Report
IN-051/2019

Incident involving an AIRBUS A320, registration EC-MKO, operated by VUELING, and an EMBRAER 145, registration F-HRAM, operated by AERO4M, 17.4 NM northeast of Barcelona-El Prat airport (Spain) on 27 September 2019

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

Notice

El presente Informe es un documento técnico que refleja el punto de vista de la Comisión de Investigación de Accidentes e Incidentes de Aviación Civil en relación con las circunstancias en que se produjo el evento objeto de la investigación, con sus causas probables y con sus consecuencias.

De conformidad con lo señalado en el art. 5.4.1 del Anexo 13 al Convenio de Aviación Civil Internacional; y según lo dispuesto en los arts. 5.5 del Reglamento (UE) n.° 996/2010, del Parlamento Europeo y del Consejo, de 20 de octubre de 2010; el art. 15 de la Ley 21/2003, de Seguridad Aérea; y los arts. 1, 4 y 21.2 del R.D. 389/1998, esta investigación tiene carácter exclusivamente técnico y se realiza con la finalidad de prevenir futuros accidentes e incidentes de aviación mediante la formulación, si procede, de recomendaciones que eviten su repetición. No se dirige a la determinación ni al establecimiento de culpa o responsabilidad alguna, ni prejuzga la decisión que se pueda tomar en el ámbito judicial. Por consiguiente, y de acuerdo con las normas señaladas anteriormente la investigación ha sido efectuada a través de procedimientos que no necesariamente se someten a las garantías y derechos por los que deben regirse las pruebas en un proceso judicial.

Consecuentemente, el uso que se haga de este Informe para cualquier propósito distinto al de la prevención de futuros accidentes puede derivar en conclusiones e interpretaciones erróneas.

CONTENTS

ABBREVIATIONS

° ‘ “	Sexagesimal degrees, minutes and seconds
°C	Degrees centigrade
A/P	Autopilot
A/T	Autothrust
ACAS	Airborne collision avoidance system
ACC	Area control center
AEMET	Spain’s National Weather Agency
AESA	Spain’s National Aviation Safety Agency
AMAN	Arrivals management
ATPL (A)	Airline transport pilot license for airplanes
ATC	Air traffic control
CAVOK	Clouds and visibility OK
CFL	Cleared flight level
CPL (A)	Commercial pilot license for airplanes
ATCO	Air traffic controller
E	East
FAENT	Fondo Anual para la Adaptación a la Evolución Normativa y Tecnológica
FIC	Flight information center
FL	Flight level
ft	Foot
h	Hour
IAF	Initial approach fix
ICAO	International Civil Aviation Organization
IFR	Instrument flight rules
km	Kilometer
km/h	Kilometer per hour
kt	Knot
LECB	ICAO indicator for the Barcelona ACC/FIC
LEBL	ICAO indicator for the Barcelona-El Prat Airport
m	Meter
METAR	Aviation routine weather report
MHz	Megahertz
min	Minute
MFD	Multi-function display
MP	Multi pilot
N	North
NE	Northeast
NM	Nautical miles

PAC	Conflict warning of the SACTA system
PF	Pilot flying
PFD	Primary flight display
PM	Pilot monitoring
QAR	Quick Access recorder
RA	Resolution advisory
RNAV	Area navigation
s	Second
S	South
SACTA	Automated air traffic control system
Sector F25W	Final approach sector of the Barcelona TMA
Sector T1W	Feeder sector of the Barcelona TMA
SERA	Standardised European Rules of the Air
SID	Standard instrument departure
SOP	Standard operating procedure
STAR	Standard terminal arrival route
STCA	Short term conflict alert
TA	Traffic advisory
TCAS	Traffic collision avoidance system
TRAN	Transition
UTC	Coordinated universal time
VAC	Conflict violation of the SACTA system

Synopsis

	Aircraft 1	Aircraft 2
Operator	Vueling	Aero4M
Aircraft	Airbus A320 registration EC-MKO	Embraer 145 registration F-HRAM
Persons on board	6+185, uninjured	3+0, uninjured
Type of operation	Commercial air transport – Scheduled – International – Passenger	Commercial air transport – ferry flight
Phase of flight	Approach – initial approach	Approach – initial approach
Flight rules	IFR	
Date and time of incident	Friday, 27 September 2019 at 10:04[1] UTC	
Site of incident	17.4 NM northeast of Barcelona-El Prat Airport at FL070	
Date of approval	29 April 2020	

Summary of event:

On Friday, 27 September 2019, at 10:04 UTC, there was an incident due to a loss of separation between an Airbus A320, registration EC-MKO, operated by Vueling en route from the airport of London-Gatwick (United Kingdom) to the airport of Barcelona-El Prat (Spain), and an Embraer 145, registration F-HRAM, operated by Aero4M which had taken off from the airport of Castres Mazamet (France) also en route to Barcelona-El Prat.

At the time of the incident, the Vueling aircraft was in radar and radio contact with sector F25W of Barcelona ACC, and the Aero4M aircraft was in radar and radio contact with sector T1W of Barcelona ACC.

The aircraft were inbound to point BL443 and descending, having been previously cleared to do so. The Vueling aircraft flew over the point and continued the transition, while the Aero4M aircraft was cleared to shorten its route and fly direct to point BL435, which resulted in both aircraft converging at BL435 at a very similar altitude. After TCAS RA were received in the two cockpits, both aircraft executed evasive maneuvers. Based on data taken from the radar track, at the point of closest approach they were separated by 0.8 NM horizontally and 200 ft vertically at FL070.

After the incident, both aircraft continued their respective flights. There was no damage of any kind.

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

The investigation has determined that the loss of separation between the two aircraft was caused by improver planning and execution of the approach sequence by the controller in sector T1W.

No safety recommendations are issued.

1. FACTUAL INFORMATION

1.1. History of the flight

On 27 September 2019, an Airbus A320 operated by Vueling, registration EC-MKO, was on a flight with callsign VLG19ZN[2] from London-Gatwick Airport (United Kingdom) to the Barcelona-El Prat Airport (Spain). At the same time, an Embraer 145 operated by Aero4M, registration F-HRAM and callsign AEH993F, was flying from Castres Mazamet Airport (France) en route to the Barcelona-El Prat Airport.

VLG19ZN was cleared to fly standard terminal arrival route (STAR) PUMAL1W with the CLE1W transition (TRAN) to runway 25R.

