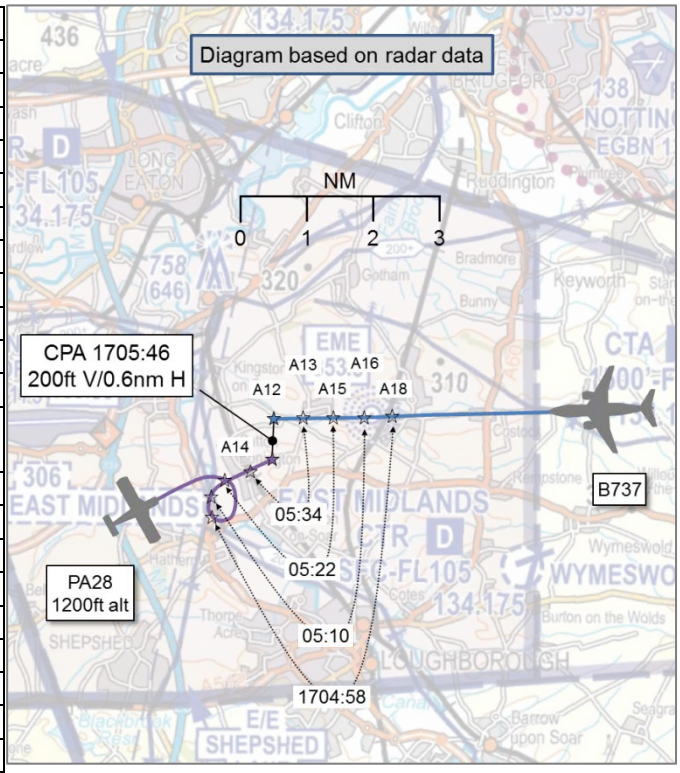
AIRPROX REPORT No 2017060

Date: 09 Apr 2017 Time: 1706Z Position: 5249N 00114W Location: 3nm E East Midlands airport

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	B737	PA28
Operator	CAT	Civ Pte
Airspace	CTR	CTR
Class	D	D
Rules	IFR	VFR
Service	Aerodrome	Aerodrome
Provider	East Midlands	East Midlands
Altitude/FL	1200ft	1400ft
Transponder	A,C,S	A,C,S
Reported		
Colours	Company	Mainly white
Lighting	Strobes, nav, landing	Strobe, nav
Conditions	VMC	VMC
Visibility	>10km	>10km
Altitude/FL	1400ft	1000ft
Altimeter	QNH	QFE (1006hPa)
Heading	269°	090°
Speed	155kt	110kt
ACAS/TAS	TCAS II	Not fitted
Alert	RA	N/A
Separation		
Reported	0ft V/1.5nm H	0ft V/1nm H
Recorded	200ft V/0.6nm H	



THE BOEING 737 PILOT reports that he was fully configured and stable on approach to RW27 at East Midlands airport. He had been warned of a light aircraft orbiting on left base; he had the aircraft on TCAS and visual. He received a TCAS TA at approximately 1500ft and saw the aircraft apparently flying towards them at a similar level; a TCAS RA descent shortly followed. He maintained visual contact and elected to go-around as avoiding action. He commented that because he was in VMC and visual with the aircraft he considered that a go-around was the safest action. The descend RA was given at a low altitude flying towards rising terrain and, in his opinion, following the RA would have resulted in multiple GPWS alerts. The pilot of the light aircraft gained visual contact and also took avoiding action.

He assessed the risk of collision as 'Medium'.

