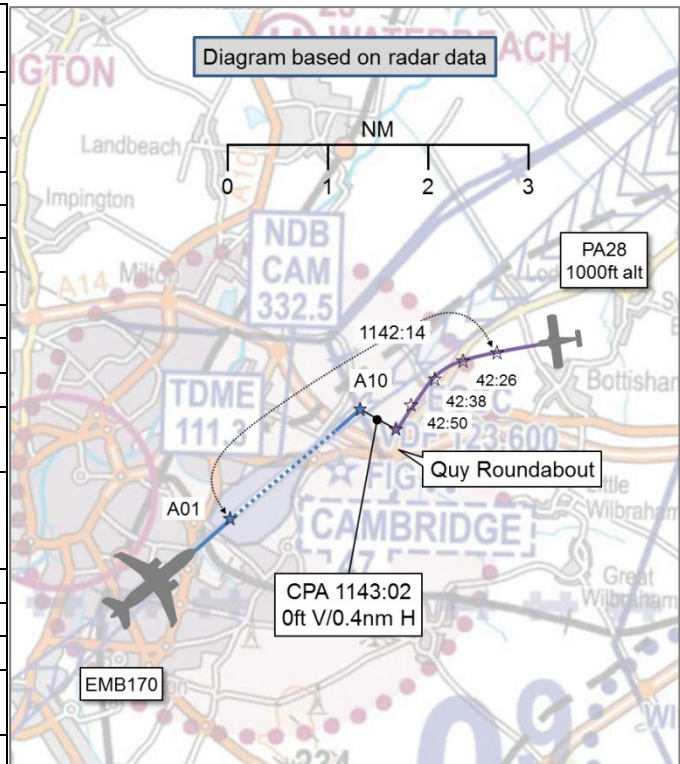


AIRPROX REPORT No 2015058

Date: 2 May 2015 Time: 1143Z Position: 5213N 00013E Location: Cambridge Airport (Saturday)

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	EMB170	PA28
Operator	Civ Trg	Civ Trg
Airspace	Cambridge ATZ	Cambridge ATZ
Class	G	G
Rules	VFR	VFR
Service	Aerodrome	Aerodrome
Provider	Cambridge	Cambridge
Altitude/FL	1100ft	1000ft
Transponder	A/C/S	A/C
Reported		
Colours	Company colours	White/grey/red
Lighting	Navigation, anti-collision. Strobes u/s.	Beacon, strobes, landing.
Conditions	VMC	VMC
Visibility	>10km	10km
Altitude/FL	1100ft	1000ft
Altimeter	QNH (1011hPa)	QFE
Heading	055°	Orbit
Speed	140kt	95kt
ACAS/TAS	TCAS II	Not fitted
Alert	RA	N/A
Separation		
Reported	0ft V/<1nm H	NK
Recorded	0ft V/0.4nm H	



THE EMB170 PILOT reports that, whilst on the climb-out after a touch-and-go during circuit training, a TCAS RA to maintain vertical speed was received. Whilst on the approach, ATC had requested that they change to a left-hand circuit. He believed this was to allow the (ultimately conflicting traffic) to join downwind right-hand. He was comfortable accepting this as it had minimal impact on their workload. On receipt of the TCAS RA he followed the commands and, during this time, the 'jump-seat' pilot was able to visually acquire the traffic. Once clear of the RA, ATC were advised, and a left turn (away from the traffic and into the cleared circuit) was initiated. The circuit clearance of 2000ft was exceeded by 300ft during the recovery from the TCAS manoeuvre. On the approach, they were aware of the traffic, and the change of sequencing proposed by the Aerodrome controller seemed reasonable avoiding conflict. For obvious reasons during the later stages of the approach, touch-and-go and subsequent climb-out, the workload was high requiring a degree of reliance on the clearance received. The pitch attitude is also very high at this point, restricting forward view from the left-hand seat, particularly in the area of the conflicting traffic. During the initial climb, and prior to the TCAS event, he was aware of the Aerodrome controller giving an update on their position. A response along the lines of 'I'm sure they'll have us on their TCAS' was transmitted but he did not know if it was from the conflicting aircraft's pilot.