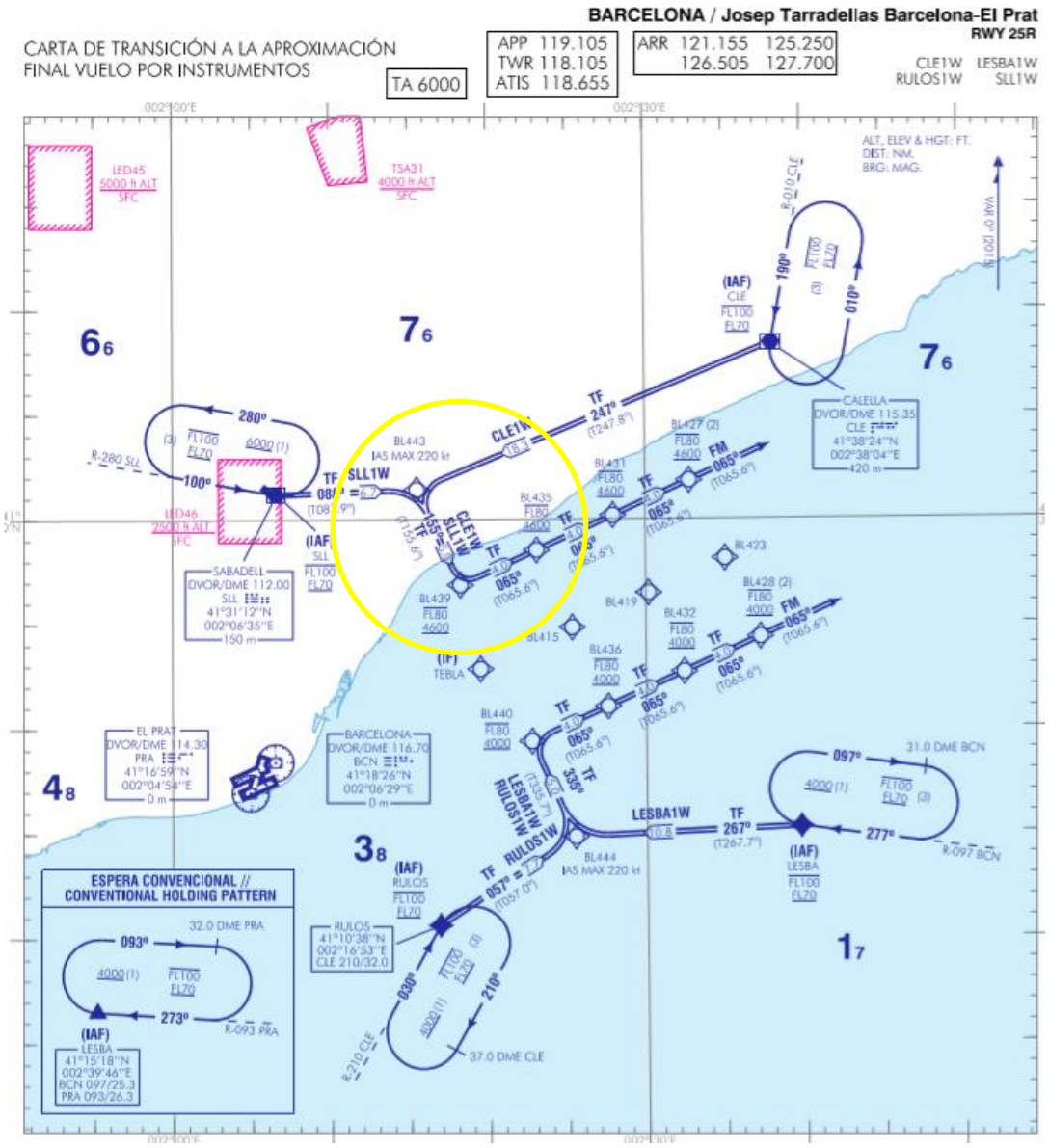


Fig. 1 Detail of chart AD 2 – LEBL TRAN 5.1 (CLE1W).
Points BL443, BL439 and BL435 are inside the yellow circle.

[2] In what follows, each aircraft will be identified by its callsign.

AEH993F was cleared to fly the ALBER1W STAR with the CLE1W TRAN to runway 25R.

Both aircraft made contact on the sector T1W frequency.

VLG19ZN was cleared to make successive descents until it was instructed to descend to 5000 ft and proceed to point BL443 and then it was transferred to Sector LEBLF25W. As for AEH993F, the controller instructed it to fly direct to point BL443 and follow the transition; however, its crew only acknowledged[3] the instruction to fly direct to this point. AEH993F was then cleared to descend to 6000 ft, and later on it was cleared to fly direct to point BL435. As a result of this last clearance, both aircraft were at similar altitudes on converging tracks, which caused the TCAS systems on the two aircraft to issue resolution advisories.

At the closest point, the aircraft came within 0.8 NM and 200 ft of each other.

1.2. Injuries to persons

1.2.1. VLG19ZN (EC-MKO)

Injuries	*Crew*	*Passengers*	*Total*	*Other*
Fatal				
Serious				
Minor				
None	6	185	191	
TOTAL	6	185	191	

1.2.2. AEH993F (F-HRAM)

Injuries	*Crew*	*Passengers*	*Total*	*Other*
Fatal				
Serious				
Minor				
None	3		3	
TOTAL	3		3	

1.3. Damage to aircraft

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

1.4. Other damage

None.

[3] Or read-back

1.5. Personnel information

1.5.1. Information on the crew of VLG19ZN (EC-MKO)

The captain of the aircraft, a 49-year-old Spanish national, had an airline transport pilot license for airplanes (ATPL(A)) issued by Spain's National Aviation Safety Agency (AESA), with A320 type and instrument ratings that were valid until 30 April 2020. He also had a class-1 medical certificate that was valid until 12 September 2020. He had a total of 11,786 flight hours, of which 10,259 had been on the type.

The first officer of the aircraft, a 23-year-old Spanish national, had a commercial pilot license for airplanes (CPL(A)) issued by AESA, with A320 type and instrument ratings that were valid until 30 April 2020. He also had a class-1 medical certificate that was valid until 16 June 2020. He had a total of 815 flight hours, of which 650 had been on the type.

1.5.2. Information on the crew of AEH993F (F-HRAM)

The captain of the aircraft, a 32-year-old French national, had an airline transport pilot license for airplanes (ATPL(A)) issued by France's General Directorate for Civil Aviation, with EMB 135/145 type and instrument ratings that were valid until 31 August 2020. He also had a class-1 medical certificate that was valid until 30 November 2019. He had a total of 2,493 flight hours, of which 1,193 had been on the type.

The first officer of the aircraft, a 28-year-old French national, had a commercial pilot license for airplanes (CPL(A)) issued by France's General Directorate for Civil Aviation, with EMB 135/145 type and instrument ratings that were valid until 31 October 2020. He also had a class-1 medical certificate that was valid until 31 October 2020. He had a total of 3,928 flight hours, of which 177 had been on the type.

1.5.3. Information on the control personnel

The position from which air traffic control services to the aircraft in question were being provided (sector LEBLT1W) was staffed by two individuals: an executive controller and a planning controller.

The executive controller, a 50-year-old Spanish national, had an air traffic controller license issued by AESA on 24 February 2000, as well as a medical certificate that was valid until 14 January 2020. He had a total experience of 19 years at the unit. He had an approach endorsement for the unit that was valid until 3 October 2020.

The planning controller, a 53-year-old Spanish national, had an air traffic controller license issued by AESA on 29 June 1989, as well as a medical certificate that was valid until 23 April 2020. He had a total experience of 30 years at the unit. He had an approach endorsement for the unit that was valid until 25 October 2020.