THE PIPER PA28 PILOT reports that he was executing a right-hand orbit on left base for RW27. The B737 was scheduled to land before him so he was holding on base leg, as instructed by ATC. When orbiting on base leg for RW27 he usually uses the River Trent (which runs perpendicular to the runway about 1.2nm from the RW27 threshold) as a reference point for the position of base leg. On close examination of his chart after the incident he noticed that the river is a little further from the threshold on left base than it is on right base, so, in retrospect, he should have been aiming to stay slightly west of the river. ATC told him the position of the B737 and asked him to report visual. He thought his heading was about 180° at the time, so he was not in the best position to spot the other aircraft. He continued to look for the aircraft as the orbit continued and he thought that he started to pay less attention to where he was relative to the river. He also did not compensate for the wind (roughly 270°/19kt) by flying west briefly so as to maintain his position on base leg. Once his right-hand orbit had brought him back to around 080°, he saw the other aircraft descending on final towards RW27. He reported visual immediately. The aircraft did seem closer than he had expected it

to be, but it did not seem dangerously close, so he took no evasive action other than to continue his right-hand orbit, which would take him further from the B737 as it passed him on final. At some point after the B737 had passed him (he thought about 0.5nm from the runway threshold) he heard the B737 pilot notify ATC that they were going around. ATC gave him clearance to report final for RW27.

He assessed the risk of collision as 'Low'.

THE EAST MIDLANDS AERODROME CONTROLLER reports that the PA28 pilot was transferred from Radar for a VFR join from the south. On first contact he was instructed to join and hold on left base because there was an inbound aircraft for the ILS at approximately 10nm (the B737). Shortly after the B737 pilot made contact he was cleared to land, along with Traffic Information that the PA28 pilot would be holding on left base. The PA28 pilot, on reaching left base, carried out 1 right-hand orbit and rolled out. Meanwhile the B737 was on final at approximately 5-6nm. The PA28 pilot drifted closer to final approach track, still in a right-hand orbit. At this point he asked the PA28 pilot if he was visual with the B737 on about a 5nm final. He reported negative. He believed that they were at a similar level and the B737 pilot informed him that he had received an RA and he acknowledged the call. The PA28 reported visual with the B737. The B737 pilot informed him that he was going around. He told the Radar controller that the B737 pilot was going around due to an RA. The PA28 pilot was then told to report final No1 and informed of wake turbulence criteria against the B737. He asked to be removed from the position when the PA28 had landed and staffing would permit a change.

Factual Background

The weather at East Midlands was recorded as follows:

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EGNX 091650Z 26019KT CAVOK 21/08 Q1016=
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East Midlands airport elevation is 306ft.

SERA[1] states that:

'An aircraft operated on or in the vicinity of an aerodrome shall make all turns to the left, when approaching for landing, unless otherwise indicated, or instructed by ATC.'

Analysis and Investigation

CAA ATSI

ATSI had access to reports from the pilots of the B737 and the PA28, and the air traffic controller involved. The local unit investigation was obtained and the local area radar and radio recordings were also reviewed. Screenshots produced in this report are provided using recordings of the Prestwick MRT Radar. Levels indicated are in altitudes. All times UTC.

The B737 (SSR code 7447) was an IFR flight routeing to East Midlands. The pilot was in receipt of an Aerodrome Control Service from East Midlands Tower. The PA28 (SSR code 4556) was a VFR flight to East Midlands. The pilot was also in receipt of an Aerodrome Control Service from East Midlands Tower.

At 1649:39 the PA28 pilot first called East Midlands Approach when overhead Market Harborough to request joining instructions inbound to East Midlands. He was allocated an SSR code of 4556 and requested to report approaching the southern Control Zone (CTR) boundary.

At 1657:10 the Radar controller issued a joining clearance for the PA28 pilot, instructing him to remain east of the M1 motorway and to report entering the CTR.

[1] SERA.3225.

At 1659:52 the Radar controller descended the B737 pilot to 3000ft and advised that they were 21nm from touchdown.

At 1702:15 (Figure 1) the PA28 pilot was transferred to the East Midlands Tower frequency. The controller had been vectoring the B737 pilot for an ILS approach to RW27 and transferred the B737 to East Midlands Tower a short time later.