He assessed the risk of collision as 'Medium'.

THE PA28 PILOT reports that, on returning from a flight to the east of Cambridge airport, ATC asked him to join downwind for RW05. Knowing the airport's required circuit plan he joined by the Quay¹ roundabout at 1000ft QFE. He was then asked to orbit as another aircraft was already orbiting further downwind. On completion of the second orbit he saw the reporting aircraft lifting off the runway, but he was unable to exit his track due to his forward speed and the relatively low speed of his aircraft, coupled with the 'westerly' [he reported] wind at the time. Separation distance was not assessable as the reporting aircraft was behind him and out of sight.

He assessed the risk of collision as 'Low'.

THE CAMBRIDGE AERODROME CONTROLLER reports that he was operating with a trainee. The PA28 pilot was transferred from the Approach controller to the Aerodrome controller passing Newmarket. The pilot was asked to descend to height 1000ft and report reaching, to join downwind left-hand RW05 and was passed Traffic Information on an EMB170 conducting right-hand circuits at altitude 2000ft. The pilot replied that he had read about the EMB170 in the circuit prior to his flight and questioned the joining instructions. The trainee controller corrected the joining instructions to join downwind right-hand. This had been a slip of the tongue due to downwind left-hand being the standard join for Cambridge's predominant runway (23). Due to a Tiger Moth orbiting at the end of the downwind leg for wake turbulence purposes, the PA28 pilot was instructed to take up orbits at the start of the downwind leg. Due to the complexity of the wake turbulence issues he changed his plan and gave the EMB170 pilot instructions to fly the next circuit left-hand to sequence the traffic more efficiently and safely. With the EMB170 on final, Traffic Information was passed on the PA28 joining downwind right-hand for RW05 because he appeared to be encroaching towards the RW05 climb-out path. He then cleared the EMB170 pilot for a touch-and-go. The PA28 pilot reported taking up left-hand orbits late downwind for RW05, at which point the trainee controller corrected him on his position and said take up orbits at the start of the downwind leg. He took control from his trainee again and told the PA28 pilot to route to the east to clear the climb-out, and passed Traffic Information on the EMB170 who was just getting airborne from his touch-and-go. The PA28 pilot refused the instruction and informed them that he was orbiting at Quay Mill which is on the climb-out for RW05 inside the ATZ. He then remarked that the EMB170's TCAS would inform its pilot of his position. By this time the aircraft were in close proximity and avoiding action from the Tower was not issued due to being unable to see clearly the correct action to be taken without potentially making the situation more serious. The EMB170 pilot reported receiving a TCAS RA by the time they could see a clear course of action so no other information was needed. Both he and his student were immediately relieved from the position and the EMB170 pilot reported to the oncoming controller a miss distance of 200-300ft.

Factual Background

The Cambridge weather was:

EGSC 021120 10007KT 020V150 9999 FEW032 10/04 Q1011

The Cambridge Aerodrome Traffic Zone, Class G airspace, is a circle 2.5nm radius centred on the longest notified runway (05/23) from surface to 2000ft². Airfield elevation is 47ft.

'Unless otherwise instructed by Air Traffic Control the visual circuit height is 1500ft for all multi-engined types, 1000ft for other fixed-wing aircraft and 700ft for helicopters. All heights QFE. The following circuit directions will be adhered to: Runways 23, 28— left hand; Runways 05, 10— right hand. The above procedures may be departed from at any time to the extent necessary for avoiding immediate danger.'³

¹ Junction of A14/A1303 approximately 1nm east of airport.

²UK AIP AD 2.EGSC-8.

³UK AIP AD 2.EGSC-11.

