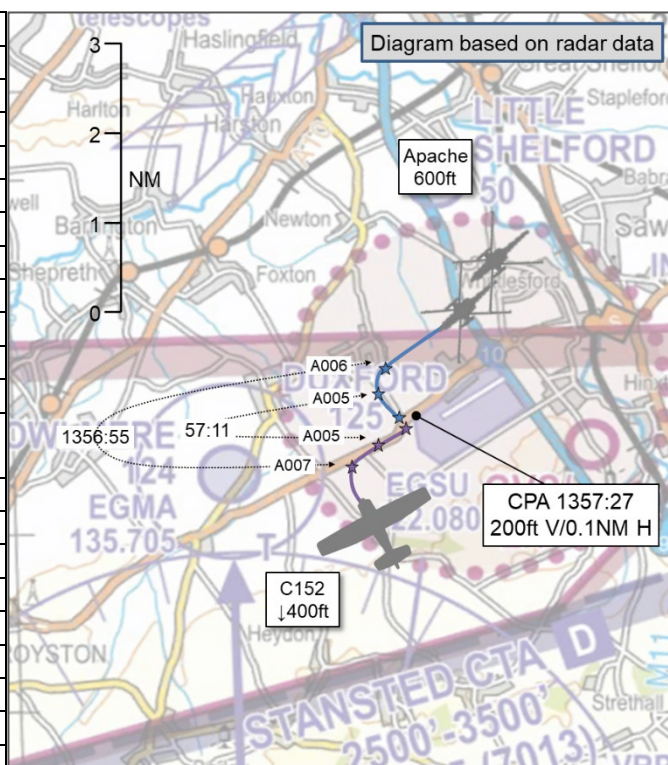


AIRPROX REPORT No 2021239

Date: 12 Oct 2021 Time: 1357Z Position: 5205N 00006E Location: Duxford

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Apache	C150
Operator	HQ AAC	Civ FW
Airspace	Duxford ATZ	Duxford ATZ
Class	G	G
Rules	VFR	VFR
Service	AFIS	AFIS
Provider	Duxford	Duxford
Altitude/FL	600ft	400ft
Transponder	A, C, S	A, C
Reported		
Colours	Green	White, Blue, Red
Lighting	HISL, Nav, Landing	Anti-col, Landing
Conditions	VMC	VMC
Visibility	5-10km	>10km
Altitude/FL	500ft	~500ft
Altimeter	QFE	QFE (1019hPa)
Heading	180°	060°
Speed	90kt	65kt
ACAS/TAS	Not fitted	SkyEcho
Alert	N/A	None
Separation at CPA		
Reported	200ft V/500m H	200ft V/300m H
Recorded	200ft V/0.1NM H	



THE APACHE PILOT reports that they were operating as a section of two Apaches conducting Diversion Nav training. The section routed from Mildenhall to Duxford at around 500ft AGL to remain clear of cloud. RT was established with Duxford and the formation join from the north to the downwind leg of the RW06 circuit briefed. The formation only heard mention of a Spitfire that was positioning to the north of the field. The formation joined the downwind leg, announcing their position and intentions on 122.080MHz. When turning onto final (a descending profile), the Patrol Commander in the lead aircraft heard another (unexpected) call of 'final'. Knowing this call was unlikely to have come from the Spitfire, the Patrol Commander looked low and right and saw a high-wing single engine aeroplane on a converging course. A call of 'climb, climb, climb' was made on the patrol frequency, and the formation climbed and decelerated to remain clear. The Patrol Commander maintained visual contact with the aircraft on final, and turned the patrol to fit within the broad outline of the circuit pattern. They called on the Duxford frequency to state that they had seen the FW and were heading on runway track maintaining south of the runway to continue en-route. The formation remained suitably separated from the FW, but only due to having heard the unexpected 'final' call. Had that not been made, the aircraft would have continued on a converging course.

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

THE C150 PILOT reports that they were flying an instructional sortie in the circuit. They were recording and monitoring flight progress on SkyDemon on an iPad in conjunction with a [EWS] personal electronic conspicuity device which was configured with ADS-B-in and ADS-B-out. On their final circuit of the sortie they were aware of the formation of 2 Apache helicopters that had stated they would join downwind LH RW06. The formation was not showing on the SkyDemon display. They turned final at approx. 1NM from the threshold (the student was handling, the instructor doing the RT) and were visual with the Apaches that had now called downwind LH RW06 (the non-standard northern circuit normally

reserved for warbird traffic). Other significant traffic was a Spitfire positioning for a run and break. They believed the Apaches had been passed traffic on the Spitfire but did not recall them being told about the C150, therefore as soon as they turned final they transmitted “[C/S] final at one mile, visual with the Apaches” to make sure that they were aware. The FISO subsequently replied “land your discretion on the paved”. As they continued towards the runway they saw the Apaches turn base leg ahead of them. They were still higher than the C150 and appeared to be flying quite slowly. They recalled having some discussion with the student as to whether the Apaches had seen them and considered breaking off the approach. However, believing that the Apaches appeared to be decelerating and that they would pass safely ahead of them, they continued the approach, with their flight path taking them ahead of and beneath that of the Apaches. Whilst on final, they recalled hearing the Apache pilot state that they were now just going to fly through as “we weren’t tracking the aircraft that flew underneath us”.