1.6. Aircraft information

1.6.1. Information about VLG19ZN (EC-MKO)

The aircraft with registration EC-MKO, an Airbus A320-232 with serial number 7028, had a valid certificate of airworthiness issued by AESA on 14 April 2016. It was operated by Vueling, S.A., whose air operator certificate (number ES.AOC.060) had been issued by AESA on 28 June 2019. The aircraft had 10,541 flight hours and 7,323 cycles.

1.6.2. Information about AEH993F (F-HRAM)

The aircraft with registration F-HRAM, an Embraer 145 with serial number 145258, had a valid certificate of airworthiness issued by France's General Directorate for Civil Aviation on 4 August 2017, which was valid until 3 August 2020. It was operated by Aero4M, whose air operator certificate (number SI.AOC.04/2014-Amd.01) had been issued by the aviation authority of Slovenia on 18 September 2019. The aircraft had 36,746 flight hours and 35,270 cycles.

1.7. Meteorological information

According to the information provided by Spain's National Weather Agency (AEMET), the satellite images and aerodrome reports indicate that at the time and location of the incident, there were few clouds at 1500 ft and broken clouds at 3500 ft, but there was no storm or convective activity or reduced visibility. The low-level winds in the area were forecast to be weak.

The METARs for the Barcelona-El Prat Airport (the event occurred 17.4 NM northeast of this airport) at the times closest to the event were as follows:

METAR LEBL 270930Z 33003KT 280V010 9999 FEW017 BKN035 23/17 Q1018 NOSIG=

METAR LEBL 271000Z VRB01KT 9999 FEW013 BKN035 24/19 Q1018 NOSIG=

METAR LEBL 271030Z 13004KT 110V170 9999 FEW015 BKN035 24/20 Q1018 NOSIG=

1.8. Aids to navigation

All the navigation systems worked correctly.

1.9. Communications

The records for the oral communications between ATC and the aircraft in sector T1W were available, and the radar data from the Palestra system[4] were also obtained. To better understand the sequence of events, the information from both sources of data – voice and radar – are combined in this section. The most relevant information affecting the incident in question is provided starting at 09:54:24. Prior to this time, VLG19ZN had been cleared by the ATCO in sector T1W to fly the PUMAL1W STAR and the CLE1W transition and fly at FL100, while AEH993F was flying the ALBER1W STAR and the CLE1W transition and was cleared to descend to FL100.

At 09:54:24, the controller in sector T1W instructed VLG19ZN to fly direct to point BL443. The crew correctly acknowledged the instruction. The controller then instructed AEH993F to "*"fly direct to the BL443 to continue with the transition*", but the crew only acknowledged "*fly direct BL443*", which ATC did not correct.

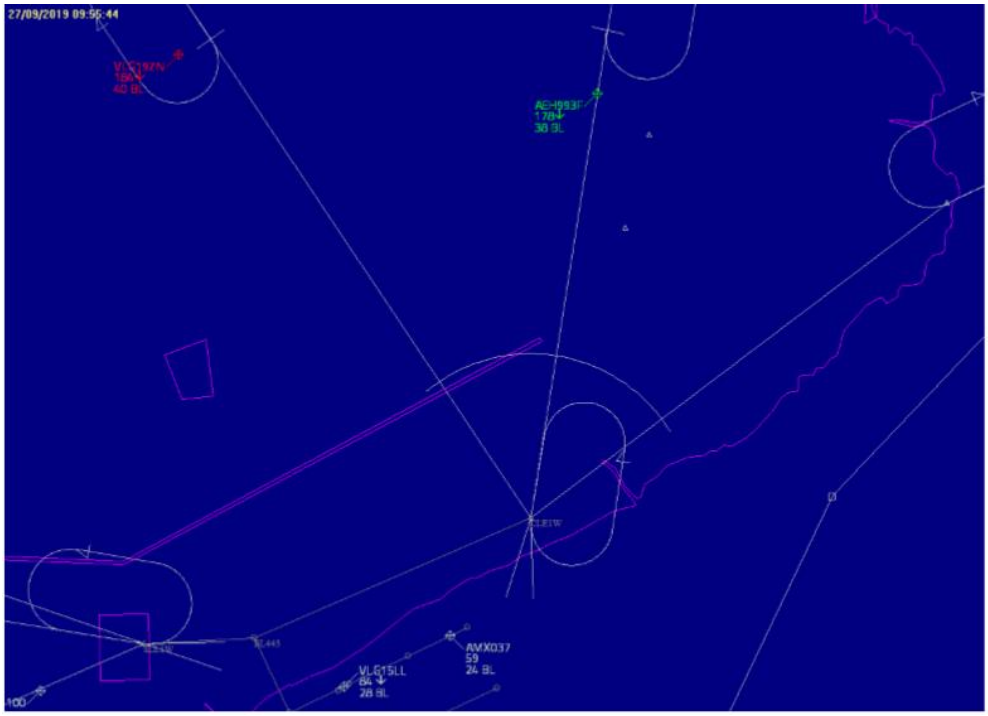


Fig. 2 Palestra image for 09:55:44

Then, the controller in sector T1W instructed VLG19ZN to descend to 5000 ft, which the crew acknowledged correctly. Afterwards, he instructed AEH993F to descend to FL080, which its crew acknowledged correctly.

[4] This system reproduces data recorded from SACTA after the fact, meaning the representations shown here may differ slightly from what the controllers saw on their displays in real time during the incident.

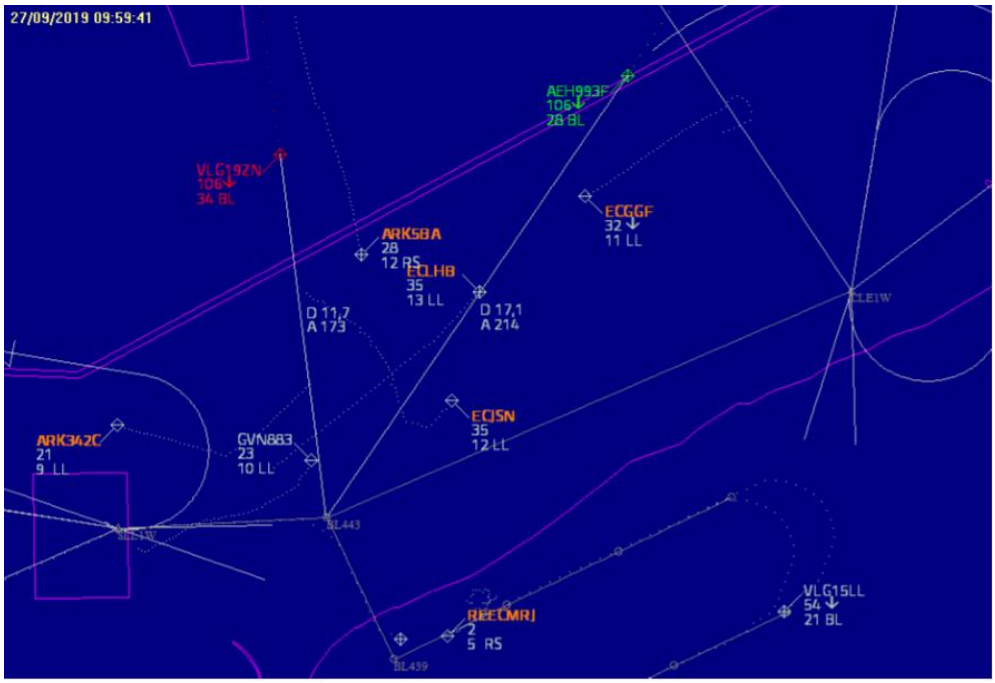


Fig. 3 Palestra image for 09:59:41

The controller in sector T1W then instructed VLG19ZN to reduce its speed to 250 kt, which the crew acknowledged correctly.