Analysis and Investigation

CAA ATSI

The EMB170 pilot was operating in the right-hand circuit for RW05. The PA28 pilot had departed Cambridge to the north-east approximately 20min earlier and was returning from that direction. The controller elected to route the EMB170 pilot into a left-hand circuit to accommodate the arrival of the PA28 from the north-east into a right-hand circuit. The PA28 pilot was cleared into the right-hand circuit at 1139:40. This tactic should have enabled the best flow of traffic around the ATZ. The PA28 pilot was issued with Traffic Information on the EMB170 in order for the pilot to position himself directly downwind from the north-east; the pilot confirmed he knew about the jet in the circuit. As the PA28 approached Cambridge from the north-east he was observed to be tracking towards the climb-out from RW05 (Figure 1 at 1142:02).

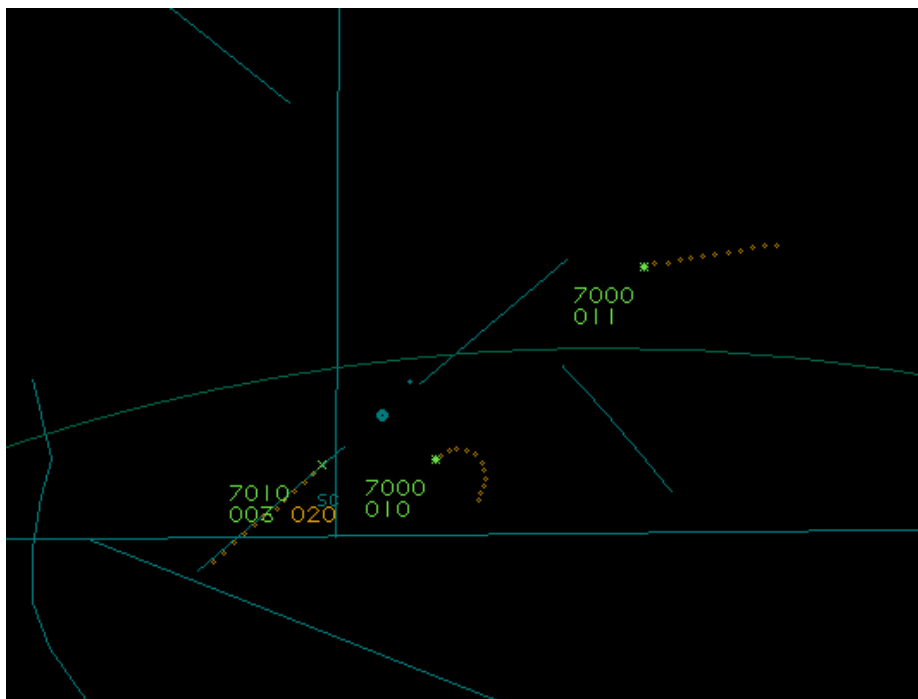


Figure 1 (1142:02) (EMB170 7010 at FL003, PA28 7000 at FL011).

The controller had one other aircraft in the circuit (also right-hand) so instructed the PA28 pilot to orbit left at the beginning of the downwind leg at this time. As there appeared to be no turn by the PA28 pilot, the controller instructed him to move further to the east; however, the aircraft did not appear to adjust course. [UKAB Note: the PA28 pilot responded to the initial request to orbit at the start of the downwind leg by stating that he would do so adjacent to the 'Quy roundabout', which is near the start of the downwind leg. The controller then asked him to orbit 'just a little bit further to the east' at 1142:30].

[At 1142:40] the PA28 pilot then stated that he could see the other aircraft and commented that the EMB170 pilot would be able to see his aircraft on TCAS.

[At 1142:50, the PA28 pilot called that he was commencing his orbit].

As the EMB170 pilot took-off following a touch-and-go, he came into close proximity to the PA28 (Figure 2 at 1143:02).

