

TECHNICAL REPORT

IN-001/2022

Incident on 08 January 2022 involving a privately-operated MOONEY M 20K 231 aircraft, registration D-EKUR, and a ROBINSON R 44 helicopter operated by AVIATION HELICOPTER CENTRE, registration EC-MTH, at Son Bonet Aerodrome (Mallorca, Spain)

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.

NOTICE

This report is a technical document that reflects the point of view of the Civil Aviation Accident and Incident Investigation Commission (CIAIAC) regarding the circumstances of the accident and its 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 5.6 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 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

NOTICE.....	1
CONTENTS.....	2
ABBREVIATIONS	3
SYNOPSIS	4
1.FACTUAL INFORMATION	5
1.1. History of the flight	5
1.2. Injuries to persons	7
1.3. Damage to the aircraft	7
1.4. Other damage	7
1.5. Personnel information	7
1.5.1. Occupants of the helicopter	7
1.5.2. Occupants of the aircraft	8
1.6. Aircraft Information	8
1.6.1. ROBINSON R-44 helicopter	8
1.6.2. MOONEY 20K aircraft.....	9
1.7. Meteorological information	9
1.8. Aids to navigation	9
1.9. Communications	10
1.10. Aerodrome information	10
1.11. Flight recorders	12
1.12. Aircraft wreckage and impact information	14
1.13. Medical and pathological information	14
1.14. Fire	14
1.15. Survival aspects	14
1.16. Tests and research	14
1.17. Information about the management and organisation	14
1.18. Additional information	14
1.19. Useful or effective investigation techniques	15
2. ANALYSIS	16
3. CONCLUSION	18
3.1. Findings	18
3.2. Causes/contributing factors	18
4. RECOMMENDATIONS	19

ABBREVIATIONS

° ‘ “	Degrees, minutes, seconds
°	Sexagesimal degrees
ABL	Apron border line
AEMET	Spain's State Meteorological Agency
AENA	Spanish Airports and Air Navigation
AIP	Aeronautical Information Publication
CPL(H)	Commercial pilot license (helicopter)
E	East
FI (H)	Flight instructor (helicopter)
ft	Feet
ft/min	Feet per minute
GPS	Global positioning system
h	hour
hp	Horsepower
IR(A)	Instrument rating (aircraft)
kg	Kilogramme
km	Kilometre
km/h	Kilometres per hour
LEPA	ICAO code for Palma de Mallorca Airport
LESB	ICAO code for Son Bonet Aerodrome
m	Metre
m/min	Metres per minute
METAR	METEorological aerodrome report
MHz	Megahertz
N	North
PRKG	Aircraft parking area
PPL(H)	Private pilot license (helicopter)
RADAR	Radio detection and ranging
RSGSO	Person responsible for the Operational Safety Management System
R/TC	Spanish-language radiotelephony rating
ULM	Ultralight aircraft
TPO	Programming and Operations Technician
TWY	Taxiway
VFR	Visual flight rules

TECHNICAL REPORT

IN-001/2022

AIRCRAFT 1

Owner and Operator: AVIATION HELICOPTER CENTRE

Aircraft: ROBINSON R 44 CLIPPER I, registration EC-MTH

Date and time of incident: 8 January 2022, 09:34 h (local time)

Location of incident: Son Bonet Aerodrome (Mallorca).

Persons on board: Three. Two (2) crew. One (1) passenger.

Flight rules: VFR

Type of flight: General Aviation - Instruction flight

AIRCRAFT 2

Owner and Operator: Private

Aircraft: MOONEY M 20K 231, registration D-EKUR

Date and time of accident: 8 January 2022, 09:34 h (local time¹)

Location of incident: Son Bonet Aerodrome (Mallorca).

Persons on board: One (1) crew and a (1) passenger.

Flight rules: VFR

Type of flight: General aviation – Private

Approval date: 25 May 2022

SYNOPSIS

Summary:

The ROBINSON R 44 helicopter operated by the AVIATION HELICOPTER CENTRE school, on registration EC-MHT, was making a local instruction flight with an instructor, student and a passenger on board. After flying the aerodrome circuit, it approached the head of runway 23 at Son Bonet Aerodrome (Mallorca), passed the threshold, and then hovered at a low altitude just to the right of the runway.

Moments later, the MOONEY M 20K 231 aircraft, on registration D-EKUR, carrying out a local flight with the pilot and a passenger on board, performed a direct final approach to land on runway 23.

The final moments of this manoeuvre, just before touchdown, led to a loss of horizontal separation between the two aircraft. The helicopter, which was slightly higher than the aircraft, performed an evasive manoeuvre, turning right and climbing slightly.

The aircraft landed normally and left the runway via exit taxiway S3.

The helicopter remained in the same position for a few moments and then took off again on runway 23.

The investigation has determined that the loss of separation occurred because the crews of both aircraft failed to adhere to the landing procedures.

¹ Unless otherwise indicated, the report refers to local time. UTC can be calculated by subtracting one (1) hour.