At 10:01:04, the controller in sector T1W instructed AEH993F to descend to 6000 ft. The crew acknowledged correctly.

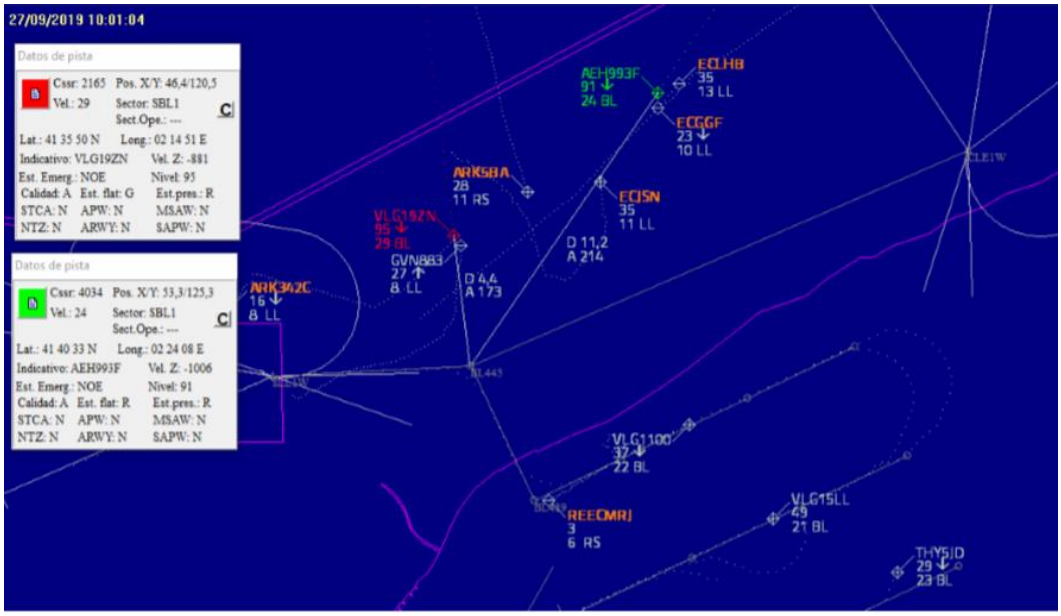


Fig. 4 Palestra image for 10:01:04

At 10:01:32, the controller in sector T1W instructed AEH993F to “fly direct to the BL435”, which the crew acknowledged correctly (see location of point BL435 in Figure 1).

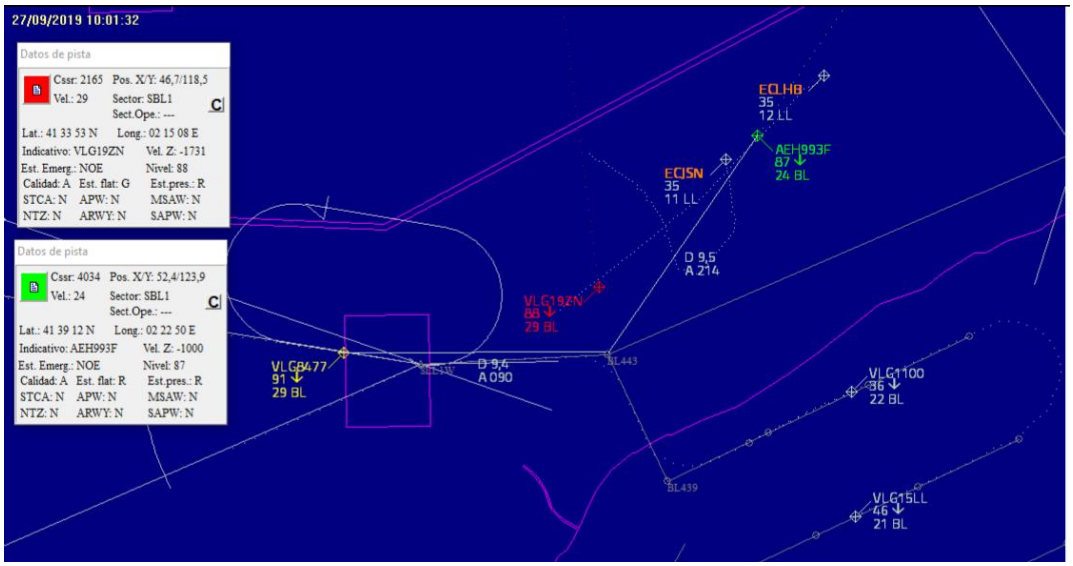


Fig. 5 Palestra image for 10:01:32

At 10:02:04, the controller in sector T1W instructed VLG19ZN to reduce to its minimum clean approach speed and transferred it to 119.105 MHz, which is the frequency for sector F25W. The crew of the aircraft acknowledged correctly.

The controller in sector F25W then instructed VLG19ZN to descend to 2300 ft and reduce to its minimum clean speed, which the crew acknowledged correctly.

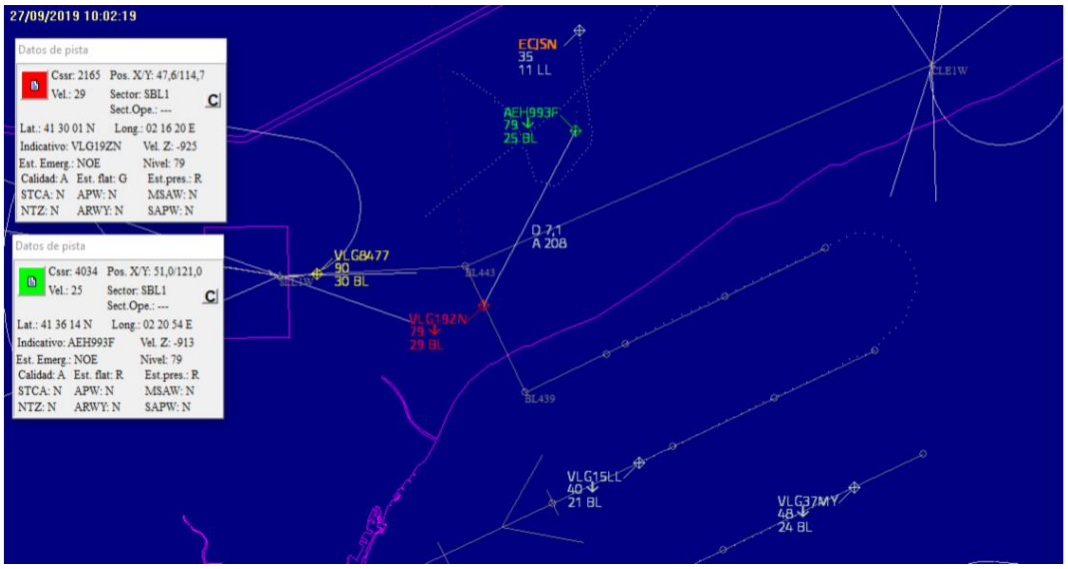


Fig. 6 Palestra image for 10:02:19

At 10:02:29, the controller in sector T1W instructed AEH993F to maintain FL070, and the crew replied they were reaching it. The controller in sector T1W then instructed AEH993F to reduce its speed to 210 kt, which the crew acknowledged correctly.