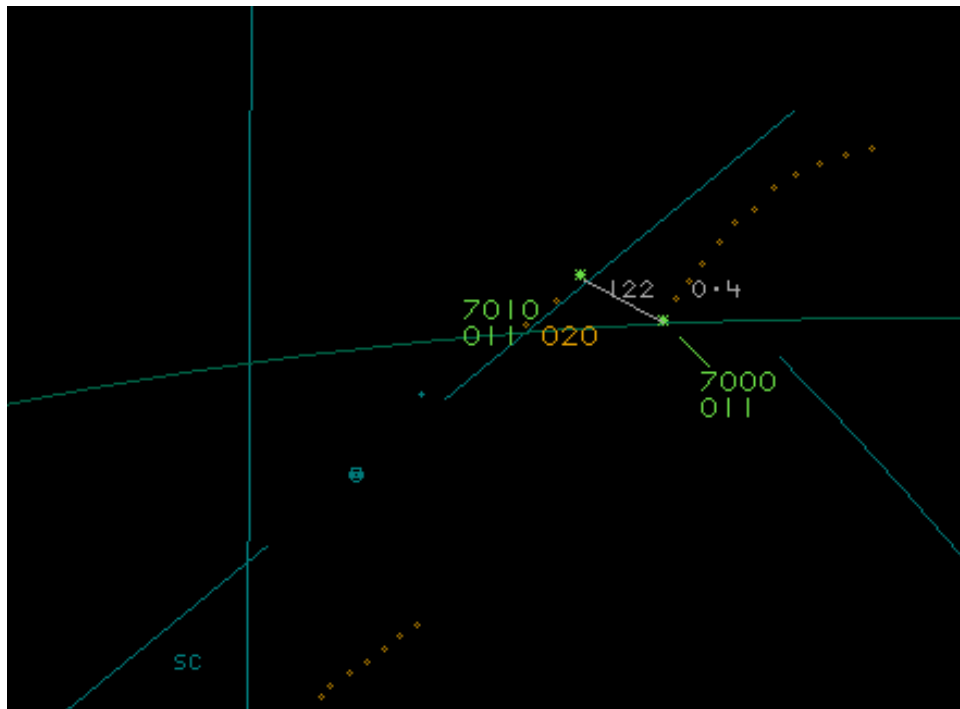


Figure 2 (1143:02)

After passing the PA28 the EMB170 pilot reported a TCAS RA and subsequently filed an Airprox. The PA28 pilot then began a left-hand orbit. Although the airspace around Cambridge Airport is Class G, all aircraft flying within the ATZ are required to comply with ATC instructions.

Occurrence Investigation

RTF recording of Cambridge Aerodrome control:

- PA28 Cambridge (1139+10) Tower (PA28 C/S) is er over Newmarket two thousand five hundred for rejoin.
- ATC (PA28 C/S) Cambridge Tower descend now to report level (1139+20) alti-er correction at height one thousand feet Cambridge QFE one zero zero nine join downwind lefthand at one thousand.
- PA28 Er (PA28 C/S) descending to (1139+30) one thousand feet one one zero to join downwind lefthand confirm.
- ATC Apologies downwind righthand.
- PA28 Downwind righthand thank you very much (PA28 C/S) (1139+40) and to join downwind righthand runway er zero five.
- ATC (PA28 C/S) traffic's an Embraer One Seventy in the circuit will be at two thousand feet to keep him above you for wake turbulence (1139+50).
- PA28 Er I was aware of all that er (PA28 C/S) thanks very much for the reminder.
- EMB170 (EMB170 C/S) we're er final zero (1140+50) five touch and go.
- ATC (EMB170 C/S) are you able to accept a lefthand circuit after this touch and go.
- EMB170 (EMB170 C/S) affirm.
- ATC (EMB170 C/S) roger runway (1141) zero five main clear touch and go surface wind one four zero degrees nine knots a lefthand circuit.

EMB170 Clear touch and go runway zero five main and a lefthand circuit (EMB170 C/S).

EMB170 (EMB170 C/S) er what altitude for this lefthand circuit.

