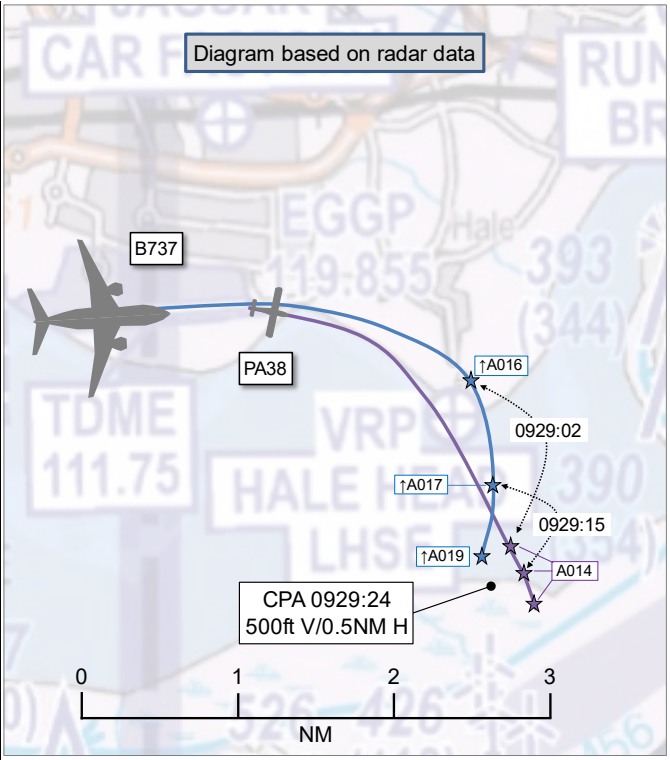
AIRPROX REPORT No 2023125

Date: 11 Jun 2023 Time: 0929Z Position: 5318N 00247W Location: 2.5NM SE Liverpool Airport

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	B737	PA38
Operator	CAT	Civ FW
Airspace	Liverpool CTR	Liverpool CTR
Class	D	D
Rules	IFR	VFR
Service	ACS	ACS
Provider	Liverpool Tower	Liverpool Tower
Altitude/FL	1900ft	1400ft
Transponder	A, C, S+	A, C, S
Reported		
Colours	Blue and White	White and red with yellow trim.
Lighting	Strobe and anti-collision.	Anti-collision and nav lights
Conditions	VMC	VMC
Visibility	>10km	>10km
Altitude/FL	1770ft	NK
Altimeter	QNH (1015hPa)	QNH
Heading	Turning 210°	140°
Speed	NK	70kt
ACAS/TAS	TCAS II	Not fitted
Alert	RA	None
Separation at CPA		
Reported	NK V/NK H	800ft V/NK H
Recorded	500ft V/0.5NM H	



THE B737 PILOT reports the crew were cleared to line up [at their departure airport] via [holding point] 'C' with a light-aircraft [waiting] on 'D'. The light-aircraft [pilot] was cleared to line up and take-off, instructed to turn onto heading 150° and climb to 1500ft. Moments later, the Tower [controller] told them to line up and wait on RW09. The crew were instructed after departure to head 210° and climb to 3000ft. Once at the RW, and moments after the light-aircraft was cleared for take-off, the Tower [controller] cleared the crew to take-off. The crew were surprised by the take-off clearance and asked [the Tower controller] again if they were cleared to take-off, to which the reply was 'affirm'. At that moment the crew saw the [light-aircraft] traffic turning towards the right and climbing away. The crew initiated the take-off roll and after departure an immediate turn was required at 580ft. After the turn and climbing, a Traffic Collision Avoidance (TCAS) Traffic Advisory (TA) was spotted. The crew adopted a defensive position ready to take action. The traffic was always in sight and on TCAS all the time. Soon after the 'bug up' call and during the cleaning phase a vertical speed Resolution Advisory (RA) 'Monitor vertical speed' message was heard. This caused a startle effect on the crew. No autopilot was engaged at that time and auto-throttle was engaged. The crew monitored the vertical speed to keep away from the red and amber band [of the TCAS display]. The traffic was in sight and the aircraft was climbing away from the traffic, complying with the vertical speed RA (climbing away from the red band of the RA [display]). No correction of flight path was needed. A 'clear of conflict' [audio advisory] was heard and, moments after, the flight resumed normally. Due to the flight phase and because these events were just for a few seconds there was no time to use standard phraseology (the aircraft [crew] were complying with the RA at all times). They reported the RA to the Tower [controller]. No altitude bust or deviation from the initial clearance was made.

