECMG NSW HVY WIND SHEAR REPORTED
27/05/2018 19:20:30		automatico	ATIS_ARRIVAL	LEMD INFO ARR E TIME 1920 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 140 DEG 7 KT VRB BTN 080 AND 170 DEG VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 18 DP 13 QNH 1013 BECMG NSW HVY WIND SHEAR REPORTED
27/05/2018 19:20:31		automatico	ATIS_DEPARTURE	LEMD INFO DEP R TIME 1912 RWY IN USE 14L 14R TRL 140 TWY N6 N9 CLSD WIND 120 DEG 13 KT VRB BTN 100 AND 170 DEG VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 18 DP 13 QNH 1013 BECMG NSW HVY WIND SHEAR REPORTED

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Fecha y Hora	Usuario	Generación	Tipo	Mensaje
27/05/2018 19:30:30		automatico	ATIS_ARRIVAL	LEMD INFO ARR F TIME 1930 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 120 DEG 6 KT VRB BTN 070 AND 190 DEG VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 18 DP 12 QNH 1013 NOSIG HVY WIND SHEAR REPORTED
27/05/2018 19:30:32		automatico	ATIS_DEPARTURE	LEMD INFO DEP S TIME 1920 RWY IN USE 14L 14R STARTUP DLA ABOUT 40 MIN DUE TO WX COND TRL 140 TWY N6 N9 CLSD WIND 120 DEG 10 KT VRB BTN 080 AND 150 DEG VIS 10 KM OR MORE VCTS CLD FEW CB 5000 FT BKN 7000 FT T 18 DP 13 QNH 1013 BECMG NSW HVY WIND SHEAR REPORTED
27/05/2018 19:40:29		automatico	ATIS_ARRIVAL	LEMD INFO ARR G TIME 1940 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 110 DEG 8 KT VRB BTN 070 AND 160 DEG VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 18 DP 13 QNH 1013 NOSIG HVY WIND SHEAR REPORTED
27/05/2018 19:40:32		automatico	ATIS_DEPARTURE	LEMD INFO DEP T TIME 1930 RWY IN USE 14L 14R STARTUP DLA ABOUT 40 MIN DUE TO WX COND TRL 140 TWY N6 N9 CLSD WIND 120 DEG 12 KT VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 18 DP 12 QNH 1013 NOSIG HVY WIND SHEAR REPORTED
27/05/2018 19:50:29		automatico	ATIS_ARRIVAL	LEMD INFO ARR H TIME 1950 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 120 DEG 10 KT VRB BTN 060 AND 160 DEG VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 18 DP 13 QNH 1014 NOSIG HVY WIND SHEAR REPORTED
27/05/2018 19:50:33		automatico	ATIS_DEPARTURE	LEMD INFO DEP U TIME 1940 RWY IN USE 14L 14R STARTUP DLA ABOUT 40 MIN DUE TO WX COND TRL 140 TWY N6 N9 CLSD WIND 120 DEG 12 KT VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 18 DP 13 QNH 1013 NOSIG HVY WIND SHEAR REPORTED
27/05/2018 20:00:10	torre1	manual	ATIS_DEPARTURE	LEMD INFO DEP V TIME 1950 RWY IN USE 14L 14R STARTUP DLA ABOUT 40 MIN DUE TO WX COND TRL 140 TWY N6 N9 CLSD WIND 100 DEG 11 KT VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 18 DP 13 QNH 1014 NOSIG HVY WIND SHEAR REPORTED

