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INVESTIGATION REPORT

Serious incident
to the Airbus A319-112 registered **LZ-FBB**
and the Airbus A320-232 registered **TC-FBJ**
on 25 November 2014
at Paris-Charles-de-Gaulle airport[1] (Val-d'Oise)

(1) Paris-CDG.

(2) Except where otherwise indicated, the times in this report are in Coordinated Universal Time (UTC). One hour should be added to obtain the local time.

(3) Pilot Flying.

(4) Pilot Monitoring.

Time	Around 08:20[2]
Operators	LZ-FBB: Bulgaria Air TC-FBJ: Freebird Airlines
Type of flights	Commercial air transport
Persons on board	LZ-FBB: Captain; first officer; 6 cabin crew; number of passengers not determined TC-FBJ: Captain (PF[3]); first officer (PM[4]); number of cabin crew and passengers not determined
Consequences and damage	None

This is a courtesy translation by the BEA of the Report on the Safety Investigation. As accurate as the translation may be, the original text in French is the work of reference.

Runway incursion by an aircraft during take-off of another aircraft

1 - HISTORY OF THE FLIGHT

Note: the history of the flight is based on the radio recordings, radar recordings and the FDR data from both aeroplanes.

The A319, registered LZ-FBB and operated by Bulgaria Air, call sign LZB431, was carrying out a flight from Sofia (Bulgaria) to Paris. The A320, registered TC-FBJ and operated by Freebird Airlines, call sign FHY542, was carrying out a flight from Paris to Istanbul (Turkey). The exchanges between the crews of these aeroplanes and the air traffic control were carried out in English. The METAR[5] of 08:30 UTC indicated visibility of 9 km.

(5) METeorological Aerodrome Report.

Runways 08L and 08R were in service and were being used as "*nominal twin runways*": take-offs were performed on runway 08L and landings on runway 08R. The crews of the landing aeroplanes therefore had to cross runway 08L in order to get to the airport terminals.

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At 08:18:43, the LOC controller(6) indicated to the crew of flight LZB431, which had just vacated runway 08R via taxiway V5: "*Bulgaria 4 3 1, hold short of 0 8 L, holding point S 6.*" The crew of flight LZB431 correctly read back.
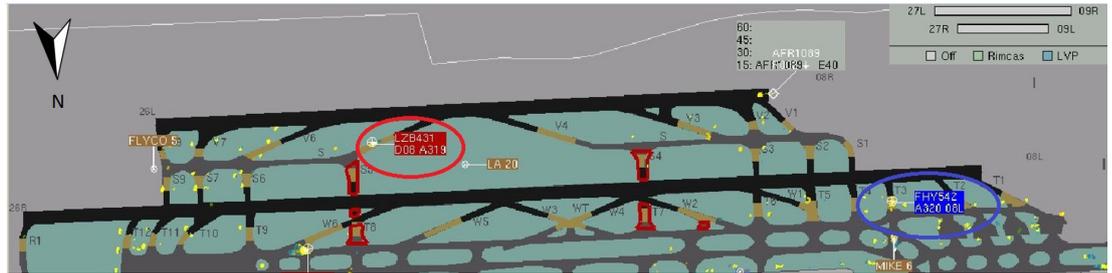
Figure 1: positions at 08:18:43 (ground radar): LZB431 in red and FHY542 in blue

At 08:18:51, the LOC controller cleared the crew of flight FHY542 to take off from runway 08L. Another aeroplane, AFR1089, landed on runway 08R and vacated via taxiway V6.

At 08:19:34, the LOC controller indicated to the crew of flight LZB431, "*Bulgaria 4 3 1, number one, keep on taxiing.*" The crew of flight LZB431 read back using the same terms as the LOC controller.