The pilot assessed the risk of collision as 'Low'.

THE PA38 PILOT reports an Airprox had been filed [due to another] aircraft having a take-off clearance shortly after they had departed. They were not aware of anything at the time.

The pilot assessed the risk of collision as 'None'.

THE LIVERPOOL TOWER CONTROLLER reports [that a B737 pilot], on departure from Liverpool, reported a TCAS RA on light traffic. The PA38 [pilot] departing [via a local waypoint] not above 1500ft VFR was airborne at time 0926. The B737 [pilot], on a non-standard departure with a right turn heading 210° climbing to 3000ft, was given Traffic Information as they lined up on the runway, on the PA38 that had just departed. The PA38 [pilot] was also given Traffic Information on the departing B737 behind, southwest bound and climbing through their level. The B737 [pilot] was then cleared for take-off. Once the B737 had been climbed to 5000ft, before they were transferred to Scottish Control, they reported that they had a TCAS RA on the VFR light traffic.

Factual Background

The weather at Liverpool was recorded as follows:

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METAR EGGP 110820Z 11003KT 070V140 CAVOK 21/15 Q1015
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Analysis and Investigation

Liverpool ATC Investigation

The timeline of events follows, all times are UTC. The PA38 pilot had acknowledged their position at the Delta holding point at 0922:50 and at 0924:50 they were cleared to 'line up and wait RW09' via Delta. After clearing another aircraft to change frequency, the controller then gave the PA38 pilot their departure clearance at 0925:41 'surface wind is light and variable. With a right turn out RW09, you're cleared for take-off.' The PA38 pilot acknowledged.

At 0925:52 the B737 pilot called 'ready', and was told to hold at Charlie and that the PA38 would be 'airborne at [time] 26'. At 0926:05 the controller passed the B737 pilot's departure clearance 'requesting right 210° climbing 3000ft' which was acknowledged. They were further cleared to 'line up and wait RW09' via Charlie at 0926:24 and then cleared for take-off at 0927:02 'surface wind's light and variable, RW09, cleared for take-off'. The B737 pilot responded 'say again', and the departure was repeated at 0927:14. The controller then provided Traffic Information to the PA38 pilot at 0927:24 'Traffic is a Boeing 738 departing off 09 behind you, climbing through your level IFR. They will be turning southwest bound.'

After a series of departure calls and instructions from the controller, at 0929:42 the B737 pilot called 'And, er, for your information we had, er, TCAS RA with the departing traffic', which had been acknowledged by the controller before instructing them to change to their next frequency.

In summary, a PA38 [pilot] was cleared for take-off from RW09. Soon after, the [B737 pilot] was passed Traffic Information on the departed PA38 routing to the southeast, VFR, not above altitude 1500ft, and then cleared for take-off. The B737 departed RW09 onto a heading of 210° climbing to an altitude of 3000ft. The [PA38 pilot] was passed Traffic Information on the departing B737 behind them, routing to the southwest, climbing through their level. [The PA38] was approximately 1.5NM southeast of the airfield when [the B737] was painted on the radar screen. The blips had merged, and it was difficult to see the altitude separation between the two aircraft, however, it did appear that there was a minimum of 500ft separation when [the B737] was directly overhead [the PA38]. [The B737 pilot] continued their climb to altitude 5000ft, informing ATC of the RA. The RA was acknowledged by ATC and the aircraft was then transferred to Scottish Control.

The Unit Training Officer (UTO) watched the replay and did not think there was enough time from clearing the PA38 [pilot] for take-off to clearing the B737 [pilot] for take-off, given that they were on the same routing. While no rules had been broken, it was not in the spirit of the duty of care that Air Traffic Control Officers (ATCOs) should be employing when they control. The UTO briefed the

management team on their findings who would further debrief the ATCO. The event was discussed at some length and it was concluded that the debrief was a suitable and sufficient corrective action.