At 10:03:11, the controller in sector T1W coordinated with the controller in sector F25W and asked him to instruct VLG19ZN to increase its rate of descent. The controller in sector T1W then instructed AEH993F to turn right immediately to heading 070º. The crew asked for the instruction to be repeated, so the controller in sector T1W instructed AEH993F to turn left

immediately to heading 070º. The crew requested confirmation that the turn was to the left, which the controller in sector T1W did. In response, the crew reported that they had VLG19ZN on TCAS and again requested confirmation of the left turn, since the other aircraft was proceeding toward its left. The controller in sector T1W instructed the crew to maintain its current heading.

The controller in sector F25W then instructed VLG19ZN to increase its rate of descent until it passed 5000 ft, which the crew acknowledged correctly.

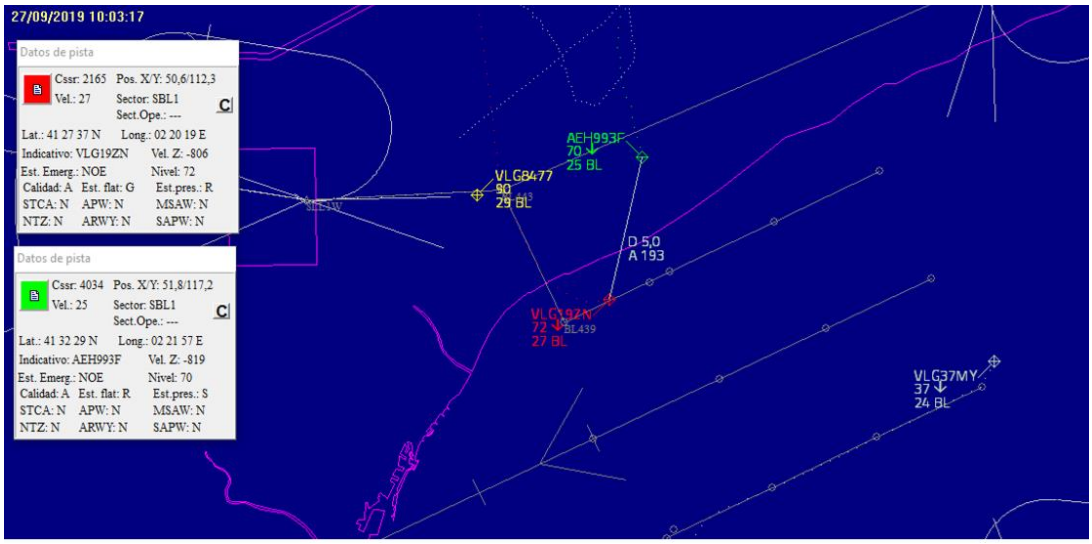


Fig. 7 Palestra image for 10:03:17

At 10:04:04, VLG19ZN reported a TCAS RA, which the controller in sector F25W acknowledged. The figure below, which is for that time, shows the activation of the STCA-VAC feature. At the time, the aircraft were separated by 0.9 NM and 200 ft.

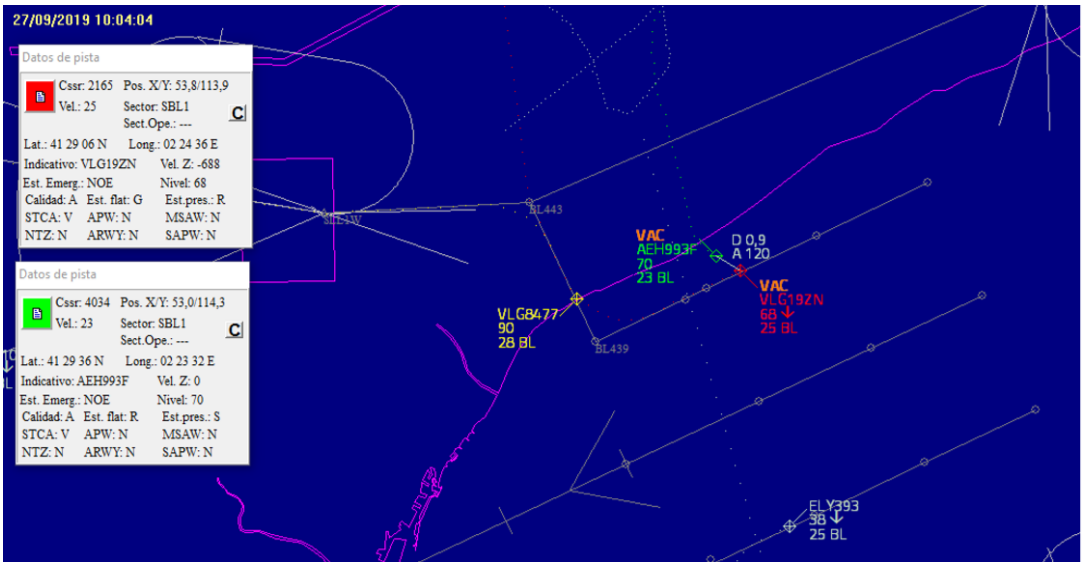


Fig. 8 Palestra image for 10:04:04

At 10:04:12, the controller in sector T1W instructed AEH993F to turn to heading 060º. The crew of the aircraft acknowledged correctly and reported they had received a TCAS RA,

and that they had the traffic in question in sight. It was then that the aircraft were at their closest point of approach: 0.8 NM and 200 ft.

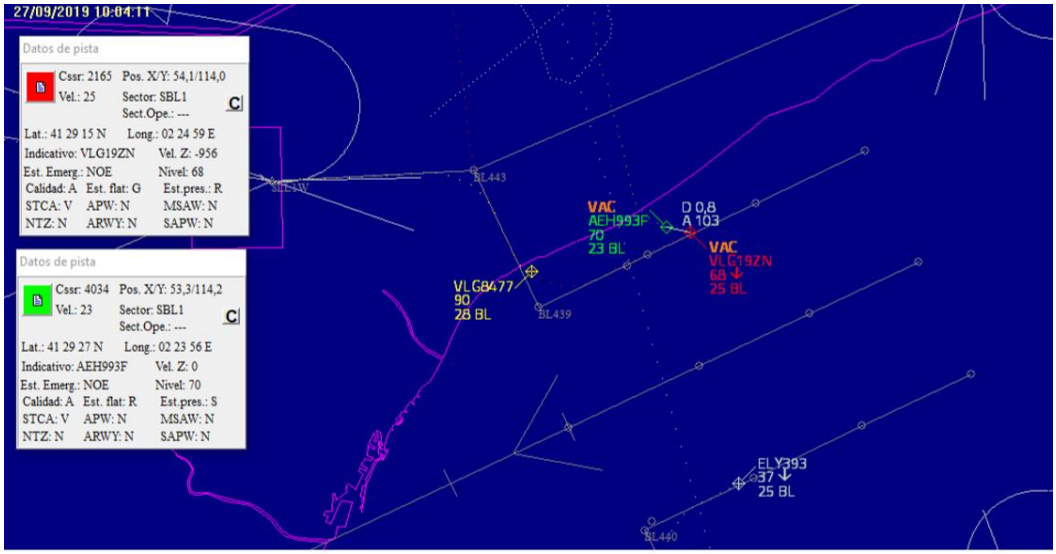


Fig. 9 Palestra image for 10:04:11

Later, the crew of VLG19ZN reported they were clear of conflict and continued descending to 2300 ft.

