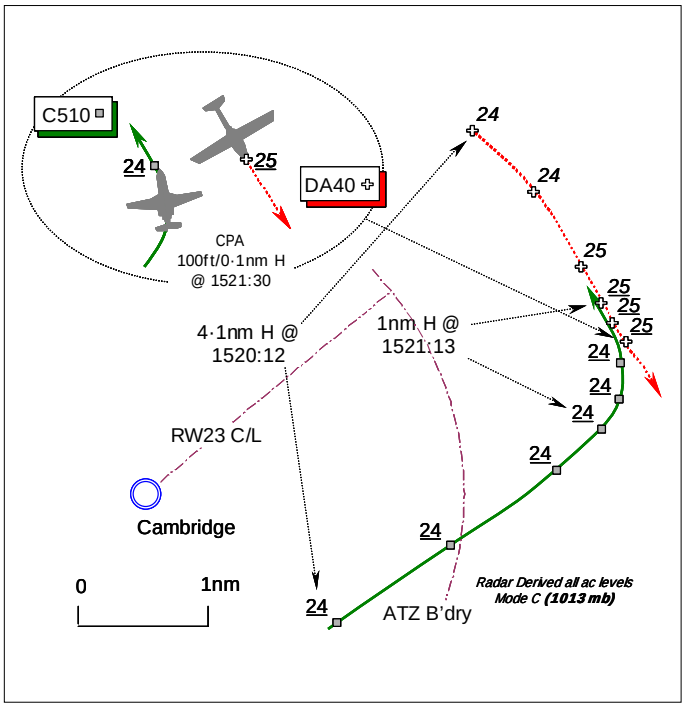
AIRPROX REPORT No 2010017

Date/Time:	25 Feb 2010 1521Z	
Position:	5212N 00010E (4nm NE of Cambridge A/D - elev 47ft)	
Airspace:	London FIR	(*Class: G*)
	Reporting Ac	*Reported Ac*
Type:	Cessna C510	Diamond DA40
Operator:	Civ Comm	Civ Club
Alt/FL:	1600ft QNH	2000ft QNH
Weather:	VMC CLBC	VMC CAVOK
Visibility:	10km+	10nm
Reported Separation:	100ft V/300ft H	500ft V/1-2nm H
Recorded Separation:	100ft V/0·1nm H (200yd H)	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE CESSNA CITATION 510 PILOT reports he was conducting a local VFR training flight from Cambridge and in receipt of an Aerodrome Control Service from Cambridge TOWER on 122·2MHz. The local Cambridge conspicuity squawk was selected with Mode C; a Traffic Information System (TIS) – a form of TCAS I - is fitted which provides TAs only. His ac is coloured white and the HISLs and landing lights were on.

Flying at 140-150kt in VMC some 400ft below cloud at 1600ft QNH, at the end of the downwind leg for RW23 whilst turning onto L base, about half way through the turn another ac – that he thought was a PA28 but actually the DA40 - was observed flying close by in the opposite direction. He did not take avoiding action as he recognised that the other ac was not on a collision course and a T.I.S. 'avoidance alert' was heard, which indicated it was 100ft+ above them. He estimated the DA40 was 100ft above his ac as it passed on a reciprocal heading 300ft away safely down their starboard side with a 'low' Risk. He informed TOWER of the occurrence on RT, and later by phone, and he was told the other ac was working Cambridge Radar.

UKAB Note (1): The C510 cct training flight was simulating the steep London City airport approaches with the PAPIs set at a 5° glide-path.

THE DIAMOND DA40 PILOT reports he was en-route from Gamston to Biggin Hill via Earls Colne under VFR whilst in receipt of a BS from Cambridge APPROACH (APP) on 123·6MHz. The assigned squawk was selected with Mode C on; elementary Mode S is fitted.

En-route in a level cruise at an altitude of 2000ft in CAVOK, heading 120° at 110kt, he saw a twin-engine business jet to his R (West). It was first seen about 5nm away below him – he thought it was climbing - and he was a little surprised that he had not received any notification from APP that a fast jet was travelling in an opposite direction to him, near to his position. He was not aware of the Airprox until contacted by the RAC at LATCC (Mil).

UKAB Note (2): The DA40 pilot initially reported seeing a jet passing at least 1–2nm away well clear to the SE of Cambridge, which he did not consider to be an Airprox. Given the significant disparity in horizontal separation, in a subsequent conversation with UKAB Staff when the geometry of the

encounter was described in detail, the DA40 pilot opined that he had not seen the C510 when it passed 0·1nm to starboard in a position some 4nm NE of Cambridge airport.

UKAB Note (3): Both the Cambridge Aerodrome Controller (ADC) and the Cambridge Approach Radar Controller (RADAR) completed brief reports; however, as the C510 crew had not mentioned it would be reported as an Airprox at the time, they were unable to recall any additional details.

ATSI reports that the controllers' memory of events was vague. This is reflected in both of their written reports completed at a later date. Their workload was reported as being moderate.