1. THE FACTS OF THE INCIDENT

1.1. Overview of the accident

The ROBINSON R 44 CLIPPER I helicopter operated by the AVIATION CENTRE flight school, registration EC-MTH, had an instructor, student and a passenger on board. It had taken off at 9:30 h from Son Bonet Aerodrome (Mallorca) for a local instruction flight consisting of several aerodrome circuits, using runway 23. The student was seated on the right and was in charge of the flight controls.

At 10:34 h², after having flown five circuits, he made the sixth approach and, according to the images recorded by two airport cameras, on completing it, hovered at a low altitude over a grassy area to the right of the runway and close to the threshold. Over a period of 20 seconds, the helicopter turned left, positioning itself perpendicular to the runway, then right, and then left again.

After this last turn, the MOONEY M 20K 231 aircraft, registration D-EKUR, which had the pilot and a passenger on board, reached the start of runway 23 (the point where the asphalt begins) after making a long final approach that was recorded on the RADAR.

The two occupants of the aircraft indicated that they had performed a local flight on an east-north-easterly heading to point "E", which is located 25 km east of the airport. During the flight, they passed the towns of Santa María del Camino, 10 km from the airport, then Binissalem, another 10 km further, and finally Inca, which is a further 5 km from the airport and next to point "E".

The passenger specified that they flew to the south of the MA-13³ motorway, keeping the villages they passed to their left to avoid interfering with traffic heading towards Son Bonet Aerodrome from point "E". However, during the return flight, they flew to the north of the motorway so as not to interfere with any aircraft leaving the aerodrome and heading towards point "E".

They went on to explain that when they were on the final approach, the passenger communicated their position by radio. Approximately one (1) to two (2) minutes later, they heard someone say "base", which surprised them because it was the first call they had heard from an aircraft in the circuit. However, as they were already on final with the runway in sight, they assumed there was no problem.

Just as the aircraft was about to touch down, the helicopter performed an evasive manoeuvre, climbing slightly and turning to the right. Despite the manoeuvre, the horizontal separation between them at the closest point was approximately 4 m.

The aircraft landed normally and left the runway via exit taxiway S3.

The helicopter remained in the same position for around 45 seconds and then took off again on runway 23. By that time, the aircraft had already left the runway and was heading towards the aircraft parking apron on taxiway C2.

The instructor on board the helicopter said he thought the loss of separation occurred near exit S1, when his aircraft's longitudinal axis was oriented at approximately 210° and the student was at the controls trying to stabilise the hover before heading towards exit S2 and the head of runway 23 to take off again.

He also commented that they had reported their position on the radio when they were on right base for runway 23 and again on final, but as he had not heard any other aircraft report that it was on final, he assumed the aircraft had approached runway 23 to land without prior warning.

² The exact time of the incident was determined from the information obtained from the aircraft's RADAR trace, as the two airport cameras that recorded the event did not show the same time, nor did they coincide with the time recorded by the RADAR.

³ The MA-13 motorway runs between the towns of Palma de Mallorca and Son Ferragut in a southwesterly-northeasterly direction

Lastly, he explained that the person sitting behind him⁴ realised there was an aircraft coming in to land, so he took the controls, lifted the collective and moved the helicopter up and to the right to separate them from the incoming traffic and prevent a collision.

The pilot of the aircraft said he only noticed the helicopter above the grassy area to his right a few seconds before landing. He thought it was manoeuvring to park on the helipad, but it was too late for him to have any kind of reaction. He also said later that he thought the person they heard say 'base' on the radio might have been the helicopter pilot.

The passenger pointed out that there was some crosswind during the approach and landing, and he thought perhaps the wind shifted the helicopter slightly towards the runway just as they were about to touch down. He said they did not take any evasive action because, given their height at the time, it was too late to do anything.



Figure 1. Overview of the situation

The only witness to the event was a helicopter flight instructor who was parked in position seven (7) on the apron, opposite the hangars but a long way from the runway. According to this witness, after starting up his aircraft (a helicopter with registration number EC-NGK), he tuned the radio to the 123.500 MHz frequency used at Son Bonet Aerodrome, heard the incident helicopter communicate "right base 23", and verified that there was a helicopter in that position. He also heard the helicopter crew say "final runway twenty-three (23)" and again noted that they were on final approach.

However, he did not hear any further communication, either while completing his pre-flight routine at station seven (7) or afterwards when he moved to taxiway P4. It was when he was there that he saw an aircraft on its final approach to runway 23 (short final) and the helicopter positioned on the side of the runway, hovering next to the threshold.

⁴ This person holds a private helicopter pilot licence, PPL(H), but had no role assigned on board. The flight school operations manual does not prohibit other people being on board the helicopter during a lesson

He assumed the aircraft would initiate a “go-around” or the helicopter would move forward to the S2 exit, but the aircraft continued to land, and the helicopter remained hovering in the same position. At the last moment, just as the aircraft was about to touch down, the slightly higher helicopter made a sharp turn to the right to avoid a possible collision, and the aircraft continued to land, without performing any evasive manoeuvres. He estimated that the two aircraft were only a few metres apart at one point.

The witness said that after the loss of separation, the helicopter continued to hover for a few moments and then continued the flight along runway 23.