The pilot assessed the risk of collision as ‘None’.

THE DUXFORD FISO reports that they could not remember much detail as, due to illness and time away they were reporting some weeks after the Airprox. They remembered the Apache flight slowing down and passing above the Cessna after it had landed, then departing the circuit. They also recalled a Spitfire which was running in to join the circuit and that much of their attention was drawn to this against the helicopters. Additionally, they recalled the Apache lead saying that they would phone in about the aircraft they were not ‘tracking’. No such call was received but the Cessna pilot visited the tower and they had a brief discussion about the situation. At no stage was an Airprox filed. The FISO had not had access to the RT recordings.

Factual Background

The weather at Cambridge was recorded as follows:

EGSC 121350Z 36009KT 9999 -SHRA BKN014 15/11 Q1024=

Analysis and Investigation

CAA ATSI

The flight of two Apaches (AH1) was on a diversion navigation exercise at approximately 500ft “*to remain clear of cloud*”. The C150 was conducting a right-hand circuit with a student pilot and instructor on board, having recently returned to the airfield from training in the local area.

At approximately 1347:27 the pilot of one of the AH1s called the Duxford AFISO advising that they were “*requesting join from the north*” and requested the airfield information. The AFISO gave the runway in use (06), requested a call on left-base, passed the QFE and asked if they were inbound to land. The AH1 pilot replied “*affirm and we’re currently just to the north of Newbury er so we are 500ft – two ??? both two onboard to the north of Newbury to land*” (Figure 1).

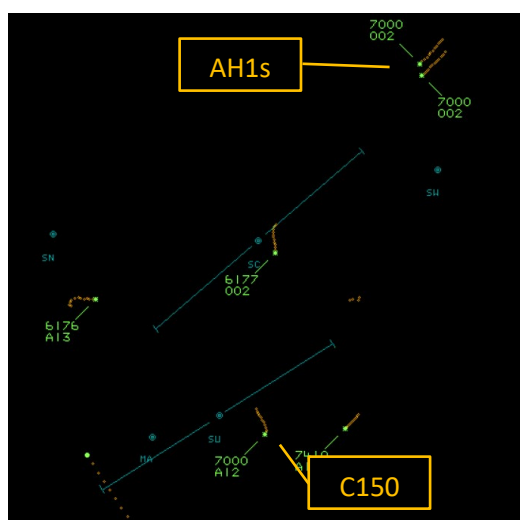


Figure 1 – 1347:27

At 1348:18 the pilot of the C150 reported downwind for a touch and go and was instructed by the AFISO to report final.

Just over a minute later the AFISO was occupied with a departing survey helicopter, and then, at 1350:44, before the C150 pilot had reported on final the AFISO gave them the surface wind and “06 paved touch and go your discretion” (Figure 2).

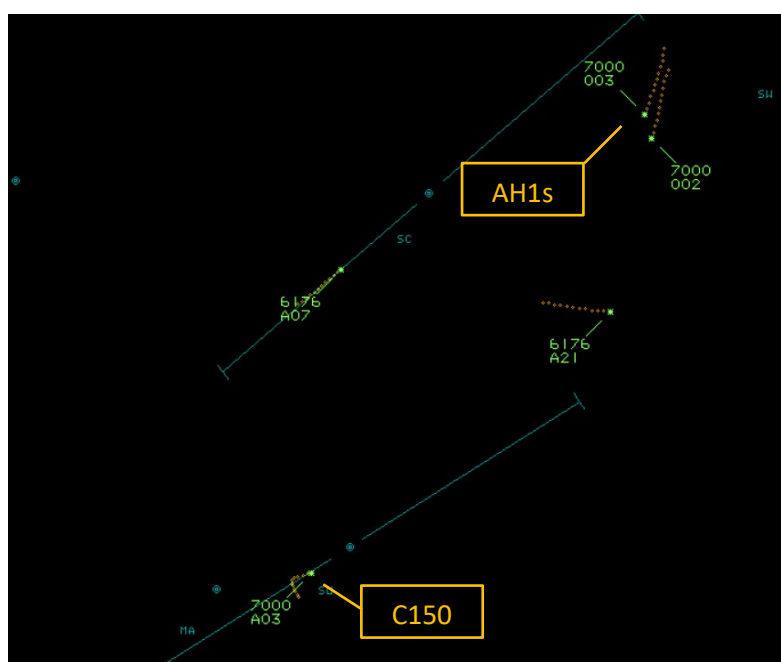


Figure 2 – 1350:44

The survey helicopter departed shortly afterwards which was followed by a Spitfire pilot calling for departure details.