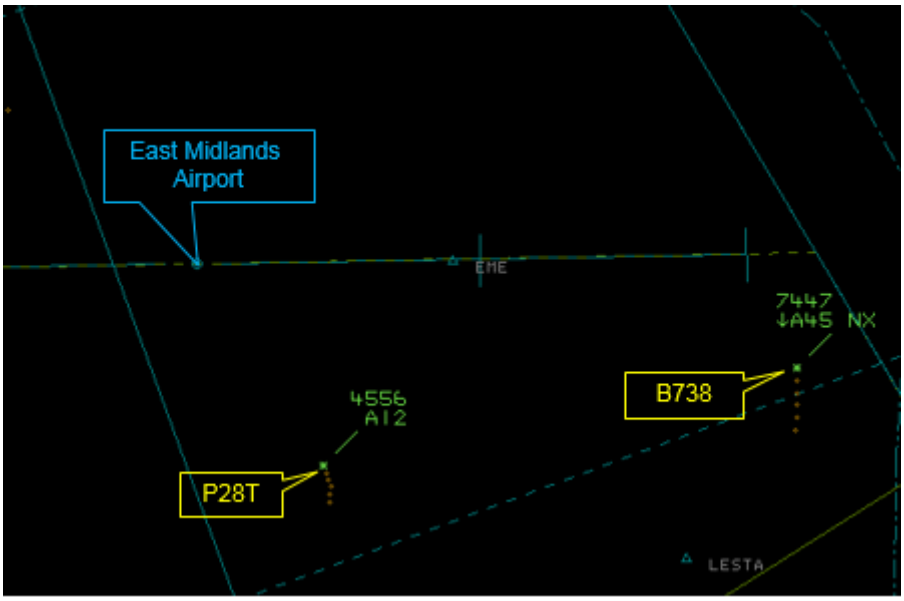


Figure 1 - 1702:15.

At 1702:35 the Aerodrome controller instructed the PA28 pilot to hold on left base.

The B737 pilot reported established on the localiser for RW27 at 1703:17 (Figure 2).

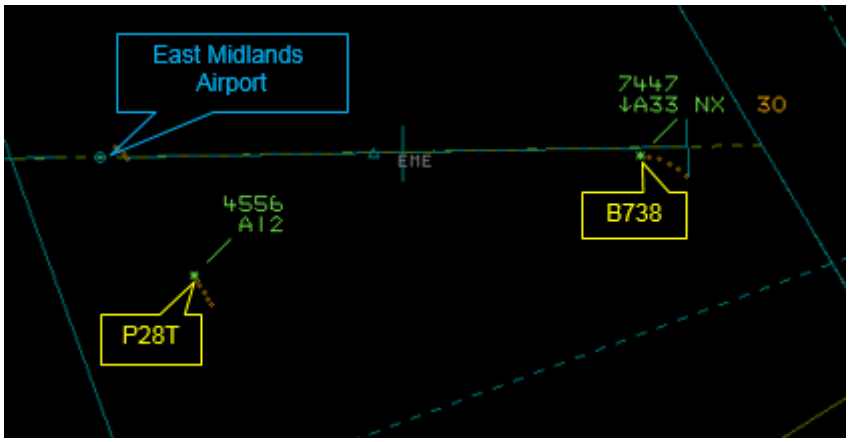


Figure 2 – 1703:17.

At 1703:24 the Aerodrome controller cleared the B737 pilot to land and issued specific Traffic Information about a light aircraft orbiting on left base (referring to the PA28). The B737 pilot acknowledged the Traffic Information.

At 1704:12 (Figure 3), the controller advised the PA28 pilot that the traffic they were looking for was a B737 on approximately a 5nm final. The PA28 pilot acknowledged the call.