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Fecha y Hora	Usuario	Generación	Tipo	Mensaje
27/05/2018 20:00:30		automatico	ATIS_ARRIVAL	LEMD INFO ARR I TIME 2000 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 120 DEG 12 KT VRB BTN 060 AND 160 DEG VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 18 DP 12 QNH 1014 NOSIG HVY WIND SHEAR REPORTED
27/05/2018 20:00:32		automatico	ATIS_DEPARTURE	LEMD INFO DEP W TIME 2000 RWY IN USE 14L 14R STARTUP DLA ABOUT 40 MIN DUE TO WX COND TRL 140 TWY N6 N9 CLSD WIND 100 DEG 11 KT VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 18 DP 13 QNH 1014 NOSIG
27/05/2018 20:00:45	torre2	manual	ATIS_ARRIVAL	LEMD INFO ARR J TIME 2000 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 120 DEG 12 KT VRB BTN 060 AND 160 DEG VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 18 DP 12 QNH 1014 NOSIG
27/05/2018 20:10:30		automatico	ATIS_ARRIVAL	LEMD INFO ARR K TIME 2010 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 110 DEG 13 KT VRB BTN 060 AND 150 DEG VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 17 DP 13 QNH 1014 NOSIG
27/05/2018 20:10:32		automatico	ATIS_DEPARTURE	LEMD INFO DEP X TIME 2000 RWY IN USE 14L 14R STARTUP DLA ABOUT 40 MIN DUE TO WX COND TRL 140 TWY N6 N9 CLSD WIND 100 DEG 12 KT VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 18 DP 12 QNH 1014 NOSIG
27/05/2018 20:20:30		automatico	ATIS_ARRIVAL	LEMD INFO ARR L TIME 2020 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 100 DEG 10 KT VRB BTN 060 AND 160 DEG VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 17 DP 12 QNH 1014 NOSIG
27/05/2018 20:20:32		automatico	ATIS_DEPARTURE	LEMD INFO DEP Y TIME 2010 RWY IN USE 14L 14R STARTUP DLA ABOUT 40 MIN DUE TO WX COND TRL 140 TWY N6 N9 CLSD WIND 090 DEG 11 KT VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 17 DP 13 QNH 1014 NOSIG

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Fecha y Hora	Usuario	Generación	Tipo	Mensaje
27/05/2018 20:25:26	torre1	manual	ATIS_DEPARTURE	LEMD INFO DEP Z TIME 2020 RWY IN USE 14L 14R STARTUP DLA ABOUT 40 MIN DUE TO WX COND TRL 140 TWY N6 N9 CLSD WIND 100 DEG 11 KT VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 17 DP 12 QNH 1014 NOSIG
27/05/2018 20:30:30		automatico	ATIS_ARRIVAL	LEMD INFO ARR M TIME 2030 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 090 DEG 8 KT VRB BTN 060 AND 130 DEG VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 17 DP 12 QNH 1014 NOSIG
27/05/2018 20:30:33		automatico	ATIS_DEPARTURE	LEMD INFO DEP A TIME 2025 RWY IN USE 14L 14R TRL 140 TWY N6 N9 CLSD WIND 100 DEG 11 KT VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 17 DP 12 QNH 1014 NOSIG
27/05/2018 20:40:29		automatico	ATIS_ARRIVAL	LEMD INFO ARR N TIME 2040 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 090 DEG 9 KT VRB BTN 050 AND 160 DEG VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 17 DP 12 QNH 1015 NOSIG
27/05/2018 20:40:33		automatico	ATIS_DEPARTURE	LEMD INFO DEP B TIME 2030 RWY IN USE 14L 14R TRL 140 TWY N6 N9 CLSD WIND 100 DEG 10 KT VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 17 DP 12 QNH 1014 NOSIG
27/05/2018 20:50:29		automatico	ATIS_ARRIVAL	LEMD INFO ARR O TIME 2050 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 090 DEG 7 KT VRB BTN 040 AND 120 DEG VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 17 DP 12 QNH 1015 NOSIG
27/05/2018 20:50:33		automatico	ATIS_DEPARTURE	LEMD INFO DEP C TIME 2040 RWY IN USE 14L 14R TRL 140 TWY N6 N9 CLSD WIND 100 DEG 9 KT VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 17 DP 12 QNH 1015 NOSIG
27/05/2018 20:52:03	torre1	manual	ATIS_DEPARTURE	LEMD INFO DEP D TIME 2050 RWY IN USE 14L 14R TRL 140 TWY N6 N9 CLSD WIND 090 DEG 11 KT VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 17 DP 12 QNH 1015 NOSIG