At 08:19:37, the LOC controller told the crew of flight AFR1089 to taxi behind the 319 Bulgaria on left. The crew of flight AFR1089 asked whether they were cleared to cross. The LOC controller replied no. These exchanges were carried out in French.
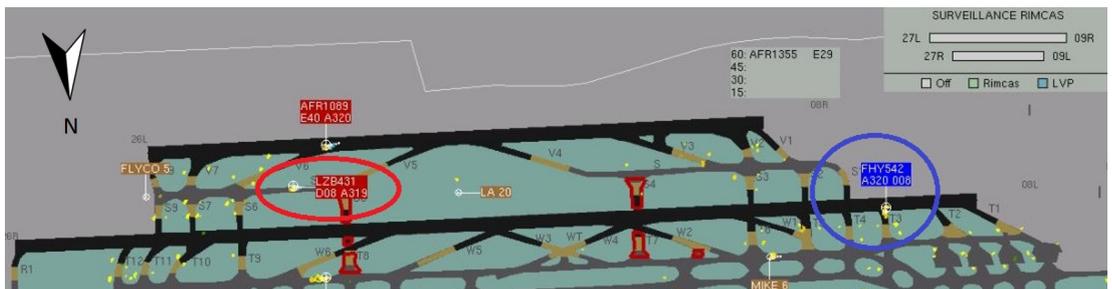
Figure 2: positions at 08:19:30 (ground radar)

At 08:20:17, LZB431 entered runway 08L via S6. The RIMCAS(7) warning was triggered one second later. FHY542, performing the take-off run, was at approximately 1,500 m before the intersection with taxiway S6 and at an indicated airspeed of 139 kt.

Figure 3: positions at 08:20:28 (ground radar)

At 08:20:37, FHY542 flew over the intersection with S6 at a height of around 500 ft. LZB431 had vacated the runway and was stopped on taxiway T9.

The BEA investigations are conducted with the sole objective of improving aviation safety and are not intended to apportion blame or liabilities.

2 - ADDITIONAL INFORMATION

2.1 Witness statements

2.1.1 Crew of A320 performing Freebird Airlines flight FHY542

The pilots said that the controller had cleared them for take-off as they approached the holding point of runway 08L. When the aeroplane had reached V1, they saw the Bulgaria Air A319 for the first time, approaching holding point S6. They were expecting, however, that it would come to a halt before entering the runway, its taxiing speed being compatible with this scenario. Shortly after, they realised that it was crossing the holding point. As the rotation speed had been reached[8], the captain decided to take off. They estimated that they flew over the A319 at a height of around 100 ft.

[8] 142 kt.

2.1.2 Crew of A319 performing Bulgaria Air flight LZB431

The pilots said that the frequency was very busy with exchanges in both French and English. After vacating runway 08R, they were initially told to taxi to holding point S6 and to hold short of runway 08L. While they were approaching this holding point, the controller said, "*Bulgaria 4 3 1, number one, keep on taxiing.*" They understood this as being a clearance to cross the runway. They therefore read back the instructions, repeating the controller's words. After crossing the runway, the controller told them that they had not been cleared to cross it. They did not see the Freebird Airlines A320.

2.1.3 Crew of A320 performing Air France flight AFR1089

The captain said that when the controller told the Bulgaria Air A319 to keep taxiing, he asked himself if that corresponded to a clearance to cross runway 08L as, being based at Paris-CDG, he knew that normally controllers explicitly gave the crossing clearances. This is why, when the controller told him to follow the A319, he asked him to confirm the clearance to cross the runway.

2.1.4 LOC controller

The controller started his shift at 08:00. He had asked for the help of a COR LOC controller[9] as he specified that the ITM controller[10] was transferring him aeroplanes in final approach with separations reduced to 2.5 NM. This led to a high workload. A crew had in fact had to abort its approach shortly before the arrival of the Bulgaria Air A319 as the preceding aeroplane had not vacated the runway.

[9] Controller assisting the LOC controller and coordinating with the other controllers.

[10] Controller radar vectoring aeroplanes in approach.