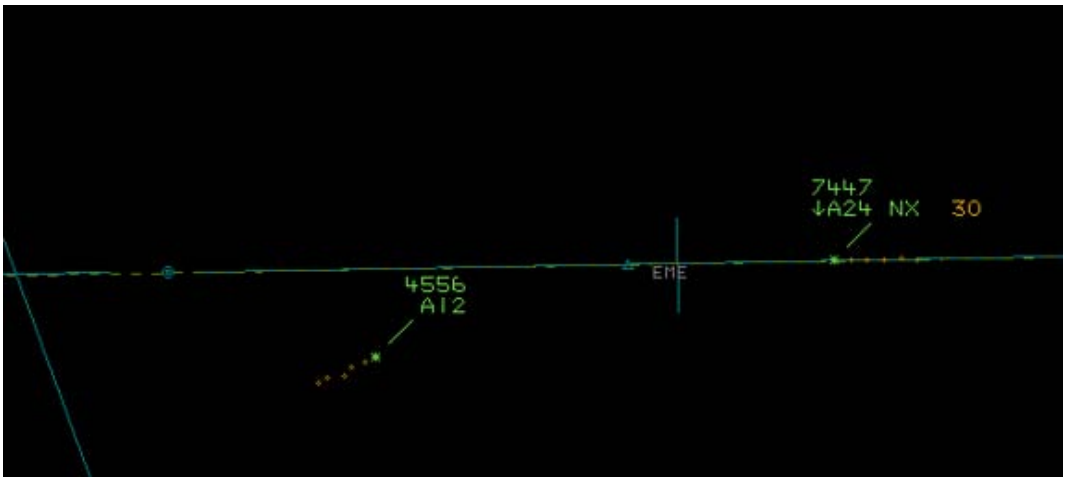


Figure 3 – 1704:12.

At 1705:28 (Figure 4), the controller asked the PA28 pilot if they were visual with the B737 and to confirm that they were still in the orbit. There was 1.4nm horizontal and 200ft vertical between the two aircraft at this time. As the PA28 pilot continued in the orbit the aircraft appeared to continue eastbound before the pilot confirmed they were visual with the B737.

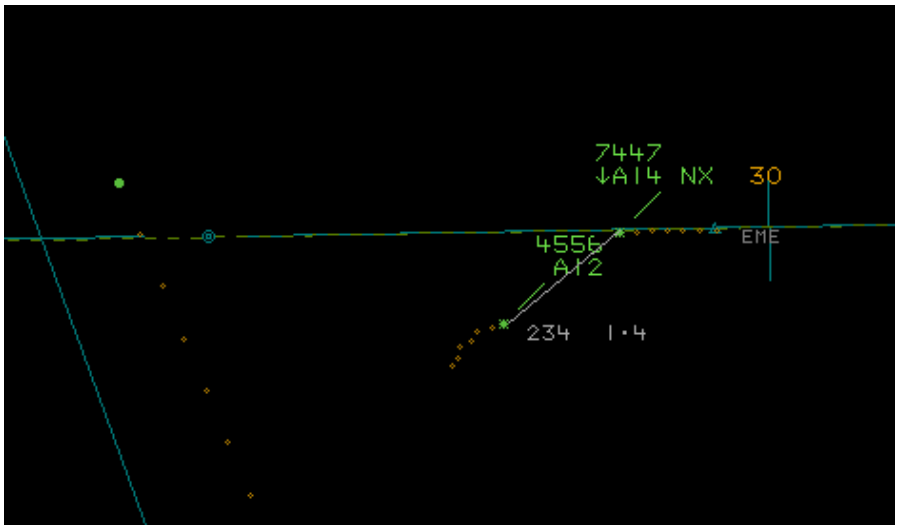


Figure 4 – 1705:28.

CPA occurred at 1705:46 (Figure 5), with a lateral distance of 0.6nm and a vertical distance of 200ft.