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Fecha y Hora	Usuario	Generación	Tipo	Mensaje
27/05/2018 21:00:30		automatico	ATIS_ARRIVAL	LEMD INFO ARR P TIME 2100 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 080 DEG 6 KT VRB BTN 040 AND 130 DEG VIS 10 KM OR MORE CLD FEW 4500 FT BKN 7000 FT T 17 DP 12 QNH 1015 NOSIG
27/05/2018 21:00:33		automatico	ATIS_DEPARTURE	LEMD INFO DEP E TIME 2051 RWY IN USE 14L TRL 140 TWY N6 N9 CLSD WIND 090 DEG 11 KT VIS 10 KM OR MORE CLD FEW CB 4700 FT BKN 7000 FT T 17 DP 12 QNH 1015 NOSIG
27/05/2018 21:10:30		automatico	ATIS_ARRIVAL	LEMD INFO ARR Q TIME 2110 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 030 DEG 4 KT VRB BTN 010 AND 120 DEG VIS 10 KM OR MORE CLD FEW 4500 FT BKN 7000 FT T 16 DP 13 QNH 1015 NOSIG
27/05/2018 21:10:34		automatico	ATIS_DEPARTURE	LEMD INFO DEP F TIME 2100 RWY IN USE 14L TRL 140 TWY N6 N9 CLSD WIND 080 DEG 6 KT VRB BTN 040 AND 110 DEG VIS 10 KM OR MORE CLD FEW 4500 FT BKN 7000 FT T 17 DP 12 QNH 1015 NOSIG
27/05/2018 21:20:30		automatico	ATIS_ARRIVAL	LEMD INFO ARR R TIME 2120 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND 040 DEG 4 KT VRB BTN 350 AND 080 DEG VIS 10 KM OR MORE CLD FEW 4500 FT BKN 7000 FT T 16 DP 13 QNH 1015 NOSIG
27/05/2018 21:20:34		automatico	ATIS_DEPARTURE	LEMD INFO DEP G TIME 2110 RWY IN USE 14L TRL 140 TWY N6 N9 CLSD WIND 080 DEG 6 KT VRB BTN 060 AND 130 DEG VIS 10 KM OR MORE CLD FEW 4500 FT BKN 7000 FT T 17 DP 13 QNH 1015 NOSIG
27/05/2018 21:30:30		automatico	ATIS_ARRIVAL	LEMD INFO ARR S TIME 2130 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND CALM VIS 10 KM OR MORE CLD FEW 4500 FT BKN 7000 FT T 16 DP 13 QNH 1015 NOSIG
27/05/2018 21:30:34		automatico	ATIS_DEPARTURE	LEMD INFO DEP H TIME 2120 RWY IN USE 14L TRL 140 TWY N6 N9 CLSD WIND 060 DEG 5 KT VRB BTN 010 AND 120 DEG VIS 10 KM OR MORE CLD FEW 4500 FT BKN 7000 FT T 16 DP 13 QNH 1015 NOSIG

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Fecha y Hora	Usuario	Generación	Tipo	Mensaje
27/05/2018 21:40:30		automatico	ATIS_ARRIVAL	LEMD INFO ARR S TIME 2140 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND CALM VIS 10 KM OR MORE CLD FEW 4500 FT BKN 7000 FT T 16 DP 13 QNH 1015 NOSIG
27/05/2018 21:40:34		automatico	ATIS_DEPARTURE	LEMD INFO DEP I TIME 2130 RWY IN USE 14L TRL 140 TWY N6 N9 CLSD WIND 040 DEG 4 KT VRB BTN 360 AND 080 DEG VIS 10 KM OR MORE CLD FEW 4500 FT BKN 7000 FT T 16 DP 13 QNH 1015 NOSIG
27/05/2018 21:50:30		automatico	ATIS_ARRIVAL	LEMD INFO ARR S TIME 2150 EXPECT ILS Z APCH RWY IN USE 18L 18R TRL 140 FLOCK OF BIRDS IN FNA WIND CALM VIS 10 KM OR MORE CLD FEW 4500 FT BKN 7000 FT T 16 DP 13 QNH 1015 NOSIG
27/05/2018 21:50:34		automatico	ATIS_DEPARTURE	LEMD INFO DEP J TIME 2140 RWY IN USE 14L TRL 140 TWY N6 N9 CLSD WIND VRB 2 KT VRB BTN 350 AND 130 DEG VIS 10 KM OR MORE CLD FEW 4500 FT BKN 7000 FT T 16 DP 13 QNH 1015 NOSIG