After the Bulgaria Air flight had vacated the runway via V5, the controller asked the crew to taxi to holding point S6. As the following aeroplane (AFR1089) had vacated the runway via V6, the controller realised that there was going to be a conflict close to holding point S6 between the taxiing Bulgaria Air flight and Air France flight. He therefore decided to give priority to the Bulgaria Air flight, as the latter was further forward.

He then concentrated on an aeroplane which was in short final for runway 08R as he was not sure that he had cleared it to land.

The COR LOC controller then told him that the Bulgaria Air flight was in the process of crossing runway 08L but that it was too late to intervene as the aeroplane taking off had already started its rotation. At the same time, the RIMCAS warning was activated.

He specified that he had not had any misgivings about the intention of the Bulgaria Air flight, as the read back had been correct and the aeroplane was taxiing slowly to the holding point.

The LOC controller had an air traffic controller licence since 2003 and was qualified for all control positions since 2005.

2.1.5 COR LOC controller

The controller started his shift at 05:40 and had been at the COR LOC position since 08:00. He specified that the traffic was quite heavy with reduced separations between the aeroplanes in final approach. These reduced separations required increased monitoring of inbound aeroplanes and late landing clearances.

He had observed the Bulgaria Air flight taxiing but specified that it was difficult to see if the aeroplane was going to stop or not, as it was taxiing slowly. When he saw it cross the holding position marking, he informed the LOC controller, specifying that it was too late to act.

He considered that if the LOC controller had not been busy with the close arrivals, he could have taken the time to clarify about the crossing. The LOC controller had not asked him to call the controller in charge of the approach (ITM controller) to ask for longer separations and he had not done this himself, as the period of peak traffic was coming to an end.

The COR LOC controller had an air traffic controller licence since 1997 and was qualified for all the control positions since 2000.

2.1.6 ITM controller

The controller started his shift at 05:40 and had been in the initial approach coordinator position until 08:00. He had then taken the ITM controller position. He specified that the traffic peak was a lot denser than usual with ten aeroplanes on the frequency and a tailwind component on the final approach making it difficult for the crews to reduce their speed. The missed approach of an aeroplane shortly after he took up the position had increased his workload which he considered already high. He did not have the time to accurately measure the separations between aeroplanes on the radar so he estimated them visually. He specified that he was aware that the separations were "tight".

The ITM controller had an air traffic controller licence since 2008 and was qualified for all the control positions since 2011.

2.2 Miscellaneous Information

2.2.1 Airport Information

The Paris-CDG airport is an international airport open to commercial air traffic. It has two sets of twin parallel runways[11]. Each of the twin runways is operated in the same way: aeroplanes land on the outer runway (runway 08R/26L for the south twin runways) and take off from the inner runway (08L/26R for the south twin runways). The inbound aeroplanes therefore have to cross the inner runway to get to the terminals. The AIP[12] states that: "*Aircraft vacating runway 08R/26L or 09L/27R after landing must NEVER cross RWY 08L/26R or RWY 09R/27L without first receiving specific ATC clearance.*"