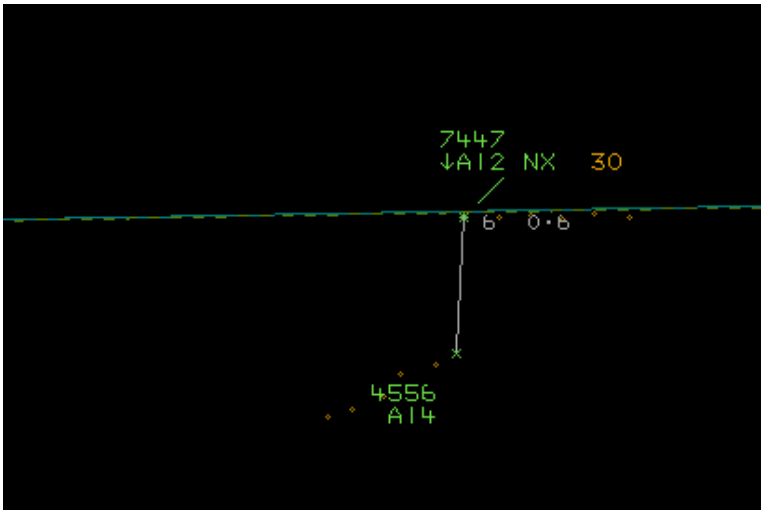


Figure 5 – 1705:46.

A few seconds after CPA (which occurred whilst the PA28 pilot was replying to the controller about sighting the B737), the B737 pilot reported a TCAS RA and executed a missed approach. When the B737 pilot was transferred back to the approach frequency he indicated that he would be filing an Airprox.

The East Midlands Aerodrome controller was providing an Aerodrome Control Service in Class D airspace. There is no requirement to separate VFR and IFR aircraft but Traffic Information shall be passed both generically (to enable aircraft to position with other aircraft), and specifically (appropriate to their stage of flight and the risk of collision). The controller issued specific Traffic Information to the inbound B737 pilot about a light aircraft holding on base leg, and specific Traffic Information to the PA28 pilot about the B737.

Radar analysis of the PA28 pilot's orbits reveal that prior to commencing the second orbit, the PA28 appeared to continue downwind on a slightly converging track with the opposite direction B737 on final approach. The controller appeared to notice this, and confirmed with the pilot that they were still orbiting. There was a strong westerly wind at the time.

The flight crew of the B737 reported receiving the Traffic Information and observed the light aircraft both on TCAS and visually. However, as they reached 1400ft, the other aircraft appeared to be flying towards them which triggered a TCAS RA to which the crew responded by initiating a go-around. Although the crew received an RA descent they continued with the go-around as they considered this the preferred option as they were relatively close to the ground.

UKAB Secretariat

The B737 and PA28 pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard[2]. An aircraft operated on or in the vicinity of an aerodrome shall conform with or avoid the pattern of traffic formed by other aircraft in operation[3].

The UK AIP[4] states the Air Traffic Control responsibilities for separation in Class D Controlled Airspace. For IFR flights: *'Separation [is] provided between all IFR flights by ATC. Traffic information [is] provided on VFR flights and traffic avoidance advice on request.'* For VFR flights: *'ATC separation [is] not provided. Traffic information [is] provided on IFR flights and other VFR flights; traffic avoidance advice on request'.*

These requirements are also stated in the Manual of Air Traffic Services Part 1[5], which additionally states: *'However, ATC has a responsibility to prevent collisions between known flights and to maintain a safe, orderly and expeditious flow of traffic. This objective is met by passing sufficient traffic information and instructions to assist pilots to 'see and avoid' each other.'*

With regard to TCAS, the UK AIP[6] states: *'In the event that an RA is issued, Flight Crews shall: (a) Respond immediately and manoeuvre as indicated by the ACAS unless doing so would jeopardise the safety of the aircraft.'*

Summary

An Airprox was reported when a B737 and a PA28 flew into proximity in Class D airspace in the East Midlands CTR at 1706 on Sunday 9th April 2017. Both pilots were inbound to East Midlands airport in receipt of an Aerodrome Control service. They were both operating in VMC, the B737 under IFR and the PA28 VFR. Whilst the PA28 was orbiting on base leg, the B737 pilot received a TCAS RA on the

[2] SERA.3205 Proximity.
[3] SERA.3225 Operation on and in the Vicinity of an Aerodrome.
[4] ENR 1.4-5, Paragraph 2.4.
[5] Section 1, Chapter 1, Paragraph 3.
[6] ENR 1.1-18, Paragraph 3.5.6.4.