Figure 2. Relative positions of both aircraft

1.2. Injuries to persons

Injuries	Crew		Passengers		Total in the aircraft		Others	
	Helicopter	Aircraft	Helicopter	Aircraft	Helicopter	Aircraft		
Fatal	0	0	0	0	0	0	0	0
Serious	0	0	0	0	0	0	0	0
Minor	0	0	0	0	0	0	0	0
Unharmmed	2	1	1	1	3	2	0	0
TOTAL	2	1	1	1	3	2	0	0

1.3. Damage to the aircraft

Neither aircraft sustained damage.

1.4. Other damage

There was no other damage

1.5. Information about the personnel

1.5.1. Occupants of the helicopter

The instructor of the helicopter was the pilot-in-command. He was a 42-year-old Scottish national with a commercial helicopter pilot license, CPL(H), issued by the Civil Aviation Authority of Malta on 27 July 2020. He held the helicopter flight instructor rating, FI(H), and the class rating for

ROBINSON R 22 and R 44 helicopters. The licence and corresponding Class 2 medical certificate were in force. He had 4,500 h of flight experience, of which 4,200 h were in type.

The student had commenced flight training on 13 December 2021 and had taken five (5) lessons (the incident flight being the sixth) totalling 3:54 h, all in the R44 CLIPPER II model with registration D-HAAX. This was the first time he had flown the CLIPPER I model helicopter with registration EC-MTH.

1.5.2. Pilot of the aircraft⁵

The ultralight aircraft pilot was 50 years old and held a private pilot licence, PPL(A), issued on 14 August 2013. He held multi-engine piston land, MEP (land), instrument flight, IR(A), and CESSNA C 501 /551 ratings. He had 1,285 h of experience. The licence, ratings and Class 2 medical certificate were in force.

1.6. Information about the aircraft

1.6.1. ROBINSON R-44 helicopter

The ROBINSON R-44 CLIPPER I helicopter, registration EC-MTH, was owned by the AVIATION CENTRE flight school. According to AESA's aircraft registry, it was manufactured in 2012 with serial number 2220 and is powered by a LYCOMING O-540-F1B5 engine.

It's 9.09 m long, 3.27 m high, and has a fuselage measuring 1.28 m wide. Its overall length (with blades parallel to the longitudinal axis) is 11.77 m, its overall width (between the skids) is 2.18 m, the diameter of its main rotor is 5.025 m, and the diameter of its tail rotor is 1.47 m.

Its empty weight is 662 kg, and its maximum take-off weight is 1,089 kg. It had a valid restricted certificate of airworthiness, and at the time of the accident, both the aircraft and the engine had 2,075 h of flight time.

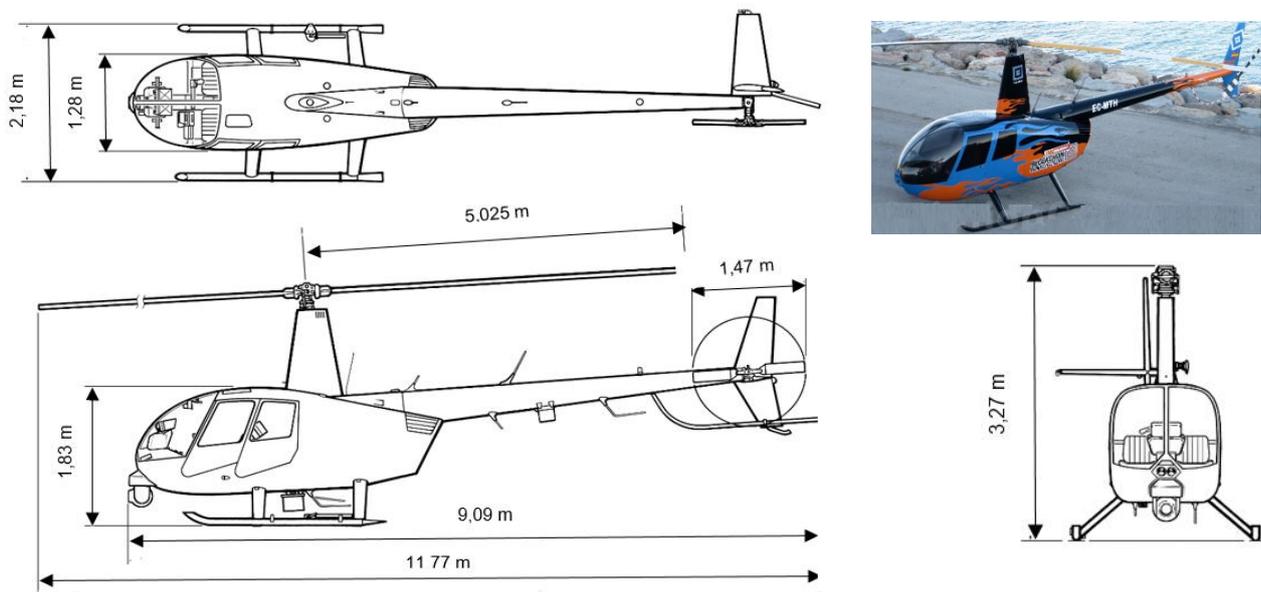


Figure 3. Images of the ROBINSON R 44 helicopter

⁵ The 27-year-old passenger in the aircraft held a private pilot license, PPL(A), issued on 12 January 2015, and a commercial pilot license, CPL(A), issued on 15 June 2018. In addition, he had the flight instructor rating, FI(A), instrument rating, IR(A) and Spanish-language radiotelephony rating R/TC. The licence, ratings and corresponding Class 2 medical certificate were in force. He had a total experience of 640 hours.