Root Cause: Due to the noise preferential routing from RW09, all jet aircraft turn onto an outbound heading as soon as they have passed the end of the runway and passed 500ft. Therefore they are likely to be quite low when on the initial turn. Traffic was passed both ways between the [B737 pilot] and the [PA38 pilot]. However, [the B737 pilot] was cleared for take-off too soon after the [PA38] had got airborne on a similar route.

The investigator's recommendations were that ATCOs are to apply a little more caution when clearing much larger and faster IFR aircraft behind VFR aircraft when on similar routeing and that it would be good for based [pilots] to be aware that if they are ever uncomfortable with the spacing between themselves and VFR aircraft (both arriving and departing), to inform ATC and larger spacing will be applied.

The investigation concluded that the recommendations were carried out with a satisfactory briefing of the ATCO, and a final action for this event was for it to be included in the next quarterly Standards Bulletin. The airline Base Captain [for the B737 fleet] agreed with the investigation findings and fed the recommendation back to crew.

UKAB Secretariat

An analysis of the NATS radar replay was undertaken and both aircraft were positively identified from Mode S data as they departed from RW09 at Liverpool (Figure 1).

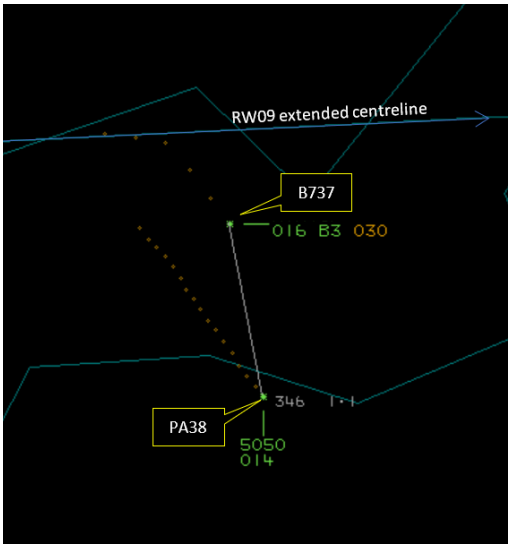


Figure 1 – Time 0929:02 separation 1.1NM and 200ft.

The closest point of approach was at 0929:24 as the B737 passed behind the PA38 during the turn onto 210° (Figure 2).

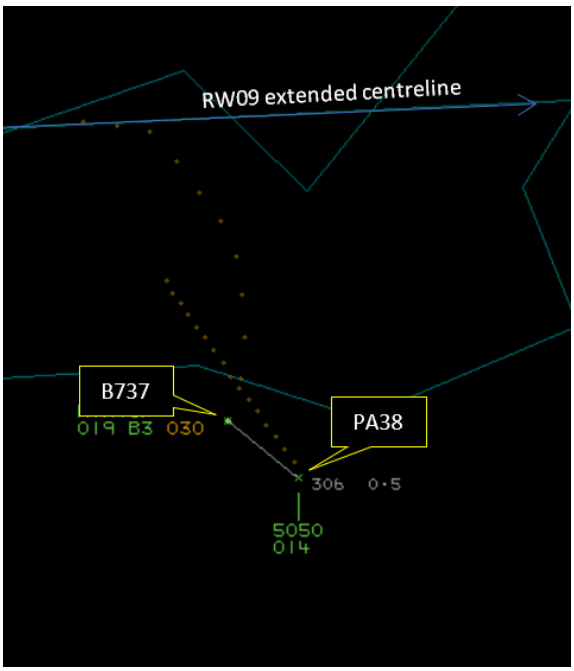


Figure 2 – Time 0929:24 CPA separation 0.5NM and 500ft.

The B737 and PA38 pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard.[1]

Summary

An Airprox was reported when a B737 and a PA38 flew into proximity 2.5NM southeast of Liverpool Airport at 0929Z on Sunday 11th June 2023. The B737 pilot was operating under IFR in VMC and the PA38 pilot was operating under VFR in VMC. Both pilots were in receipt of an ACS from Liverpool Tower.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from both pilots, radar photographs/video recordings, a report from the air traffic controller involved and a report from the appropriate operating authority. Relevant contributory factors mentioned during the Board's discussions are highlighted within the text in bold, with the numbers referring to the Contributory Factors table displayed in Part C.