At 1353:53 the AFISO passed Traffic Information on the two AH1s “to the northeast for a right-base join 06” to the Spitfire pilot prior to their departure (Figure 3).

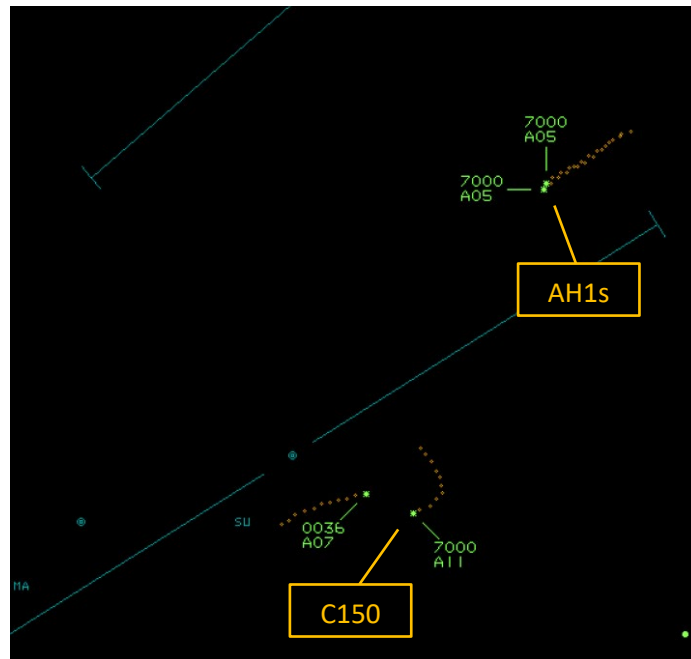


Figure 3 – 1353:53

At 1354:12 the AH1 pilot requested a left-base join from the north for RW06. The AFISO instructed them to report on left-base and advised that the Spitfire was lining up for a departure to the north which was acknowledged by the AH1 pilot. The AFISO went on to advise the AH1 pilot that there was no known traffic to affect them at Fowlmere.

At 1355:30 the pilot of the C150 reported downwind and was instructed to report final (Figure 4).

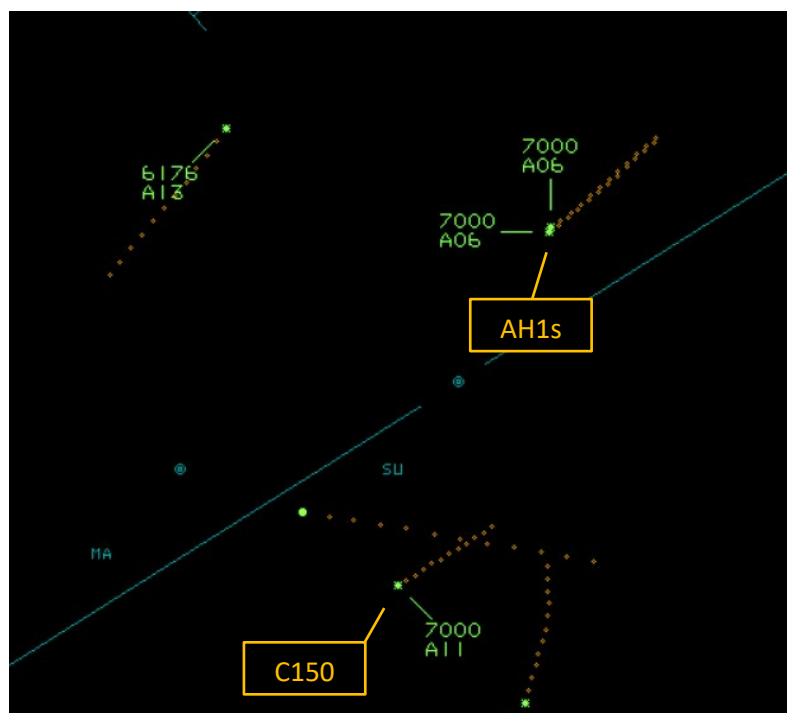


Figure 4 – 1355:30

The survey helicopter then reported leaving the frequency and, at 1356:30, the AH1 pilot reported “downwind runway 06 left” and was instructed by the AFISO to report final (Figure 5).