The Airprox occurred in Class G airspace 3·9nm NE of Cambridge Airport, which has an ATZ, bounded by a circle 2½nm radius centred on the mid-point of RW23 extending to a height of 2000ft aal. The standard cct direction for RW23 is left hand. The Cambridge RW23 instrument approaches conflict with the Lakenheath & Mildenhall CMATZ and co-ordination is required with Lakenheath for each instrument arrival.

The ADC was mentoring a trainee and ATC equipment includes VDF and an ATM. The ATM provides a primary radar picture without SSR and the standard configuration is a fixed range setting of 12nm, orientated S [the RW is to the S of the Control Tower], with the runway centreline extended to 10nm. Shown on the ATM are the Duxford and Fowlmere ATZs together with Newmarket Heath and Lakenheath/Mildenhall CMATZ.

The primary radar is situated on the aerodrome and was being affected by clutter in the north-eastern quadrant, due mainly to breakthrough of permanent echoes. Consequently instrument inbounds were in receipt of a 'Traffic Service with reduced information due poor radar performance'. The SSR is supplied from the Debden Radar head and provided the RADAR controller with a stable SSR picture. The clutter also affected the aerodrome ATM display.

The 1520 Cambridge METAR was: 14009KT 9999 FEW020 09/06 Q0985.

MATS Pt1, Section 1, Chapter 11, Page 10, Para 6.1.1- comments that

> *Pilots flying in the vicinity of aerodromes, ATS routes, or navigational aids where it is known that a Procedural Service is provided, are strongly encouraged to attempt to establish RTF contact with the notified ATS provider.*

MATS Pt1, Section 3, Chapter 1, Page 5, Para 8.2 states:

> *A particular watch should be kept for situations where a VFR flight may approach the aerodrome in a sector in which other aircraft are letting down on an instrument approach aid, or where sequencing is in operation. D/F indications, where available, will assist in this respect. In these circumstances the pilot of the VFR flight should not be given clearance for a straight-in approach and should be advised to avoid the initial and final approach areas.*

[UKAB Note (4): The higher cct altitude, combined with a late descent for the 5° approach resulted in the C510 extending downwind for a 4nm final thereby taking the jet outside the ATZ.]

At 1459 the C510 was given take-off clearance into a left hand cct to RW23 and during the cct detail the ac was squawking A6161. Three other ac were operating in the cct, with additional activity on the aerodrome.

The DA40 was en-route on a VFR flight from Gamston to Biggin Hill with a Cottesmore squawk of A3721 set when the pilot established contact with Cambridge RADAR at 1513:45, requesting a BS. At 1514:02, the DA40 pilot advised, "[C/S]..*D-A 40 1 P-O-B from Gamston to Biggin Hill via Earls Colne..1 thousand 6 hundred feet on 9-7-0 will remain clear of your zone but requesting a basic*

service for transit...". Cambridge RADAR agreed to provide a BS, passed the Cambridge QNH (986mb) and requested the pilot select a squawk of A6174.

The Cambridge RADAR controller could not remember the precise events but recognised that the route followed by the DA40 would take it NE of the aerodrome. The controller does not recall there being any potential confliction with traffic on the ILS. There were 4 inbound ac expected and the RADAR Controller reported that due to the trainee Tower Controller, inbound flights were being provided with tactical vectors with appropriate speed control, allowing the Tower Controller sufficient time to integrate the C510 between the instrument arrivals.

The track of the DA40 crossed through the RW23 approach 3·9nm NE of the aerodrome. The RADAR controller agreed that under normal circumstances such traffic would be notified to the ADC, however, on this occasion he could not remember doing so and was not aware that the DA40 had passed close to the ATZ. The RADAR controller believes that this may have been due to the increased workload and co-ordination required with Lakenheath, together with poor radar performance due to clutter and the garbling of SSR labels in the vicinity of the aerodrome. Radar recordings show two of the other cct ac displaying a squawk of A7000. The Radar Controller was aware of the C510 cct and agreed that passing the DA40 pilot pertinent information on the aerodrome activity and cct status would have aided the pilots SA.

At 1519 the QNH changed from 986mb to 985mb. The C510 crew had completed 3 ccts and at 1520:12, reported, "[C/S]..*is..late downwind for full stop".* TOWER responded, "[C/S]..*roger report final number 2 following Cessna 1-7-2 short final".* Traffic inbound on the ILS was now at 11·7nm and TOWER asked the C510 crew, *"...are you able to keep the circuit tight - traffic on the ILS approximately 10 miles."* The pilot of the C510 replied, *"...we have to go out to about..4 miles to get to pick up the steep approach* [C/S]", which TOWER acknowledged *"Roger report final."* Because the C510 was extending downwind TOWER cleared another circuiting ac to final and at 1521:30 instructed the C510 crew to, *"..report final number 2 following a Cherokee turned inside you tight left base"* . The C510 crew reponded at 1521:40, with *"..roger we just passed an aircraft on the right hand side there..by about..3 hundred feet and he's at the same level."* At 1521:46, TOWER acknowledged with *"...roger I'll just speak to RADAR".* The ADC reports that they were monitoring the cct visually and the unknown ac had not been seen. The workload in TOWER was now increasing from moderate to busy. The C510 crew did not use the term Airprox or avoiding action and neither of the controllers was aware of the close proximity of the two ac.