PA28 and decided to carry out a go-around. ATC had provided Traffic Information to both pilots. The minimum separation was recorded as 0.6nm horizontally and 200ft vertically.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from both pilots, the controller concerned, radar recordings and reports from the appropriate ATC and operating authorities.

The Board first noted that both aircraft were inbound to East Midlands airport, the B737 pilot on an IFR flight on the RW27 ILS and the PA28 pilot flying in accordance with VFR. The Aerodrome controller had instructed the PA28 pilot, who was inbound from the south, to hold on base leg for RW27 but no direction of turn was specified. Shortly afterwards, the B737 pilot, after transfer from Radar, reported established on the ILS and was cleared to land. Specific Traffic Information was issued about the PA28 orbiting on left base, and the PA28 pilot was informed about the B737: the Board noted that the controller had supplied appropriate Traffic Information to both pilots. Notwithstanding, Board members wondered whether the controller should have exercised more positive control of the PA28 rather than just instructing the pilot to hold on left base, a position which was open to the pilot's interpretation. The ATSI advisor explained that it had not been possible for the controller to instruct the PA28 pilot to hold at the end of the downwind leg, a recognised position for carrying out orbits, because he had been approaching from the south direct to base leg.

The Board then discussed the actions of the PA28 pilot. The Board noted that he had commenced orbiting to the right, which was not in compliance with SERA rules which required all turns to be made to the left unless authorised by ATC. Some members thought that if he had carried out a left-hand orbit then it might have taken him initially closer to final approach. Others commented that whilst this may have been the case, he would at least have been travelling away from the B737 and so TCAS would likely not have generated the RA (and the B737 would probably also have descended below the TCAS RA inhibit altitude if the PA28 was closer to the airfield). The Board noted that the radar recordings showed that, having completed his first orbit, the PA28 pilot appeared to roll out and continue downwind on a slightly converging track with the B737; members opined that it was this roll-out which probably resulted in the TCAS RA.

For his part, the Board noted that the B737 pilot had received a TCAS RA descent but had carried out a missed approach instead. The Board wondered if this was an appropriate action to take given that TCAS RAs should always be followed as directed unless the pilot thinks that the safety of his aircraft may be jeopardised. Civil Airline Pilot members, who fly various types of airliners, reported differences in their various company procedures following receipt of a TCAS RA descent on final approach. There were various boundaries for when to comply with an RA: one airline stipulates that descent could be made to 900ft before carrying out a missed approach; another that a missed approach should be carried out dependent on the stage of approach; and another that, with undercarriage selected down on final approach, a missed approach would always be carried out after receiving a TCAS RA. Recognising the concerns about unstable approaches, descent below glidepath when on short final, and potential for receipt of a GPWS warning that might result in a high-power manoeuvre, the Board were surprised at the disparity of the various airline procedures.

The Board then turned its attention to the cause and risk of the Airprox. After significant debate about the choice of position of the PA28 hold, the PA28 turn direction, and the role of ATC, the Board eventually agreed that the Airprox was best described as being caused because the PA28 pilot had flown close enough to the B737 to cause a TCAS RA. The Board discussed whether the actions of the controller, in not instructing the PA28 pilot to orbit further away from the final approach track, was a contributory factor but the opinion was against this because the controller's actions were probably normal practice at East Midlands and, if the PA28 pilot had continued to orbit as instructed, or left-hand, the RA would probably not have occurred. In terms of risk, the Board agreed that although safety had been degraded because the B737 pilot had had to react to the situation by carrying out a missed approach, this action, together with the visual sightings, ensured that there had been no risk of a collision. Accordingly, the Airprox was assessed as risk Category C.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The PA28 pilot flew close enough to the B737 to cause a TCAS RA.

Degree of Risk: C.