1.6.2. MOONEY 20K 231 aircraft

The privately-owned MOONEY 20K 231 aircraft, registration D-EKUR, was manufactured in 1980 with serial number 25-0437.

It is a low-wing aircraft measuring 8.15 m long and 2.5 m tall. It has a wingspan of 11.1 m and a wing surface area of 16.3 m². Its empty weight is 1,074 kg, and its maximum take-off weight is 1,315 kg. It has a retractable tricycle type landing gear with a front wheel.

It was powered by a 200 hp TEXTRON - LYCOMING IO-360-A3B6D engine and a McFARLANE MTV 12D /188 - 53 propeller.

It had a valid certificate of airworthiness, and at the time of the accident, the aircraft had 3,150 h of flight time, the engine 4,291 h and the propeller 1,607 h.

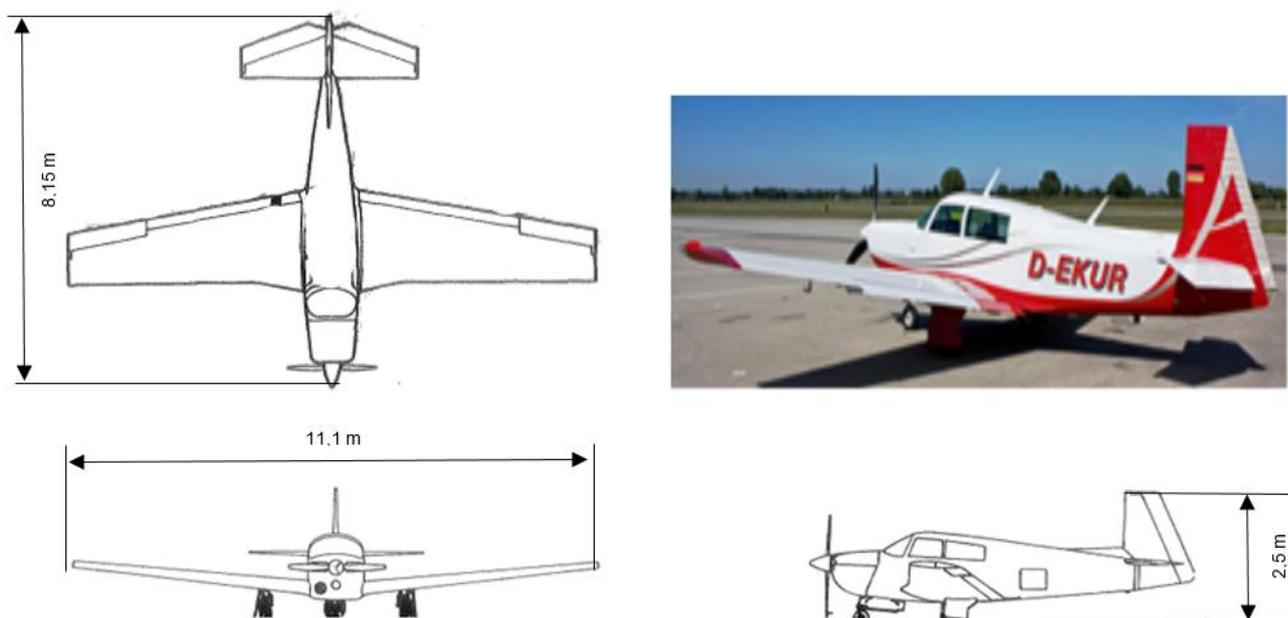


Figure 4. Images of the MOONEY M 20 Aircraft

1.7. Meteorological information

The METAR / SPECI weather reports from Son Bonet Aerodrome on the day of the accident between 9:00 h and 10:00 h were as follows:

METAR LESB 081000Z AUTO 310009KT 270V340 9999 BKN028 /// BKN032 /// 12/06 Q1024

METAR LESB **081030Z** AUTO **310011KT 280V340** 9999 **STC029** /// **BKN032** /// 12/05 Q1025

METAR LESB 081100Z AUTO 310014KT 280V340 9999 BKN030 /// BKN038 /// 12/05 Q1024

According to this information, there was a crosswind of approximately 11 kt at the time of the incident, blowing at an angle of between 50° and 110° to the runway centreline. Visibility was good because the clouds were high.

1.8. Aids to navigation

Son Bonet Aerodrome only handles visual flights and neither of the two aircraft were using navigation aids.

As per airport regulations, both the pilots had filed flight plans, which were as follows:

HELICOPTER EC-MTH	AIRCRAFT D-EKUR
(FPL-ECMTH-VG	(FPL-DEKUR-VG
-R44/L-S/C	-M20T/L-SGIRY/S
-LESB0845	-LESB0900
-N0090VFR	-N0160VFR ADX
-LESB0200 LEPA	-LESB0040
-DOF/220108)	-DOF/220108 PBN/B2)
(SPL-ECMTH	(SPL-DEKUR
-LESB0845	-LESB0900
-LESB0200 LEPA-DOF/220108-E/0300	-LESB0040-DOF/220108 PBN/B2-E/0400
P/002 A/BLUE ORANGE BLACK	P/002 R/VE J/L A/WHITE RED
N/638603197 C/JONES)	N/0041792304299 C/HANSEN)

The aircraft's RADAR trace during the final approach was also made available to the investigation.