ATC (EMB170 C/S) altitude two thousand (1141+30) feet.

EMB170 Altitude two thousand feet (EMB170 C/S).

PA28 Er (PA28 C/S) now at one thousand feet approaching the end of the downwind leg.

ATC (Take up????????? –spoken off mic) (PA28 C/S) take up one lefthand orbit at the start of the downwind leg.

PA28 Take up one orbit er adjacent to QUY roundabout roger (1142+10).

ATC (PA28 C/S) you can do it just a little bit further out to the east (1142+30) that Embraer's just on climbout now we'll be taking him into the lefthand visual circuit.

PA28 I can see him er (PA28 C/S) thank you very much and I'm sure his TCAS will tell him about me (1142+40).

(1142+50).

PA28 (PA28 C/S) commencing orbit.

(1143).

EMB170 ????? (1143+10) and (EMB170 C/S) we got an RA off that one.

ATC (EMB170 C/S) thanks I'll be filing on that as well (1143+20).

UKAB Secretariat

Both pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard⁴. Both pilots were required to observe other aerodrome traffic for the purpose of avoiding collision and to conform with or avoid the pattern of traffic formed by other aircraft in operation⁵.

CAP 493 (Manual of Air Traffic Services Part 1) states⁶:

'Clearance to enter a traffic circuit is issued when an aircraft is still some distance from the aerodrome to enable the pilot to conform with the traffic circuit, pending clearance to land. Information concerning landing direction or runway in use and any other necessary instructions are given at the same time so that the pilot may intelligently position himself in the traffic pattern.'

'Aircraft within an ATZ are required to comply with instructions from the ATC unit. Although IFR/VFR flight within Class F/G airspace outside the ATZ is permitted without an ATC clearance, controllers will act on the basis that pilots will comply fully with their instructions in order to promote a safer operating environment for all airspace users.'

⁴ SERA.3205 Proximity, Rules of the Air 2015.

⁵ SERA.3225 (a), (b) Operation on and in the Vicinity of an Aerodrome, Rules of the Air 2015.

⁶ Section 2, Chapter 1, Paragraph 18 and Section 3, Chapter 1, Paragraph 1B.2.

Comments

THE FLYING CLUB OPERATING THE PA28 reports that an incident meeting has been held between the flying club and Cambridge ATC representatives to determine the events that contributed to the Airprox and to formulate an appropriate training response for both the pilot involved and other club members. From the various inputs received, the main factor appears to have been a misunderstanding of instructions from ATC by the PA28 pilot and the club has arranged recurrent training for the pilot involved to clarify the radio and TCAS procedures which will also be passed on to club members. As the club duty manager on the day he believed that the unusually large number of aircraft and ground traffic movements due to a racing event bringing in extra helicopter, private aircraft and wide-body movements with the associated ground vehicles were a contributory factor to the incident. This, in addition to the usual weekend club, Tiger Moth, private flying, ATC training and the EMB170 pilot flying circuits throughout the day led to an unusually high workload for both pilots and ATC and some associated delay and confusion in RT. Although the scheduling for these days is not always exact, ATC has agreed to try and circulate any detailed information received in advance to allow other airport users to plan training flights and departures accordingly.

Summary

The Airprox occurred within Class G airspace of the Cambridge ATZ; both pilots were in receipt of an Aerodrome Control Service. The EMB170 pilot had been conducting circuit training to RW05 and the PA28 pilot was inbound to Cambridge from the north-east after a local flight. He was instructed to join downwind right-hand for RW05 and to orbit at the start of the downwind leg due to other traffic holding ahead - Traffic Information was issued to him about the EMB170 in the right-hand circuit. The controller then decided to clear the EMB170 pilot for a left-hand circuit after his touch-and-go. When the EMB170 pilot was on final approach Traffic Information was issued about the PA28 which appeared to be approaching the RW05 climb-out. The controller instructed the PA28 pilot to route further east and updated the Traffic Information to the EMB170 pilot as he commenced his take off from the touch-and-go. The EMB170 pilot subsequently reported having received a TCAS RA. The minimum distance between the aircraft was recorded as nil vertical and 0.4nm horizontal.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

The Board noted that there were some incorrect recollections of the incident by the PA28 pilot and the Cambridge Aerodrome controller. The radar and RTF recordings of the event were able to reveal to the Board the actual course of events leading up to the Airprox.