For each runway direction, the taxiways closest to the centre of the runway were closed so that the runway is crossed at a greater distance from the threshold of the runway in service. Thus, in the event of an incursion, there is a greater chance that the aeroplane taking off will have taken off before crossing the aeroplanes crossing the runway. On the south twin runways, taxiway S5 had therefore been withdrawn from use. When vacating via taxiway V5, the first intersection taxiway is therefore S6.
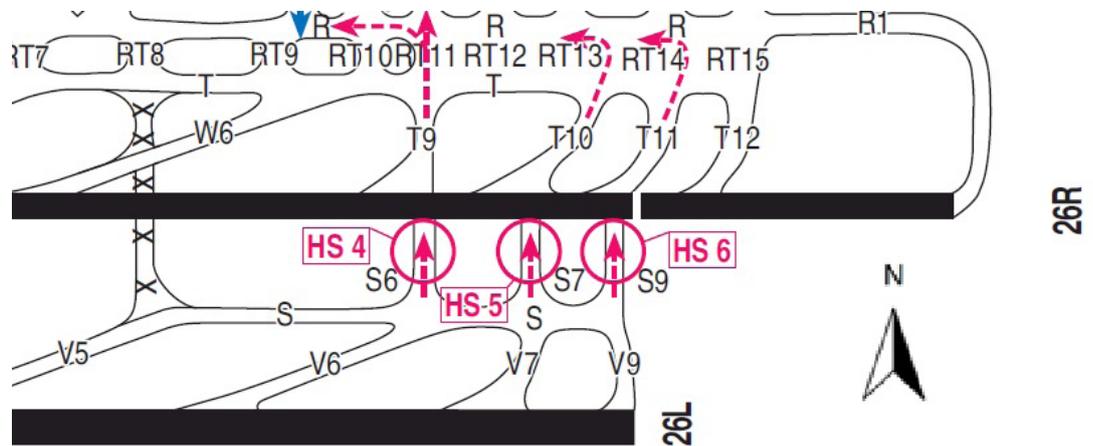
Source : SIA

Figure 4: drawing of intersection taxiways

There are differences in altitude between the various points of the Paris-CDG airport. In particular, the first five hundred metres of runway 08L are around eight metres higher than the threshold of runway 26R. It can therefore be difficult for pilots crossing the inner runway via S6 to see aeroplanes taking off from threshold 08L.

2.2.2 RIMCAS

Paris-CDG airport is equipped with a RIMCAS[13] system, which monitors ground movements, automatically detects runway incursions and alerts the controller in the event of an incursion.

The positions of the various travelling objects (aircraft and vehicles) on the aerodrome are analysed by this system. If a hazardous situation is detected in the monitoring area, it sends a visual and, if applicable, aural warning to the controller according to the seriousness of the situation.

There are two alert levels:

❏ Level 1 (situation considered potentially critical): visual warning only (orange "*ALERT*" message flashes on ground radar display).
❏ Level 2 (situation considered critical): visual warning (red "*ALERT*" message flashes on ground radar) accompanied by an aural warning (buzzer).

A level 2 warning is triggered when an aircraft has started its take-off run and its speed is more than 20 kt and a travelling object enters the runway OFZ (crossing the holding position marking).

2.2.3 Phraseology

The Aeronautical information service phraseology guide stipulates the following phraseology for the air traffic controller:

- Managing priorities when taxiing: "*Rapidair 3 2 4 5, give way to Citron Air coming from your right, taxi holding point runway 2 7 via B 7.*"
- Holding short of a runway: "*Rapidair 3 2 4 5, hold short of runway 1 8*" and then crossing a runway: "*Rapidair 3 2 4 5, cross runway 1 8 right.*"
- Crossing a runway without holding: "*Rapidair 3 2 4 5, keep taxiing, cross runway 1 8 right.*"

3 - LESSONS LEARNED AND CONCLUSION

3.1 Conclusion

The event took place during a period of dense inbound traffic with aircraft arriving with a reduced separation. This additional workload led the LOC controller to pay greater attention to inbound aeroplanes, probably to the detriment of those on the ground, in particular when they were no longer on the runway.

An inadequate phraseology was used to deal with the taxiing priorities between Air France flight 1089 and Bulgaria Air flight 431. The message "*Bulgaria 4 3 1, number one, keep on taxiing*" was not in fact accompanied by a reminder that the crew must hold short of runway 08L. This message led to an erroneous interpretation by the crew of the Bulgaria Air flight who understood it as a clearance to cross the runway.

The crew of the Air France flight had the meaning of this message clarified. The crew of the Bulgaria flight were not able to understand the exchanges in French between the controller and the crew of the Air France flight. The controller did not connect the question from the crew of the AFR1089 flight with a possible ambiguity as to the meaning of the phraseology that he had used to manage priorities.