The Board first considered the actions of the B737 pilot and agreed that, on recognition of the limited time allowed between take-off clearances between their aircraft and the PA38 ahead of them, they had fully assimilated the situation but had not requested more time or questioned the clearance other than to request that the controller 'say again' (**CF6**). The Board noted that the B737 crew had departed without further comment when cleared by the Tower controller for the second time (after the pilot's request for clarification), and members considered that the B737 pilot had missed an opportunity to delay on the runway until they had been satisfied with their separation from the preceding aircraft (**CF4**). It was clear to the Board that the B737 pilot had assimilated the likelihood of their aircraft catching up with the PA38 but members were perplexed as to why, with this situational awareness, the pilot had elected to proceed with the take-off and consequently fly into proximity with the other aircraft (**CF5**). Once airborne, the B737 pilot had received a TCAS TA and the Board noted that the B737 crew had correctly monitored the TA and followed the RA (**CF7**) with the PA38 in sight until they had been 'clear of conflict'.

On discussing the PA38 pilot's actions, members agreed that there was nothing that they could have done to have changed the course of events. The pilot had received Traffic Information on the B737

[1] (UK) SERA.3205 Proximity.

behind them but had not been in a position to take visual separation from the IFR traffic as any manoeuvre on their part would have likely exacerbated the situation.

The Board then turned their attention to the Liverpool Tower controller to determine their actions. Members noted the reduced time between the take-off clearances of the 2 aircraft and discussed a number of options that the controller could have used to handle their departures. They suspected that the controller had been working in a busy environment with time pressures, however, the Board agreed that, by not providing some extra time for the PA38 pilot to have been clear of the B737 pilot's departure path, an inappropriate clearance had been issued to the B737 pilot by the controller (**CF3**) and that, although there had been no strict requirement to have provided separation between IFR and VFR aircraft within the Class D airspace of the CTR, the controller had not provided an adequate duty of care to the pilots (**CF1**) and had not offered any instructions to resolve the developing conflict between the PA38 and the B737 (**CF2**).

In determination of risk, members agreed that safety had been degraded by the premature departure clearance from the Liverpool Tower controller to the B737 pilot and the subsequent acceptance of that clearance by the B737 crew, but that the B737 crew had monitored the situation after receiving a TA and had taken timely and effective avoiding action by following the aircraft's RA to prevent the aircraft from coming into close proximity and thus removing any risk of collision. As such, the Board assigned Risk Category C to this event.

PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK

Contributory Factors:

	2023125			
CF	**Factor**	**Description**	**ECCAIRS Amplification**	**UKAB Amplification**
	Ground Elements			
	• Regulations, Processes, Procedures and Compliance			
1	Human Factors	• ATM Regulatory Deviation	An event involving a deviation from an Air Traffic Management Regulation.	Regulations and/or procedures not fully complied with
	• Situational Awareness and Action			
2	Human Factors	• Conflict Resolution – Not provided	An event involving the non-provision of conflict resolution	
3	Human Factors	• Inappropriate Clearance	An event involving the provision of an inappropriate clearance that led to an unsafe situation	
	Flight Elements			
	• Tactical Planning and Execution			
4	Human Factors	• Insufficient Decision/Plan	Events involving flight crew not making a sufficiently detailed decision or plan to meet the needs of the situation	Inadequate plan adaption
	• Situational Awareness of the Conflicting Aircraft and Action			
5	Human Factors	• Lack of Action	Events involving flight crew not taking any action at all when they should have done so	Pilot flew close enough to cause concern despite Situational Awareness
6	Human Factors	• Lack of Communication	Events involving flight crew that did not communicate enough - not enough communication	Pilot did not request additional information
	• Electronic Warning System Operation and Compliance			
7	Contextual	• ACAS/TCAS RA	An event involving a genuine airborne collision avoidance system/traffic alert and collision avoidance system resolution advisory warning triggered	

Degree of Risk: C.