Safety Barrier Assessment[7]

The Board decided that the following key safety barriers were contributory in this Airprox:

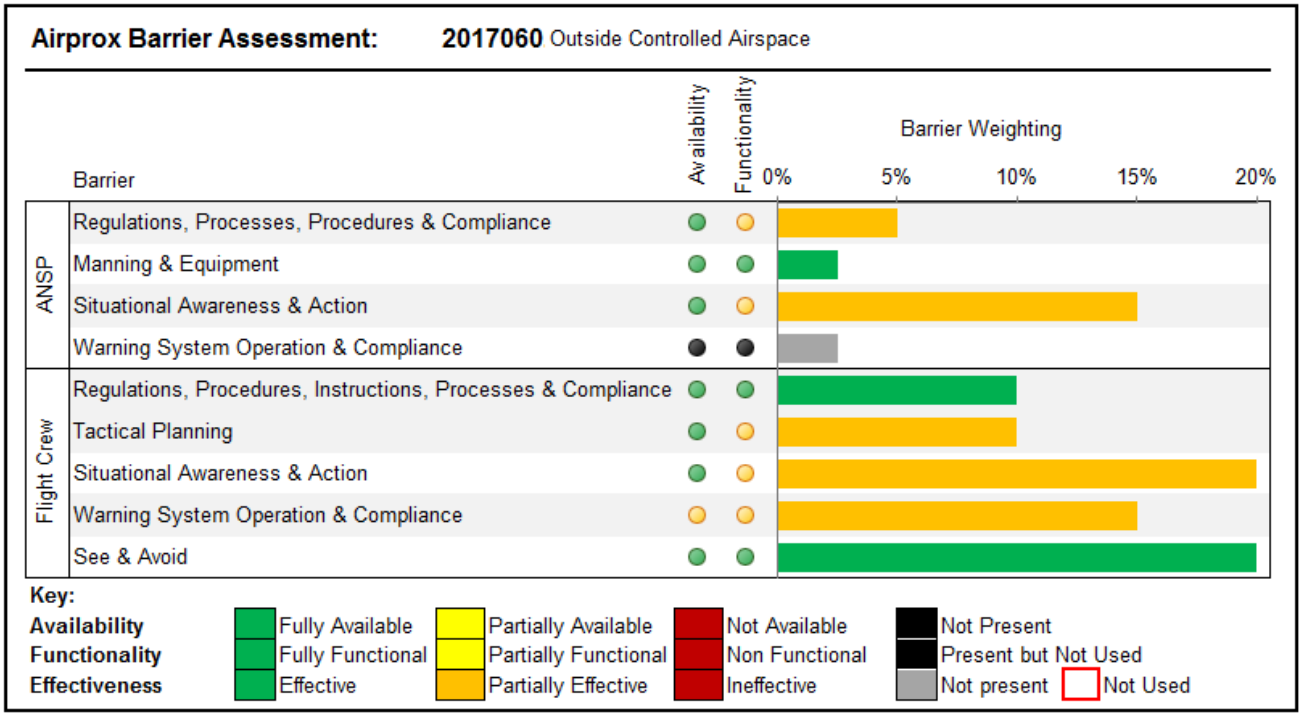
ANSP Regulations, Processes, Procedures and Compliance were only **partially effective** because the controller instructed the PA28 pilot to hold on base leg rather than ideally downwind or at a specific range from the approach path.

ANSP Situational Awareness and Action was only **partially effective** because the controller, not realising early enough that the position of the PA28 would affect the operation of the B737, did not take timely action to resolve the situation.

Flight Crew Tactical Planning was only **partially effective** because the PA28 pilot did not take into account the wind conditions and misjudged the position of base leg. He also carried out a right-hand orbit rather than turning left in accordance with SERA.3225.

Flight Crew Situational Awareness and Action was only **partially effective** because although both pilots had been issued with Traffic Information about each other, the PA28 pilot allowed himself to come closer to the flight path of the B737 than ideal.

Onboard Warning System Operation and Compliance was only **partially available** because the PA28 was not equipped with an electronic warning system. It was only **partially effective** because the B737 pilot decided to carry out a missed approach rather than descend in accordance with the TCAS RA.



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