1.10. Aerodrome information

Not applicable.

1.11. Flight recorders

The information from the aircraft's flight recorders was not available because by the time the investigation was initiated, the recorders no longer contained the data from the incident flight.

However, the flight parameters recorded in their respective QARs were available, as were the audio recordings from the control center. The radar tracks were also available. All of this information was analyzed and the relevant content integrated into the previous section.

1.12. Wreckage and impact information

Not applicable.

1.13. Medical and pathological information

Not applicable.

1.14. Fire

There was no fire.

1.15. Survival aspects

Not applicable.

1.16. Tests and research

1.16.1. Statement from the captain of VLG19ZN (EC-MKO)

The information below has been extracted from the report that the captain of EC-MKO wrote after the incident:

During the RNAV approach with the CLE1W transition to RWY 25R, they were instructed to descend to 2300 ft, and while flying between points BL435 and BL427, descending through FL070 for 2300 ft and at the airplane's minimum clean speed, they received a TCAS TA, which then turned into a TCAS RA descend. The crew reported the TCAS RA on the frequency and executed it as indicated by the resolution. A few seconds later, they were clear of conflict, so they reported they were continuing their descent to 2300 ft, as they had been instructed. Subsequently, the controller apologized and asked if they were going to file a report, to which they answered affirmatively.

1.16.2. Statement from the captain of AEH993F (F-HRAM)

The information below has been extracted from the report that the captain of F-HRAM wrote after the incident:

They were cleared to execute the CLE1W transition to the Barcelona Airport. Crossing through BL443[5], they were cleared to descend to 6000 ft, and as they started the descent, they were re-cleared to FL070. In his opinion, he did not feel comfortable with ATC's instructions. A few seconds later, they saw a traffic approaching from their right on TCAS, which they had in sight. The controller vectored him to his left, heading 070º. He thinks it was for conflict avoidance, but the other aircraft was on a converging track. The crew started turning left and immediately requested confirmation of the assigned heading, since neither the first officer nor the captain agreed with it. They again felt that the controller was a little

[5] While he used this expression, they did not in fact cross this point, which was to their right since they were cleared to fly direct to BL435.

disoriented. He instructed them to maintain heading, which they did. F-HRAM saw the other traffic cross from right to left, and at that point they received a TCAS RA. The first officer held the course manually and they were carrying out the TCAS RA descend, which lasted 2 or 3 seconds, during which they lost under 100 ft. The captain then informed ATC that it had been a dangerous situation. The crew were fully aware of the situation, the traffic and the environment at all times during the incident.

1.16.3. Statement from the executive controller in sector LEBLT1W

The information below has been extracted from the report that the executive controller wrote after the incident:

He described the sequence that led the aircraft to converge at point BL443: first, VLG19ZN, then AEH993F, and lastly another aircraft with callsign VLG8477. Upon realizing that AEH993F and VLG8477 would converge at said point, he decided to instruct AEH993F to fly direct to point BL435, and he instructed it to descend to 6000 ft, since VLG19ZN was descending to 5000 ft at a normal rate of descent. So he transferred VLG19ZN to sector F25W as it was passing through FL075. He quickly realized that VLG19ZN reduced its rate of descent, so as a result he instructed AEH993F to stop its descent at FL070, thinking the vertical separation would be sufficient. However, VLG19ZN, despite being cleared to lower altitudes, maintained FL070. Therefore, the controller instructed AEH993F to conduct an evasive maneuver by turning left to heading 070, but it reacted late and requested confirmation of the left turn. He insisted and the crew asked again, which led[6] to the prescribed minimum distances being breached. Finally, AEH993F reported having the traffic affecting it in sight to its left, so he instructed it to maintain its current heading, although it should have been turning and following[7] the TCAS RA.

1.16.4. Statement from the executive controller in sector LEBLF25W

The information below has been extracted from the report that the executive controller wrote after the incident:

He stated that he received two aircraft (VLG19ZN and AEH993F) from the feeder sector (T1W) that had already lost separation. VLG19ZN was cleared to descend to 5000 ft, but that it had not yet left FL070 and was at point BL435. AEH993F was flying north to south, steady at FL070, converging with VLG19ZN, which reported a TCAS RA.

1.16.5. Statement from the planning controller in sector LEBLF25W

The information below has been extracted from the report that the executive controller wrote after the incident:

[6] This was his literal expression (“produjo” in Spanish).

[7] This was his literal expression (“siguiendo” in Spanish). A TCAS RA does not necessarily require the aircraft to make a turn of any kind.

He stated that the traffic at the time was moderate or intense[8] and that he was doing the tasks of both the planning and queue manager. While the scale is sufficiently broad to be able to validate the sequence numbers and see if any have to be changed, the area where the incident occurred is a jumble of overlapping labels where it is impossible to control anything. He was surprised to see AEH993F flying to point BL435, since that point is not used often. He mentioned this to the executive controller in his sector.

Just then, the executive controller in sector T1W called sector F25W to request that VLG19ZN increase its rate of descent. The two aircraft involved were on different frequencies at the time: VLG19ZN on the frequency of sector F25W and AEH993F on the frequency of sector T1W. The executive controller in sector T1W explained that this was because VLG19ZN was cleared to descend to 5000 ft, so he transferred it to sector F25W.

AEH993F was flying to point BL435 to separate from another traffic [VLG8477] in sector T1W. It was cleared to descend to 6000 ft. VLG19ZN did not descend at the rate expected by sector T1W, and he heard how the executive controller warned sector F25W in order to have it increase its rate of descent. At the same time, sector T1W stopped the descent of AEH993F at FL070.

Separation between the two aircraft was lost, and even though sector T1W made AEH993F turn, the distance between the two, I seem to recall, fell to 0.8 NM. Both aircraft received TCAS RA.

1.16.6. Information on duty and rest times

It was the fourth consecutive day on duty for the executive controller in sector LEBLT1W, following three rest days. As for the shift on the day of the incident, he had been working as the executive controller in sector LEBLT1W since 09:16, and swapped positions with the planning controller after the incident.

It was the first day of duty for the planning controller in sector LEBLT1W, following three rest days. As for the shift on the day of the incident, he had been working as the planning controller in sector LEBLT1W since 09:16, and swapped positions with the executive controller after the incident.