It confirms the information provided by the aircraft's passenger, showing a long final approach to the north of the runway centreline, and alignment with the centreline at the last minute.

1.9. Communications

There is no control tower at Son Bonet Aerodrome and no recordings are made of communications between aircraft on the local frequency, which is 123.500 MHz.

ENAIRES also reported that it had no record of any communications between either aircraft and the control services it manages.

According to their testimonies, both the pilot and passenger of the aircraft had their headphones on. The passenger was making the radio communications, reporting their position when they passed Santa María del Camino, Binissalem, and when they arrived at point "E". They maintain that they did the same on their return, and that when they were over Santa María del Camino again, the passenger used the radio to ask if there were any other aircraft in the aerodrome circuit but did not get a reply, so they reported that they were joining the final leg for runway 23. Afterwards, they heard someone say "base".

The helicopter pilot said they radioed when they were on the right base for runway 23 and again when they were on final, and that he did not hear any radio communications from other aircraft.

The witness also recalled hearing the helicopter crew call when they were on base, first saying "right base 23" and later "final runway twenty-three (23)".

In addition, he said that after the event he heard the helicopter pilot radio the aircraft pilot several times, addressing him as "aircraft just landed" rather than using the aircraft's radio callsign, probably in an attempt to find out if the aircraft pilot had seen him or made any radio calls prior to the incident. However, there was no response from the other pilot.

The witness did not hear any communication from the aircraft pilot as he left the runway at exit S3, but says he eventually responded that he was on frequency at taxiway C1 without making any comment on the loss of separation that had just occurred.

1.10. Information about the aerodrome

Son Bonet Aerodrome (LESB) is located at an elevation of 47 m, 4 km southwest of the town of Marratxí (Mallorca). Its GPS coordinates are 39° 35' 56" N - 002° 42' 10" E.



Figure 5. Aerodrome circuit

According to the information published in AENA’s AIP, it has a 23 m wide runway designated 05/23. Its available length is 1,283 m from runway head 05 and 1,299 m from runway head 23.

The runway head thresholds are displaced by 183 m, with runway 05 having an elevation of 35 m and runway 23 having an elevation of 44 m, giving an average gradient of 1,0011 %.

The aerodrome circuit is northwest of the runway, i.e., to the left of runway 05 and the right of runway 23. The circuit for ultralight aircraft (ULM) is shorter.

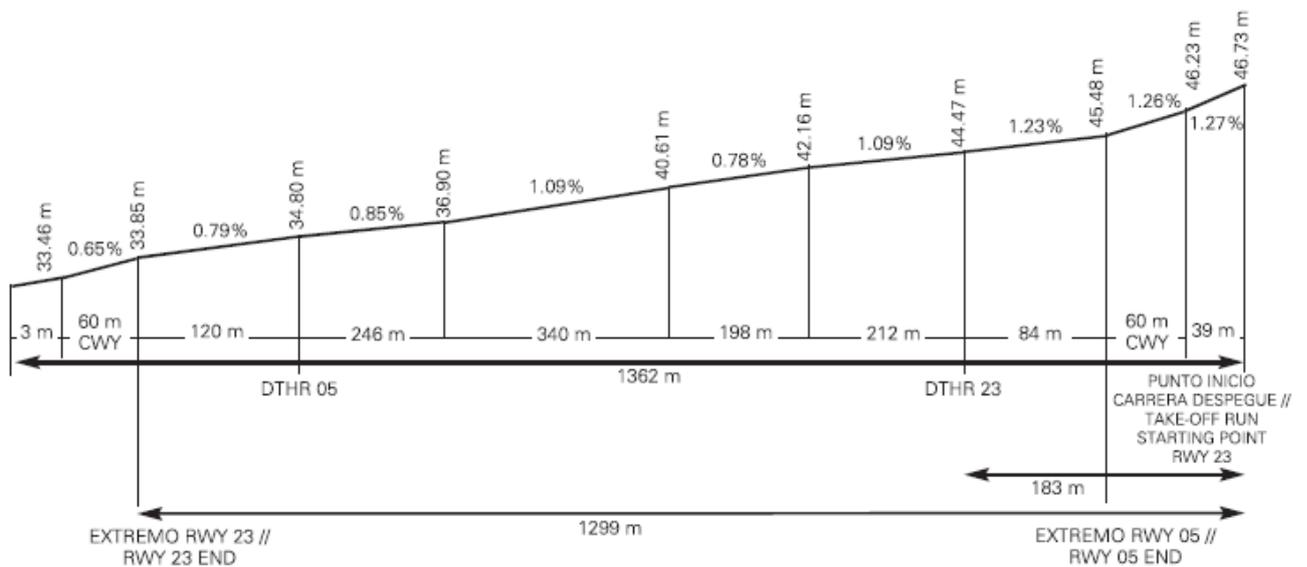


Figure 6. Profile of runway 23

The airport has a helicopter landing area within the aircraft parking apron. Its coordinates are the same as those for the aerodrome reference point. Departures and arrivals at the airport must be notified to Palma de Mallorca Airport on the operations frequency, 130.250 MHz. Submitting a flight plan is mandatory.