In addition, the configuration of the Paris-CDG runways can make it difficult for crews to detect an aeroplane taking off, notably when they cross a runway. The crew of flight LZB431 thus entered runway 08L without seeing flight FHY542 taking off. The RIMCAS alarm was triggered due to the conflict. The controllers considered that it was then too late to intervene.

3.2 Actions taken following incident

A few days after the serious incident, the "*Service Quality*" subdivision of the Paris-CDG air navigation service issued a document for controllers recalling that:

- When giving traffic or priority information to an aeroplane close to a runway, the best way to guarantee safety is to use a clear phraseology and systematically recall the limit clearance.

In addition, the RunWay Status Lights system (RWSL) initially installed and tested at the beginning of 2016 on the north twin runways of the Paris-CDG airport was deployed and commissioned on the two, north and south, twin runways on 23 May 2017[14].

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The RWSL is an entirely automatic system which directly informs aeroplane crews (and vehicle drivers) of the runway occupancy status.

It is composed of two types of light which light up in red:

❑ RELs (Runway Entrance Lights) situated at runway/taxiway intersections;
❑ THLs (Take-off Hold Lights) on the first 450 m of the runway.
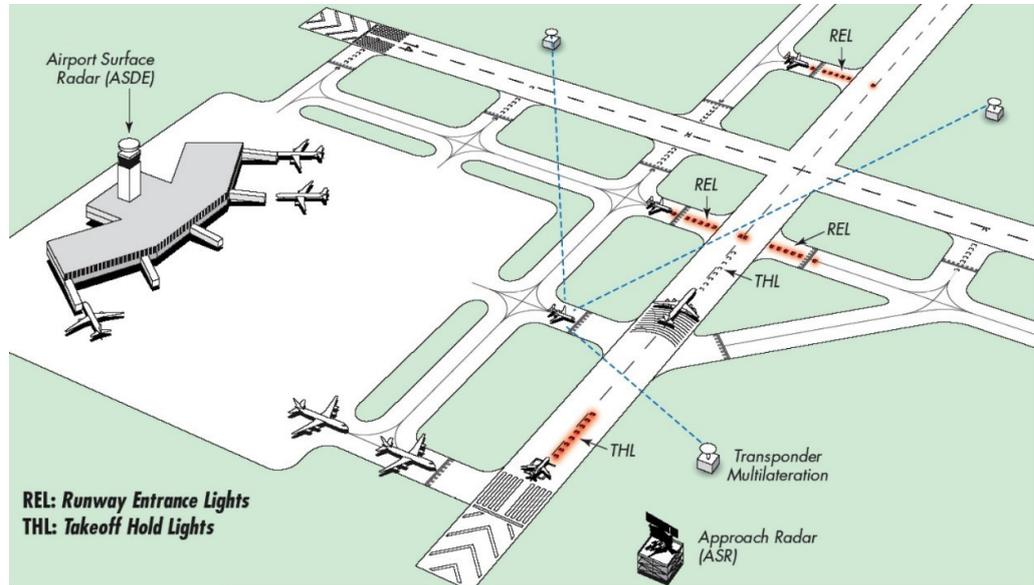
Source: DGAC - ADP

Figure 5: General diagram of RWSL

When an aeroplane has started its take-off run, the RELs light up to indicate to the aeroplanes on the runway access taxiways that the runway is occupied and that it is dangerous to enter or cross it. When one or more aeroplanes are crossing the runway, the THLs light up to indicate to the aeroplane lined up that it is dangerous to take off on this runway.

It is not intended that the system transmits an implicit approval or clearance for crossing or taking off from a runway. The pilots are still required to comply with all the control clearances except if this implies crossing a REL or a THL lit up in red. In this case, the crews must hold short of the runway for the RELs or stop the take off for the THLs (if this is possible), call the air traffic control and wait for further instructions.