1.17. Organizational and management information

- Regulation (EU) No 923/2012[9] specifies the following regarding read-back of ATC clearance in section SERA.8015 e)3):

  SERA.8015 Air traffic control clearances

[8] This was his literal expression. The report does not evaluate the potential contradiction between the two terms.

[9] Regulation laying down the common rules of the air and operational provisions regarding services and air navigation procedures

(…)

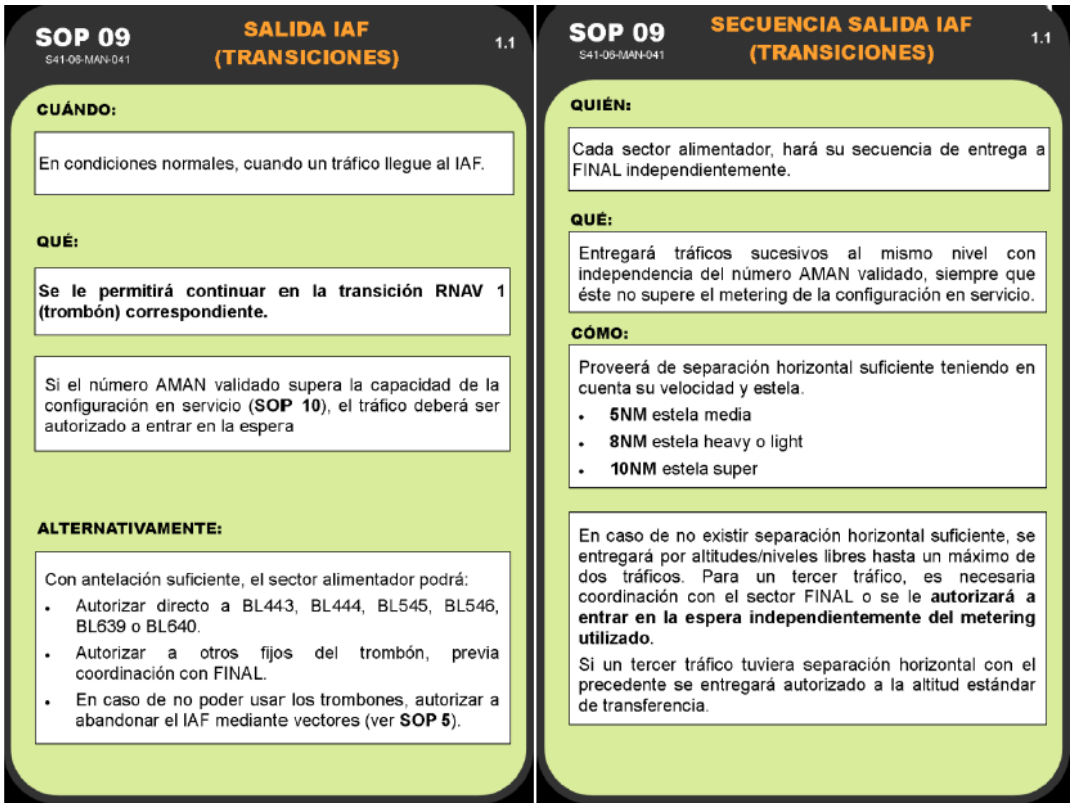
e) Read-back of clearances and safety-related information

(…)

3) The controller shall listen to the read-back to ascertain that the clearance or instruction has been correctly acknowledged by the flight crew and shall take immediate action to correct any discrepancies revealed by the read-back.

- The LECB Operations Manual, Annex B: Unit-Specific Procedures, states in point 6.5.1.2.5.2.1 (page 117), as well as on the SOP 09 checklist, the following in terms of how to coordinate between sectors before giving instructions to an aircraft:

  6.5.1.2.5.1 Clearance to leave an IAF
  FEEDER sectors shall authorize aircraft sufficiently in advance to:
  - Leave the IAF via published transitions to final approach.
  - Leave the IAF via vectors or direct to a point (BL443, BL444, BL545, BL546, BL639, BL640, to follow the corresponding transition or to any other point, previous coordination with the FINAL sector).
  - Enter in holding patterns (either directly or by delegating clearance to the previous sector).



1.18. Additional information

ENAIRE, the air navigation service provider, conducted an internal investigation into the event, based on which it proposed the following internal recommendation:

- Send the investigation report for this incident to the TMA training department for potential inclusion in the refresher FAENT[10] for approach controllers.

In April 2020, ENAIRE was asked about the degree of implementation of this internal recommendation, and it replied that it was approved for inclusion in the next FAENT, scheduled for the last quarter of 2020. As a result, the qualified controllers will receive training on the circumstances of this particular incident to prevent a future reoccurrence.

1.19. Useful or effective investigation techniques

Not applicable.

[10] Fondo Anual para la Adaptación a la Evolución Normativa y Tecnológica (Annual Fund to Adapt to Regulatory and Technological Change)

2. ANALYSIS

2.1. General considerations

On 27 September 2019, an Airbus A320 operated by Vueling, registration EC-MKO and callsign VLG19ZN, was flying from London-Gatwick Airport (United Kingdom) to Barcelona-El Prat Airport (Spain). After performing the PUMAL1W standard terminal arrival route (STAR), it was flying the CLE1W transition to runway 25R, after having been cleared to do so.

At the same time, an Embraer 145 operated by Aero4M, registration F-HRAM, which had taken off from Castres Mazamet Airport (France), was also en route to Barcelona-El Prat. After performing the ALBER1W STAR, it was cleared to follow the CLE1W transition to runway 25R. Both aircraft were in contact with sector T1W frequency.

The crews of both aircraft had the licenses and medical certificates necessary to carry out the flight.

The documentation for both aircraft was valid and they were airworthy.

Both executive and planning controllers had valid licenses, unit endorsements and medical certificates.

Their activity prior to the incident flight was also within the limits allowed by law.

The weather during the incident flight was not limiting and did not have any adverse effects.

2.2. Origin and resolution of the conflict

Both aircraft were in sector T1W, descending on course to point BL443 at similar altitudes. Their horizontal separation was well above the minimum radar separation required for that airspace. VLG19ZN had been cleared by the controller in sector T1W to follow the CLE1W transition and fly at FL100. AEH993F was flying the ALBER1W STAR and CLE1W transition and was cleared to descend to FL100.

At 09:54:24, the controller in sector T1W instructed VLG19ZN to fly direct to point BL443 which the crew acknowledged correctly.

He then instructed AEH993F to "*"fly direct to the BL443 to continue with the transition*", but the crew only acknowledged "*fly direct BL443*", which ATC did not correct. Two errors occurred here: on the one hand, the failure of the crew of AEH993F to acknowledge continuing the transition, having only acknowledged the instruction to fly direct to point BL443; and on the other, the failure of the controller to correct the acknowledgment. These two mistakes opened the door for the crew of AEH993F to assume that they should fly direct to BL443 and await subsequent instructions. It was not clear at this point that the crew of

AEH993F knew where they would fly to after point BL443, since the clearance to follow the transition was not acknowledged.

As AEH993F was reaching FL090, it was instructed (at 10:01:04) to continue descending to 6000 ft, which the crew acknowledged. At that tiem, VLG19ZN was descending through FL095 and the horizontal separation was well in excess of the prescribed minimum radar separation for that airspace.