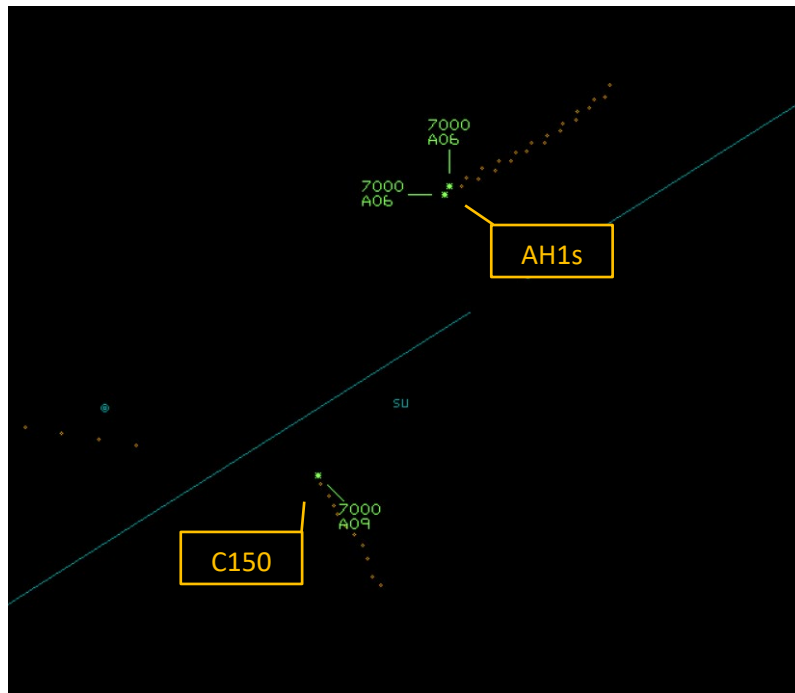


Figure 5 – 1356:30

At 1356:48 the Spitfire pilot reported 2NM to the north for rejoin with a run and break. The AFISO instructed them to report on left-base advising that “ahead of you also on a left-base is a pair of Apache helicopters”, which the Spitfire pilot reported being visual with. (Figure 6).

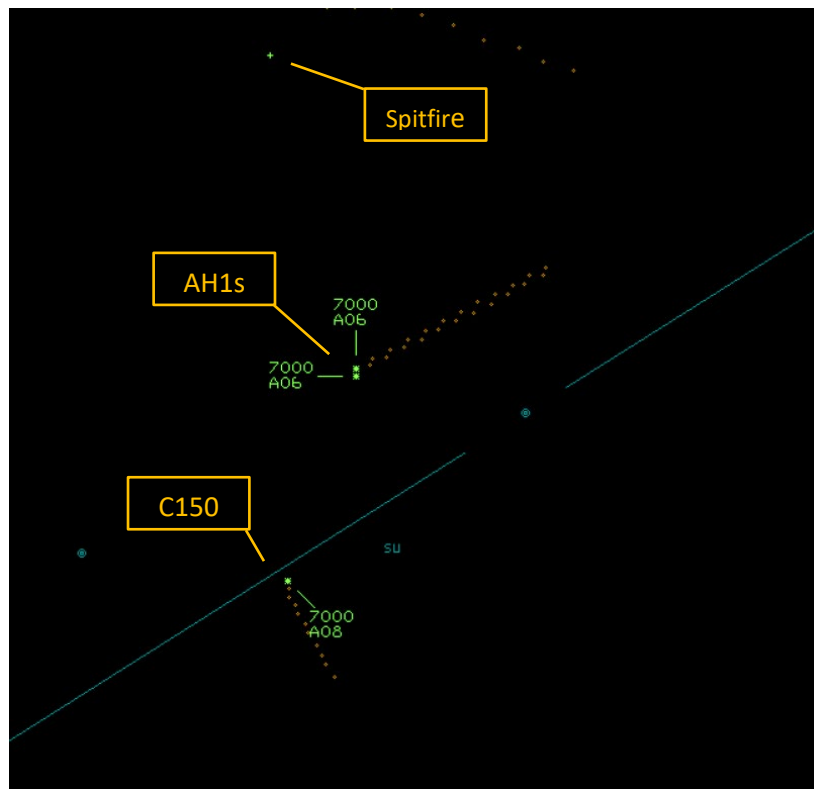


Figure 6 – 1356:48

At 1357:07 the pilot of the C150 reported “final at about a mile. Visual with the Apaches. This’ll be to land” to which the AFISO replied, “(surface wind) Runway 24 land at your discretion” (Figure 7).