HELICOPTER OPERATIONS

According to the AIP: since there is no other specific area defined for operating with helicopters at Son Bonet Airport, they will receive the same treatment as fixed-wing aircraft and will take off and/or land on the runway in use.

The stands in the apron are used as a take-off and landing area (TLOF), there are no air taxiing routes, and simultaneous operations of two helicopters that involve the use of adjacent stands are not allowed.

Helicopter taxiing procedure

Taxiing between the apron and runway will be performed by the exit taxiway S2 or S3 and taxiways C1 and TWY C2. Taxiing may be by air or ground. Certain restrictions are in place:

- Helicopter dimensions must be compatible with the taxiway (TWY) width, as well as the stand dimensions and its safety area.
- Helicopter stands are located on the main apron, numbers: 1, 4-10, 27 and 28. In the central area, PRKG 51 can also be used by helicopters. (See restrictions to stands in Item 20).
- Taxiing along the section of TWY P2 opposite hangars 1 and 2 shall be accomplished with the engine off, either under tow or carried upon a suitable vehicle.

Arrivals

Helicopters approaching by runway 05 will finish their approach close to the intersection with taxiway S3, exit via the same, and then taxi via taxiways C1 and C2 to the helicopter stand area.

Helicopters approaching by runway 23 will finish their approach close to the intersection with taxiway S2, exit via the same, and then taxi via taxiway C2 to the helicopter stand area.

If they are to park inside a hangar, they will follow the taxiway centre lines to the building, stop on the pavement close to the safety line (ABL), turn off the engine. They will be towed or transported into the hangar by an appropriate vehicle.

Departures

Helicopters taking off from runway 05 will taxi from the stand to the runway via taxiways C1 and C2 and then via exit taxiway S3. They will take off when they are on the runway.

Helicopters taking off from runway 23 will taxi from the stand to the runway via taxiway S1 and then towards threshold 23; once they have passed threshold 23, they shall take off.

Helicopters parked inside a hangar should be towed out with their engines turned off, up to the apron inside the ABL. Once there, they shall follow the procedure described.

1.11. Flight recorders

Neither aircraft was equipped with flight recorders and they are not legally obliged to carry them

Three video recordings of the event were made available to the investigation.

One of them was recorded by the witness from the P4 access point to taxiway S1. The recording captures the exact moment of the loss of separation, but an aircraft parked at stand twenty-four (24) obstructs the view.

The other two videos were recorded by airport cameras 15 and 19, both of which are located on the general aviation apron, in elevated positions.

The first is in line with parking stands 23 and 24, perpendicular to the runway and on a level with the threshold.

The second is located on top of a building in the northern part of the airport, further away from the threshold.

The following images show, from different angles, the moments before the loss of separation, the instant when the loss of separation occurred and also the moment when the helicopter resumed flight.

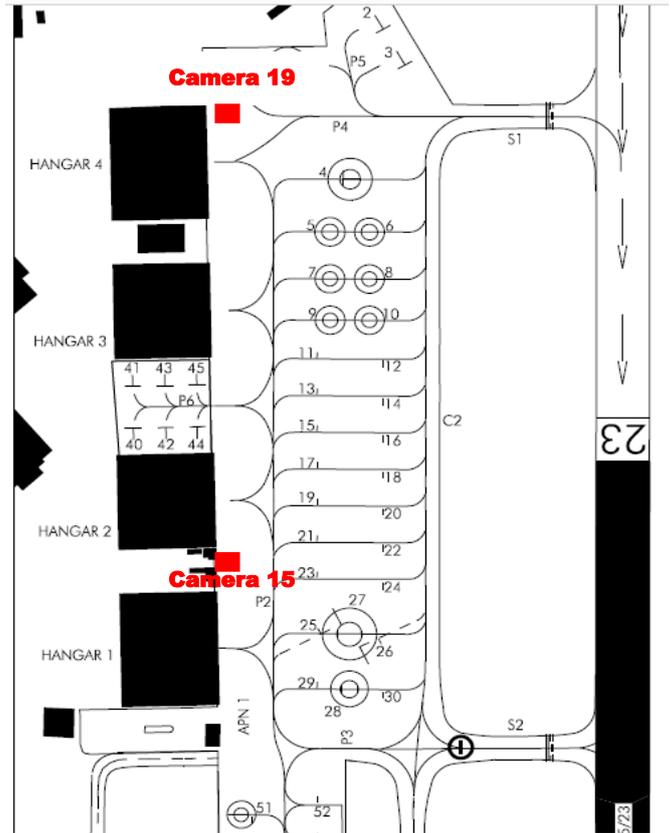


Figure 7. Camera locations



Figure 8. Moment the aircraft arrives on the runway, as seen from camera 15



Figure 9. Instants before the aircraft passes the helicopter, as seen from camera 19



Figure 10. Moment the aircraft passes the helicopter, as seen from camera 19

1.12. Aircraft wreckage and impact information

Not applicable in this incident.