The Board considered that the controller had taken appropriate action when he had changed the circuit direction of the EMB170 to a left-hand circuit. This had allowed the aircraft to remain clear of slower traffic ahead in the right-hand circuit. The controller had issued Traffic Information to the EMB170 and the PA28 pilots, accordingly both pilots had been aware of the presence of the other traffic. The Board noted that the controller recollected that he had instructed the PA28 pilot to orbit at the start of the downwind leg before he had cleared the EMB170 pilot for a touch-and-go. However, the RTF recording shows that the EMB170 pilot had been cleared for a touch-and-go before this instruction had been issued. The Board were aware from the controller's report that in his opinion the PA28 pilot had positioned too close to the RW05 climb-out and, understandably, had requested him to route further out to the east. It was also noted that he had reported that the pilot had refused to carry out this action but this was not evident from the RT transcript.

The Board then discussed the actions of the PA28 pilot. He recollected that he had seen the EMB170 lifting off the runway on completion of his second orbit whereas the radar recordings show that the CPA occurred before the PA28 pilot had commenced any orbit. He also commented that he had been unable to report the separation distance because the EMB170 had been behind him and

out of sight at the time of the Airprox. The radar recordings show that it had actually been passing alongside him at CPA as he had been proceeding downwind.

Members spent much time discussing the recollections of both the pilot and the controller, and there was considerable debate and difference of opinion about whether the PA28 pilot had complied with the controller's request to orbit further out to the east. Some members believed that there appeared to have been some ambiguity in this request, and that the pilot was required simply to route a little further east than Quy roundabout. Other members believed he should have taken up an easterly heading straight away rather than route towards Quy roundabout at all. After much debate, because the radar recordings showed that he had in fact changed direction at the time from a westerly to a south-westerly track, other members thought that, in carrying out this action, he had effectively complied with the controller's request, namely he had been at a position further east than he would have been had he maintained his original track to Quy roundabout - in his mind, he was probably still complying with the spirit of the instruction to orbit at the start of the downwind leg. Notwithstanding, the Board agreed that his change of direction still resulted in the PA28 routing towards the EMB170, and they were disturbed that the PA28 pilot's comments about the EMB170 pilot seeing him on TCAS could be construed as him placing collision avoidance responsibility on the EMB170 pilot. Rather than relying on the EMB170 pilot reacting to his TCAS, the Board considered that the PA28 pilot should have routed further away from the RW05 climb-out in the first place. Finally, the Board noted that the PA28 pilot had reported commencing an orbit at 1142:50, just before the Airprox had occurred at 1143:02.

The Board considered that it had been the actions of the PA28 pilot that had caused the Airprox. Despite being aware of the EMB170's details, and having had the aircraft in sight, he had positioned into the downwind leg too close to the EMB170 pilot's climb-out from RW05 and therefore had triggered the TCAS RA. Consequently it was considered that the cause was that the PA28 pilot had flown into conflict with the EMB170.

Although the minimum recorded separation was only 0.4nm horizontally (at the same level), the Board considered that risk of collision had been averted. The PA28 pilot had reported on the frequency just prior to the CPA that he had been visual with the EMB170, and the EMB170 pilot had received and had reacted to a TCAS RA to maintain vertical speed with the 'jump-seat' pilot also reporting that he had seen the PA28. Therefore, because of the visual sightings and the TCAS RA manoeuvre, the Airprox was categorised as risk Category C.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The PA28 pilot flew into conflict with the EMB170.

Degree of Risk: C.