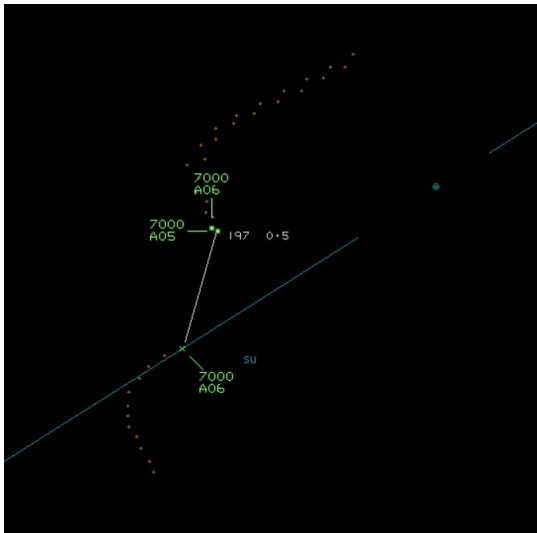


Figure 7 – 1357:07

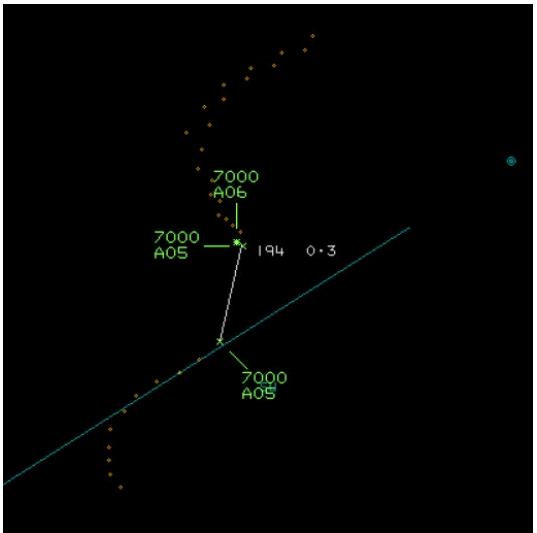


Figure 8 – 1357:15

CPA occurred at 1357:27 with the aircraft separated by 0.1NM and 200ft (Figure 9).

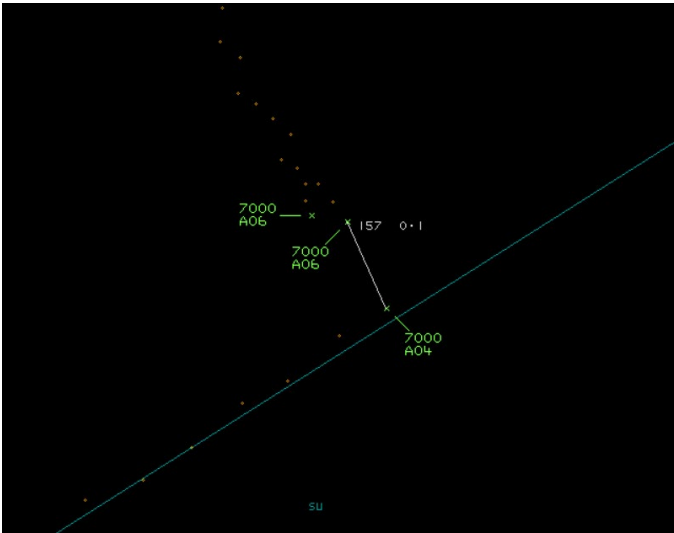


Figure 9 – 1357:27 CPA

At 1358:03 the AH1 pilot reported “we’re visual with the one ahead on final. We’re going to fly er through, er we’re going ??? to the south of your airfield and continue en-route” (Figure 10).

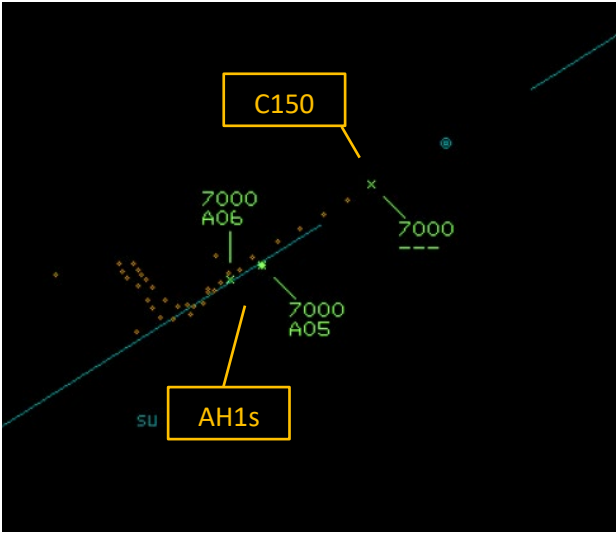


Figure 10 – 1358:03

The AFISO replied “*roger ??? your discretion. Spitfire just coming across the top of you now to er join the circuit (QNH)*”.

The AH1 pilot replied “*visual with the Spitfire and visual with the one on the runway. We’re continuing now eastbound. Out*”.