Sector T1W had received VLG8477 from sector T4W. VLG8477 was flying on course to SLL for the SLL1W transition and descending to FL090. This aircraft would arrive at point BL443 at the same time as AEH993F, so the controller (at 10:01:32) planned to separate the two and instructed AEH993F to shorten its maneuver and proceed to point BL435, which was acknowledged correctly.

As VLG19ZN was flying over point BL443 (at 10:02:04), the controller in sector T1W instructed it to reduce its speed and contact sector F25W. When its crew did so, they were cleared to continue descending to 2300 ft and reduce to their minimum clean speed, which they acknowledged correctly.

While their horizontal separation was still sufficient, the controller in sector T1W noticed that VLG19ZN and AEH993F were at similar altitudes, so (at 10:02:29) he amended his previous clearance to AEH993F to have it maintain FL070 upon reaching it. This was acknowledged correctly.

The rates of descent of VLG19ZN and AEH993F were similar at all times and they were descending through very similar altitudes, so (at 10:03:11) the controller in sector T1W asked the controller in sector F25W to instruct VLG19ZN to increase its rate of descent.

He then instructed AEH993F to turn right immediately to heading 070º. The crew of this aircraft requested that he repeat the instruction. The controller in sector T1W amended his instruction and instructed AEH993F to immediately turn left to heading 070º. The crew requested confirmation of the instruction to turn left, which the controller in sector T1W did. The crew then reported that they had the traffic on TCAS and again asked for confirmation of the left turn, since the other aircraft was approaching it from their right to the left. The controller in sector T1W instructed the crew to maintain their current heading.

The controller in sector F25W then instructed VLG19ZN to increase its rate of descent until it was past 5000 ft. The crew acknowledged the instruction, but it was not enough to keep both aircraft from receiving a TCAS resolution.

Based on the radar data, the minimum distance between the aircraft was 0.8 NM and 200 ft, at 10:04:12.

2.3. Relevant facts and relationship with the procedures/regulation

The following facts are relevant and decisive in the lead-up to the loss of separation between the two aircraft:

1) When AEH993F was instructed to *"fly direct to the BL443 to continue with the transition"*, its crew only acknowledged "*fly direct BL443*". Since they did not acknowledge the second half of the instruction, it is impossible to know if they were aware of the totality of the instruction given.

2) The above error in the acknowledgment was not corrected by ATC, meaning it was very likely that the crew of AEH993F did not know what would happen after point BL443 and were expecting to receive subsequent instructions, unsure if they would fly the transition. This error resulted in a breach of the provisions in Regulation (EU) No 923/2012, section SERA.8015 e) 3), since the controller did not ascertain that the clearance or instruction had been correctly acknowledged by the flight crew and did not take immediate action to correct any discrepancies revealed by the read-back.

3) In order to keep AEH993F from converging with another aircraft at point BL443, the controller instructed AEH993F to fly direct to a different point of the transition (TRAN CLE1W), specifically, to point BL435. As specified in point 6.5.1.2.5.2.1 (page 117) of the LECB Operations Manual, Annex B: Unit-Specific Procedures, as well as checklist SOP 09, both procedures were breached by not coordinating with the final sector (in this case, F25W) before clearing the aircraft to fly to point BL435.

   In addition, the lack of coordination with sector F25W notwithstanding, this instruction is considered inappropriate since it made AEH993F and VLG19ZN converge at point BL435 at very similar altitudes. It has been deemed that the controller in sector T1W correctly detected the conflict but he implemented a faulty plan and executed it improperly, resulting in the loss of prescribed separation between the two aircraft.

2.4. Analysis of the cause

The loss of separation between the two aircraft was caused by incorrect planning and execution of the approach sequence devised by the controller in sector T1W.

Contributing to this is the fact that the sector T1W controller:

- did not correct an incomplete acknowledgment by the crew of AEH993F to fly a transition, and
- did not coordinate with the final sector (F25W) before instructing AEH993F to fly direct to point BL435

The content of the internal safety recommendation issued by ENAIRE in its own report on the incident is deemed to be adequate, consisting of having its investigation report on this incident presented at the next refresher FAENT given to its approach controllers, to the extent that it will make it possible for said controllers to receive training on the specific of this particular incident and avoid it from happening again in the future.

This measure is deemed adequate and thus no additional safety recommendations are necessary.

3. CONCLUSIONS

3.1. Findings

- Aircraft EC-MKO (callsign VLG19ZN) was flying standard terminal arrival route (STAR) PUMAL1W and transition (TRAN) CLE1W to runway 25R at Barcelona-El Prat Airport.
- Aircraft F-HRAM (callsign AEH993F) was flying STAR ALBER1W and transition (TRAN) CLE1W to runway 25R at Barcelona-El Prat Airport.
- The crews of both aircraft had the licenses and medical certificates necessary to carry out the flight.
- The documentation for both aircraft was valid and they were airworthy.
- The weather during the incident flight was not limiting and did not have any adverse effects.
- Both executive and planning controllers in sector T1W had valid licenses, unit endorsements and medical certificates.
- Their activity prior to the incident flight was also within the limits allowed by law.
- VLG19ZN had been cleared to fly the CLE1W transition.
- At 09:54:24, the sector T1W controller instructed VLG19ZN to fly direct to point BL443, which the crew acknowledged correctly.
- Next, AEH993F was instructed to proceed to point BL443 and fly the CLE1W transition; however, the crew of AEH993F only acknowledged the instruction to fly direct to BL443.
- The sector T1W controller did not correct the faulty acknowledgment.
- At 10:01:32, the sector T1W controller instructed AEH993F to shorten the maneuver and proceed to point BL435, which was correctly acknowledged.
- The sector T1W controller did not coordinate with the final sector (F25W) before instructing AEH993F to fly direct to point BL435.
- At 10:03:11, upon realizing that both aircraft were converging on point BL435 at very similar altitudes, the sector T1W controller asked the sector F25W controller to instruct VLG19ZN to speed up its descent.
- The sector T1W controller then instructed AEH993F to maintain its current heading after having previously instructed it to turn right to heading 070º and then to turn left.
- At 10:03:17 the sector F25W controller instructed VLG19ZN to speed up its descent until it cleared 5000 ft. The crew acknowledged the instruction, but it did not prevent the two aircraft from receiving a TCAS resolution advisory.
- According to the radar data, the minimum distance between the aircraft was 0.8 NM and 200 ft at 10:04:12.
- Both aircraft continued their flights without further incident.
- As a result of its own safety report, the air navigation service provider adopted an internal recommendation that is deemed to be adequate, and thus this report does not contain any additional safety recommendations.

3.2. Causes/Contributing factors

The investigation has determined that the loss of separation between the two aircraft was caused by improver planning and execution of the approach sequence by the controller in sector T1W.

Contributing to the incident is the fact that the sector T1W controller:

- did not correct an incomplete acknowledgment by the crew of AEH993F to fly a transition, and
- did not coordinate with the final sector (F25W) before instructing AEH993F to fly direct to point BL435.

4. SAFETY RECOMMENDATIONS

None.