Safety Barrier Assessment[2]

In assessing the effectiveness of the safety barriers associated with this incident, the Board concluded that the key factors had been that:

Ground Elements:

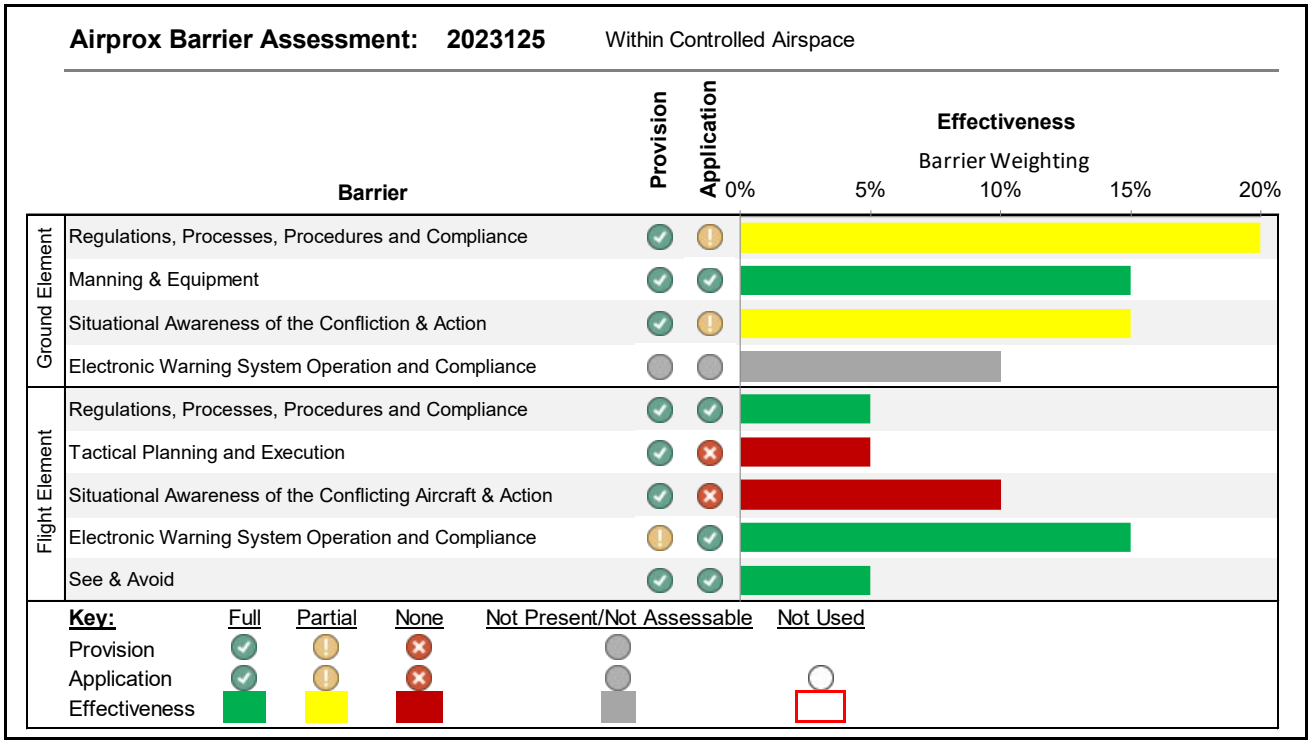
Regulations, Processes, Procedures and Compliance were assessed as **partially effective** because the controller had introduced a potential conflict with the timing of their take-off clearance to the B737 pilot.

Situational Awareness of the Confliction and Action were assessed as **partially effective** because the timing between the departure of the PA38 and the take-off clearance for the B737 pilot was not sufficient to avert the potential for conflict and, as the conflict developed, the controller did not provide instructions to resolve it.

Flight Elements:

Tactical Planning and Execution was assessed as **ineffective** because the B737 pilot took off in the knowledge that they would 'overrun' the PA38.

Situational Awareness of the Conflicting Aircraft and Action were assessed as **ineffective** because the pilot of the B737 took off when cleared but without requesting extra time on the runway to avoid a potential conflict with the preceding departure.



[2] The UK Airprox Board scheme for assessing the Availability, Functionality and Effectiveness of safety barriers can be found on the UKAB Website.