1.13 Medical and pathological information

No records.

1.14. Fire

No fire broke out.

1.15. Survival aspects

The restraint systems in both aircraft performed their function adequately.

1.16. Tests and research

Not applicable.

1.17 Organisational and management information

Not applicable.

1.18. Additional information

On 17 January 2022, AENA held a Special Committee meeting at the aerodrome to discuss the event. The meeting was attended by the Airport Director, the person responsible for the Operational Safety Management System (RSGSO), an Operations Technician and a Programming and Operations Technician (TPO).

Also present were the occupants of the aircraft and the instructor who was on board the helicopter.

According to the minutes of the meeting, the persons involved explained their perception of the events.

The helicopter instructor stated that the aerodrome circuit flown by helicopters is normally somewhat shorter than the standard circuit flown by aircraft, but that on this occasion, as a student with little experience (10 hours) was piloting, the circuit they flew was very similar to that of a fixed-wing aircraft.

He did not rule out the possibility that the two pilots had communicated simultaneously on the final part of the approach and, therefore, did not hear each other, adding that sometimes the frequency is saturated because there had been an increase in traffic recently.

The person responsible for the Operational Safety Management System indicated that a request had been made to include point 'NE' at Santa María del Camino in the visual approach chart (VAC) and that the obligation to wait at the point 'NN' point should also be added.

He also suggested a study of parallel approaches and said that he would ask for this to be carried out, if possible, in 2022.

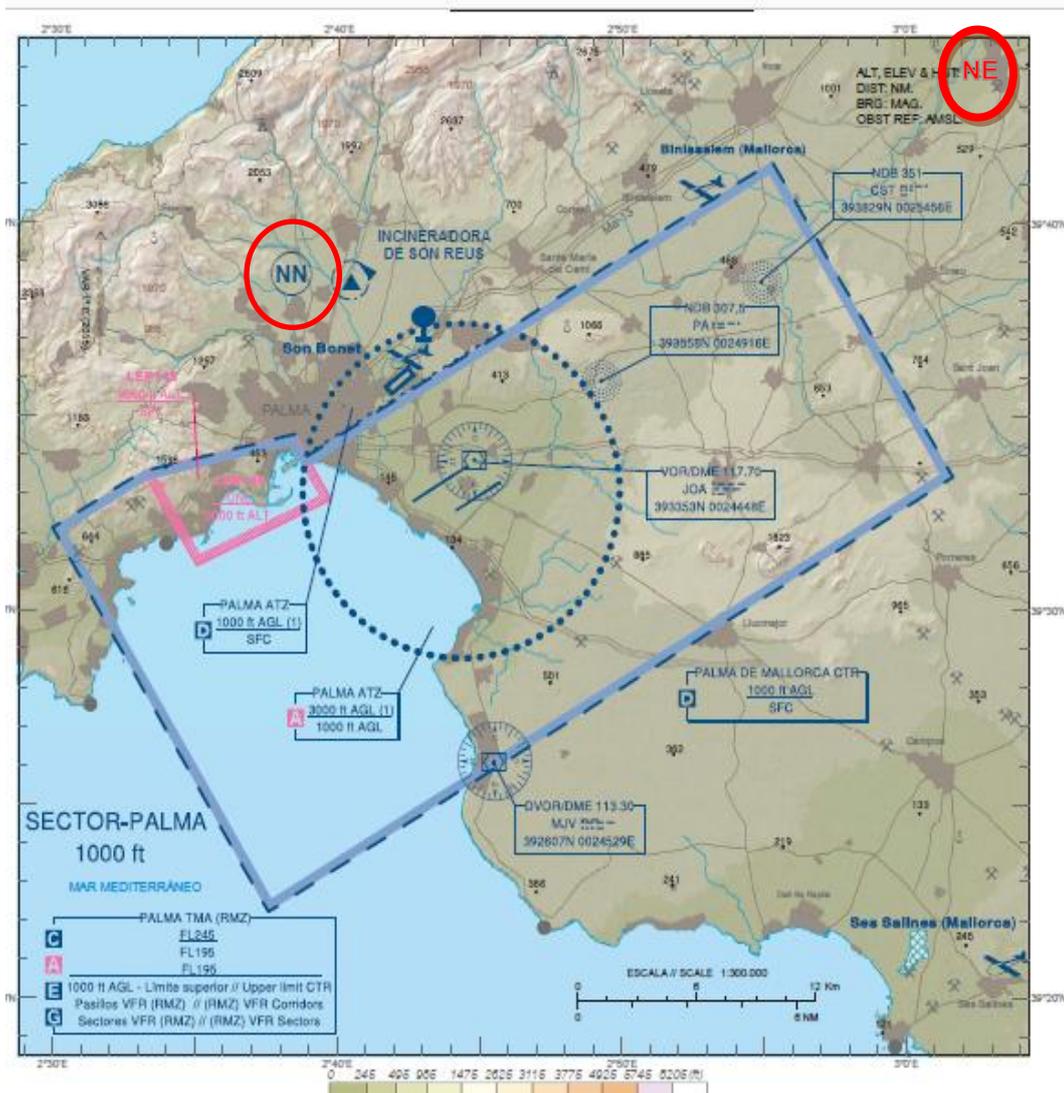


Figure 11. Visual approach chart with point 'NE'

1.19. Special investigation techniques

No special investigation techniques were required.