The AFISO requested they report when they left the frequency, to which another voice from the AH1’s replied “*we weren’t tracking the er aircraft that passed underneath us on finals. I’ll give you a call when we get back to our home base if that’s alright?*”

ATSI had access to reports from the reporting AH1 pilot, the C150 instructor and the Senior AFISO at Duxford (not the AFISO on duty). The Duxford RTF and area radar replay from which the snapshots were taken were also reviewed. No unit investigation report was received from Duxford ATC.

ATSI noted the following incorrect transmissions:

From the Duxford AFISO:

At 1353:53 they advised the Spitfire pilot that the AH1s were on right-base for RW06 (they were supposedly routing towards left-base, but actually joining downwind left-hand).

At 1357:07 they referenced RW24 for the C150 pilot’s touch and go.

From the AH1 pilot:

They reported their position in relation to Newbury (possibly meaning Newmarket) – twice.

At no time during this period did the AFISO pass Traffic Information to the AH1 pilots nor the Spitfire pilot about the C150 in the right-hand circuit. Also, at no time during their circuit did the C150 pilot receive Traffic Information on the two AH1s (nor the Spitfire inbound for a run and break).

When the AH1 pilot called for joining instructions they did not read back the QFE, the runway in use, nor the instruction to join on left-base, and this went unchallenged by the AFISO. Possibly as a result of the AFISO’s reference to right-base at 1353:53, the AH1 pilot repeated their request for a left-base join.

The AH1 pilot did initially request join from the north, (but then referenced Newbury not Newmarket). From their actual position a request for a downwind join would have been more appropriate, as was subsequently flown.

The C150 pilot did report on final approach and reported being visual with the AH1s but this does not appear to have been assimilated by the AH1 pilot(s) who by then had turned onto base-leg and were tracking towards the C150.

The report from the AH1 pilot indicated that they were unaware of the presence of the C150 until they heard the C150 pilot call on final approach and spotted the aircraft ahead and below them.

The C150 pilot reported being aware of and visual with the AH1s for the whole of their circuit. The instructor reported discussing the position of the AH1s on base leg with their student whilst the C150 was established on final approach and were not sure if the AH1s were visual with them. However, the C150 pilot believed that they (the C150) would pass “*safely ahead of them*” so continued their own approach.

No reference to Airprox was made at the time, and the AFISOs recollection of the incident was affected by the elapsed time between the event and the subsequent Airprox report. The report

submitted by Duxford ATC was completed by the Senior AFISO after having spoken with the AFISO on duty that day.

Conclusion

The AH1 pilot was unaware of the presence of the C150 until the aircraft had already passed ahead and below them on final approach.

A lack of adequate Traffic Information from the AFISO contributed to the AH1 pilot's lack of situational awareness.

Duxford are reminded of their obligations under Regulation (EU) 376/2014 as retained (and amended in UK domestic law) under the European Union (Withdrawal) Act 2018, Article 4, paragraphs 6(d) and 7, to submit a mandatory occurrence report, within 72 hours of when they are first made aware of an occurrence, and to conduct an analysis of the occurrence, in order to identify any safety hazards, followed by submission of follow up reports, in accordance with the 30 day and 3 month timescales contained in Article 11 of the regulation

UKAB Secretariat

The Apache and C150 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 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.²

Apache Operating Authority Occurrence Investigation

The Apache Safety Cell noted that the joining instructions for Duxford were open to interpretation together with a lack of warning regarding fixed wing traffic conducting 'run in breaks'. Duxford is a licenced aerodrome, therefore the source of all relevant flight procedures should be the AIP entry. It's concerning that the primary update target appears to be Pooleys rather than the AIP entry. The Minor Aerodrome publication lists the salient points from EGSU AD 2.22, including the specific instruction "Rwy 06 RHC arrivals, join downwind", exactly as listed. Pooleys provides slightly more detail, though presented in a different format and with diagrams, some of which may be self-generated/researched.

Comments

JHC

The lack of timely reporting by the AFISO is unfortunate because this would have added more context to the review. The UKAB report, C150 comments and AH-1 DASOR [21\10393] paint a confusing picture. It is understandable from all the statements that there was a real lack of situational awareness. The C150 was already in the right-hand circuit having just completed a touch-and-go. The incoherent joining procedures are not helpful; however, joining procedures can always be questioned on frequency if unsure which might have prompted further situational awareness. Nevertheless, neither the AH-1s nor Spitfire on frequency received Traffic Information about the C150 and vice versa. The AH-1 DASOR investigation notes the cockpit design and its blind spots. Accurate circuit information is therefore critical to allow the crews to focus on known traffic. Operating in formation, on at least 2 radios and joining a busy civilian aerodrome necessitates as much situational awareness as possible. If the C150 pilot was visual with the AH-1s and had noted that the AH-1 crews hadn't received Traffic Information about them, they could have perhaps prompted their plan on frequency. However, the CAA ATSI report notes the downwind calls made, and the AFISO response, so these were either not heard by the AH-1 crews, or not understood. It

¹ (UK) SERA.3205 Proximity. MAA RA 2307 paragraphs 1 and 2.