2. ANALYSIS

It has not been possible to ascertain which conversations actually took place because, given that there is no legal obligation to do so, they were not recorded.

However, visual flight rules dictate that the pilot of the aircraft should have been aware of the helicopter's presence.

When the occupants of the aircraft heard the word "base", they assumed the other aircraft was behind them because they were already on the final leg of the approach and had not seen any aircraft previously, nor had they heard anyone report that they were on the previous leg of the circuit (the downwind leg).

As a result, they continued their approach normally, not expecting to see any type of aircraft in front of them, whether helicopter or aeroplane.

Having heard nothing on the radio, the helicopter pilot assumed there was no other aircraft in the vicinity of the aerodrome (neither landing nor in the circuit).

He was initially convinced the incident had occurred because no communication was made by the aircraft, although after attending the AENA Special Committee meeting, he conceded they might have both communicated correctly but not heard each other because they spoke simultaneously.

Regardless of whether the correct communications were made, which, as mentioned above, could not be confirmed, whether the approaches and landings of the two aircraft complied with the aerodrome procedures published in the AIP must also be considered.

The Mooney M ultralight made a long final approach without flying the aerodrome circuit.

The circuit is designed to make landings easier, and although following it is advisable in the interest of operational safety, the published procedures state that it is not mandatory. A direct approach is an equally valid alternative, provided the intention to make that approach is communicated by radio, and the aircraft's position is regularly reported.

Therefore, the approach and landing made by the pilot of the aircraft complied with procedure.

As far as the helicopter is concerned, it was landing and taking off following the aerodrome circuit. There is a published procedure for this manoeuvre, according to which, as there is no specific area defined for helicopter operations at Son Bonet, take-offs and landings must be made, like aircraft, along the runway.

There are no specific air taxi routes defined for helicopters. Therefore, helicopters approaching runway 23 must end their approach in an area close to the intersection with exit taxiway S2 and then fly along taxiway C2 to the helicopter parking area if they intend to park. Alternatively, if they intend to fly another circuit, they must go to runway head 23 via exit taxiway S1 and access the runway to take off once they have crossed the threshold.

The helicopter did not proceed to exit taxiway S2 but remained in stationary flight on a level with the runway threshold.

According to the instructor, the student was trying to stabilise the helicopter to follow the taxi procedure and start a new circuit, but as he was at an early stage of his training it took time.

In order to comply with the procedure and go to exit taxiway S2, the crew of the helicopter had to ensure it was stable.

However, keeping it with its tail to the runway head for an extended period prevented them from seeing any approaching aircraft and increased the risk of a collision, especially given that a crosswind was pushing them towards the runway.

After the incident, the helicopter commenced another aerodrome circuit. However, in doing so, the crew failed to comply with the procedure because instead of going to S2 then flying via C2 to S1 in order to access the threshold and take off again, it rose from the point where it had been hovering and took off parallel to the runway, flying over the area to the right.

As a result, we have concluded that the loss of separation occurred because the helicopter crew failed to adhere to the aerodrome's landing procedure and the aircraft pilot also violated it by landing on a runway that was occupied by the helicopter.

Once the two pilots were aware of the risk, they both reacted correctly.

The helicopter pilot performed the most appropriate evasive manoeuvre to increase the distance between them, which, given that the aircraft was practically on the ground and below him, was to increase their height and at the same time turn to his right away from the runway because when they passed each other, the helicopter was at a right-angle to the runway axis.

The pilot of the aircraft continued with the landing despite the presence of the helicopter, contravening the rules of visual flight. According to the pilot, by the time he became aware of the helicopter, he was almost on the runway. If he had accelerated to take off again (i.e., if he had initiated a "go-around"), the loss of separation would have been vertical as well as horizontal because they would have been at the same height and, therefore, even closer. Thus, by opting to continue with the landing, at the point of least distance between them, the aircraft was already below the helicopter.

3. CONCLUSIONS

3.1. Findings

- The ROBINSON R 44 helicopter, registration EC-MTH, had an instructor, student and a passenger on board. After flying the aerodrome circuit, it approached via the head of runway 23 and then hovered at a low altitude just to the right of the runway as soon as it had passed the threshold.

- Moments later, the MOONEY M 20K 231 aircraft, registration D-EKUR, which was carrying out a local flight with a pilot and a passenger on board, made a direct final approach and landed via the same runway head.

- Just as it passed the threshold and was about to touch down on the runway, there was a loss of horizontal separation between the two aircraft, with the helicopter remaining in the same position, slightly higher than the aircraft.

- The helicopter performed an evasive manoeuvre by climbing slightly and turning to its right.

- The aircraft landed, exited the runway via S3 and taxied to the parking area via C2.

- The helicopter remained in the area where the loss of separation occurred for a further 45 seconds while attempts were made to stabilise it.

3.2. Causes/contributing factors

The investigation has determined that the loss of separation occurred because the crews of both aircraft failed to adhere to the landing procedures.

4. RECOMMENDATIONS