² (UK) SERA.3225 Operation on and in the Vicinity of an Aerodrome. MAA RA 2307 paragraph 17.

seems that a lack of Traffic Information is a key factor in this Airprox, with a multitude of other causal factors (errors, workload, incoherent published procedures, traffic density at the time).

AOPA

The Airprox aptly demonstrates the James Reason Swiss cheese model in that there were several occasions when any one barrier could have stopped the incident from developing further. The Apache crews were not aware of the C150 in the circuit. Although the C150 pilot had full situational awareness on the Apache, and were visual with them, they continued the approach when a better course of action may have been to go around and remain clear. As seen here, not all EC systems are compatible and therefore TEM should include mitigations. Pilots are reminded that Airprox should be reported on the RT frequency at the time of occurrence.

Summary

An Airprox was reported when an Apache and a C150 flew into proximity in the Duxford visual circuit at 1357Z on Tuesday 12th October 2021. Both pilots were operating under VFR in VMC and both were in receipt of an AFIS from Duxford.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from both pilots, radar photographs/video recordings, reports from the air traffic controllers involved and reports from the appropriate operating authorities. 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 Apache crews. They were joining from the north of Duxford and had made it clear to the AFISO of their intentions. There was conflicting documentation outlining the correct joining procedures, which may have led to some confusion for the Apache crews (**CF2**). Some members wondered whether they would have been better served joining for the right-hand circuit, which would have helped them integrate with the other circuit traffic, in this case the C150. The left-hand circuit at Duxford is normally reserved as a 'warbird' circuit to make it easier for the faster Spitfires and Hurricanes to integrate with the slower GA traffic in the right-hand circuit, and the speed of the Apaches was probably better suited to the right-hand circuit. Other members noted that as the AFISO seemed happy with the left-hand circuit join, the crew were lulled into believing it was the most sensible course of action. Noting that military airfields do not operate with AFISOs some wondered whether the Apache crews were aware that the AFISO could not issue instructions or sequence the aircraft. That being said, the Apache crews did not receive any Traffic Information on the C150 and members were not sure why, given that the C150 pilot was making all the correct circuit calls, they did not hear the other pilot on the radio (**CF4**). The JHC member told the Board that the formation would have also been communicating with each other on another frequency which may have meant that they did not hear the C150 pilot's calls, but even so, members thought that this should not have been a distraction. Consequently, the Apache crews did not have any prior situational awareness that the C150 was in the right-hand circuit (**CF5**). Once the other pilot made the final call and stated they were visual with the Apaches, the Apache crews saw the C150, albeit late (**CF7**) and were concerned by its proximity (**CF8**).

Turning to the actions of the C150 pilot, they were operating as normal in the right-hand circuit and were aware of the Apaches, and also had enough situational awareness to realise that the Apache crews had not been given Traffic Information on their aircraft. Some members thought that instead of continuing their circuit on final, once they saw the Apaches turn in ahead of them the C150 pilot could have taken the defensive option of going around (**CF3**) or even have queried their intentions on the RT. Instead they chose to make the final call with the extra information to say that they were visual with the Apaches; this call alerted the Apache crews to their position and they subsequently discontinued their approach. However, it did run the risk of allowing the aircraft to come into closer proximity if the Apache crew had not assimilated the call. The pilot reported that CWS in the C150 did not alert and members noted that they would have expected it to (**CF6**). However, given that the pilot was already aware of, and visual with, the Apaches, it made little difference on this occasion.

Finally, the Board considered the actions of the AFISO. Whilst they were not required to sequence the Apaches with the C150, they were required to pass Traffic Information useful for the safe and efficient conduct of flight. Although they passed the Traffic Information on the Spitfire and vice versa, they did not provide the Apache crews with any information on the C150 (**CF1**) and members thought this was a missed opportunity, as such information could have averted the Airprox.

When determining the risk of the Airprox, members considered the reports from both pilots and the AFISO together with the radar replay. They quickly agreed that, because the C150 pilot had been visual with the Apaches throughout, there had been no risk of collision. However, they also agreed that the lack of Traffic Information to the Apache crews meant that they had no situational awareness that the C150 was on final and therefore safety had been degraded; Risk Category C.

PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK

Contributory Factors:

	2021239			
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
Flight Elements				
• Tactical Planning and Execution				
2	Organisational	• Flight Planning Information Sources	An event involving incorrect flight planning sources during the preparation for a flight.	
3	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				
4	Human Factors	• Monitoring of Communications	Events involving flight crew that did not appropriately monitor communications	
5	Contextual	• Situational Awareness and Sensory Events	Events involving a flight crew's awareness and perception of situations	Pilot had no, late, inaccurate or only generic, Situational Awareness
• Electronic Warning System Operation and Compliance				
6	Human Factors	• Response to Warning System	An event involving the incorrect response of flight crew following the operation of an aircraft warning system	CWS misinterpreted, not optimally actioned or CWS alert expected but none reported
• See and Avoid				
7	Human Factors	• Identification/Recognition	Events involving flight crew not fully identifying or recognising the reality of a situation	Late sighting by one or both pilots
8	Human Factors	• Perception of Visual Information	Events involving flight crew incorrectly perceiving a situation visually and then taking the wrong course of action or path of movement	Pilot was concerned by the proximity of the other aircraft

Degree of Risk:

C.

Safety Barrier Assessment³

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 **ineffective** because the AFISO had not passed Traffic Information on the C150 to the Apache pilots and vice versa.

Situational Awareness of the Confliction and Action were assessed as **not used** because the AFISO was not required to sequence the traffic.

Flight Elements:

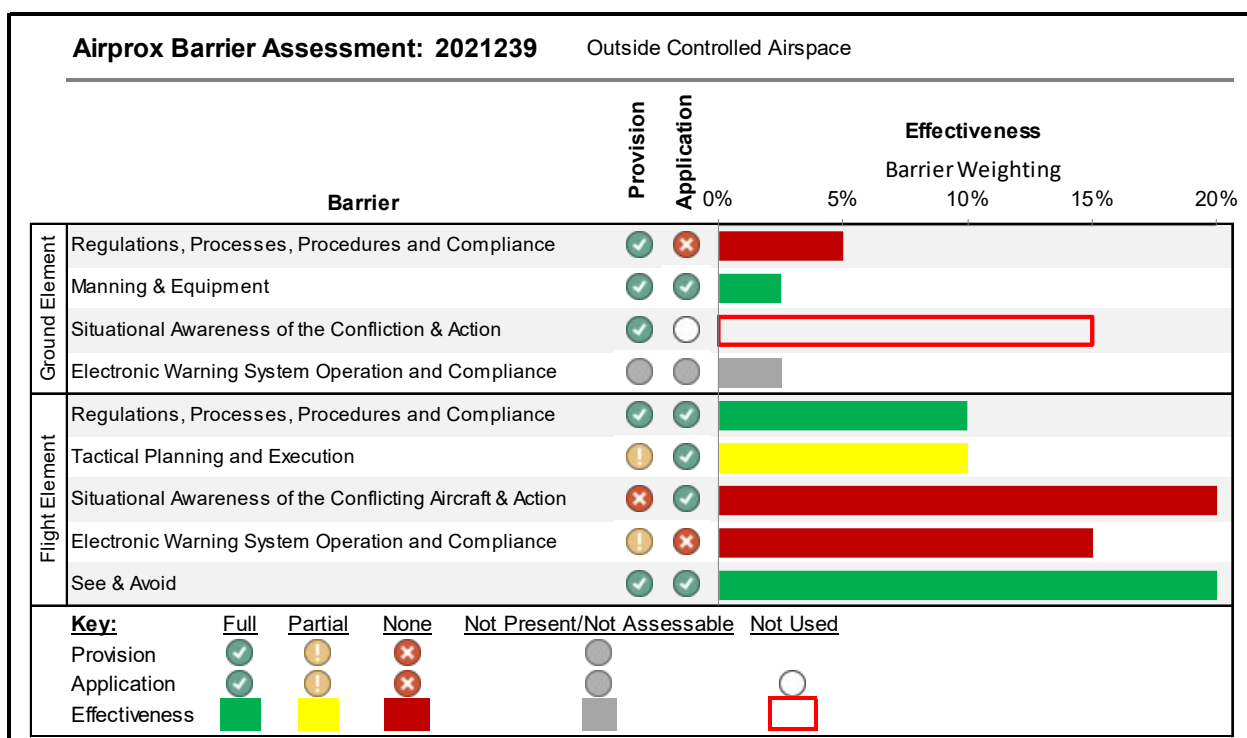
Tactical Planning and Execution was assessed as **partially effective** because the Apache crews had conflicting planning information on the correct join for Duxford.

Situational Awareness of the Conflicting Aircraft and Action were assessed as **ineffective** because the Apache crews were not aware of the C150 in the right-hand circuit.

Follow this link to the CAAs webpage on Electronic Conspicuity Devices, guidance material and compatibility table:

https://www.caa.co.uk/General-aviation/Aircraft-ownership-and-maintenance/Electronic-Conspicuity-devices/?mc_cid=ce23f03dac&mc_eid=d250bc9f1c

Electronic Warning System Operation and Compliance were assessed as **ineffective** because it was reported that the CWS on the C150 did not alert to the Apache.



³ The UK Airprox Board scheme for assessing the Availability, Functionality and Effectiveness of safety barriers can be found on the [UKAB Website](#).