At this point a conversation was initiated by the RADAR controller, interrupted a number of times by RT calls. RADAR advised TOWER that another inbound ac was about 3nm to the S [actually to the SW] routeing to the overhead. TOWER [incorrectly] assumed this to be the aircraft reported by the C510 pilot and advised RADAR that the C510 crew had seen this ac at about 300ft away laterally. RADAR responded that the pilot of the other inbound ac [approaching from the SW] had been asked to climb and agreed to transfer the other ac to TOWER. Before the call was ended, the RADAR controller passed the range on 2 further inbounds - at 8nm and 13nm.

The radar recordings at 1521:30, show the C510 3·9nm E of the aerodrome in a L turn onto base leg, indicating FL024 [about 1560ft QNH (985mb)], with the DA40 100ft above it on a reciprical track passing 0·1nm [200yd] to starboard, indicating FL025 [about 1660ft QNH (985mb)]. Neither controller was aware of the close proximity of the 2 ac. The C510 continued within the cct and landed at 1524 with no further mention of the incident. The pilot of the DA40 did not mention on RT another ac being in close proximity and at 1527:45, the DA40 pilot switched en-route - "*Cambridge RADAR* [C/S]..*well clear of your Zone now request..frequency change to Earls Colne 1-2-2 decimal 2-5",* which was approved without further comment.

TOWER was not aware of the DA40 transitting close to the ATZ and reports that no traffic information had been passed by the RADAR controller. In addition, the ATM does not have SSR capability and the primary return of the DA40 would not have been detected easily because of the 'clutter' from permanent echoes. At the time of the Airprox, TOWER's attention was concentrated on the busy

visual cct. The Cambridge MATS Pt2 states that controllers must always be mindful that when operating as ADC the primary method of observation is visually from the VCR.

RADAR did not notice the C510 or DA40 in close proximity either before or after the Airprox and considered that clutter on the display, together with garbling of the SSR labels and additional workload may have prevented detection of the potential confliction.

MATS Pt1, Section 1, Chapter 11, Page 4, Para 3.1.1 states:

> 'A Basic Service is an ATS provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights. This may include weather information, changes of serviceability of facilities, conditions at aerodromes, general airspace activity information, and any other information likely to affect safety. The avoidance of other traffic is solely the pilot's responsibility.'

MATS Pt1, Section 1, Chapter 11, Page 4, Para 3.5.1 states:

> 'Pilots should not expect any form of traffic information from a controller, as there is no such obligation placed on the controller under a Basic Service outside an Aerodrome Traffic Zone (ATZ), and the pilot remains responsible for collision avoidance at all times. However, on initial contact the controller may provide traffic information in general terms to assist with the pilot's situational awareness. This will not normally be updated by the controller unless the situation has changed markedly, or the pilot requests an update. A controller with access to surveillance derived information shall avoid the routine provision of traffic information on specific aircraft, and a pilot who considers that he requires such a regular flow of specific traffic information shall request a Traffic Service. However, if a controller considers that a definite risk of collision exists, **a warning may be issued** to the pilot.'

MATS Pt1, Section 3, Chapter 1, Page 3, Para 4.1.1 states:

> Approach Control shall co-ordinate with Aerodrome Control:
>
> Aircraft approaching to land, if necessary requesting clearance to land;
> b) Arriving aircraft which are to be cleared to visual holding points;
> c) Aircraft routeing through the traffic circuit.

TOWER was not aware of the DA40 passing through the final approach and was, therefore, not in a position to pass appropriate TI to the pilot of the C510. The ADC was monitoring a busy cct visually and would only have referred to the ATM occasionally in order to correlate an impending inbound and assess the distance from touchdown. The ATM was displaying a primary radar picture that was itself cluttered with permanent echoes that would have made it difficult to notice another moving primary contact. If SSR had been available on the ATM, then TOWER with the short-range display would have been alerted to the potential conflict. An upgrade to provide the ATM with SSR capability is scheduled before the end of 2010.

It is unfortunate that the RADAR Controller did not provide the DA40 pilot with pertinent information on the aerodrome cct activity, as this would have aided the pilot's SA considerably. The RADAR Controller cannot recollect the exact events but believes that clutter on the radar displays and garbling of the SSR labels around the aerodrome made it difficult to monitor the DA40. The additional co-ordination required with Lakenheath may have been distracting at a time when the DA40 was passing NE of the aerodrome. Inbounds were being advised about reduced TI due to poor radar performance. Radar recordings provided by Swanwick do not reflect the Cambridge primary radar picture on the day, although the SSR feed would be the same. It is difficult to assess the impact that these factors had on the RADAR controller's ability to monitor the progress of the DA40 as it passed through the final approach, close to the ATZ. It is considered probable that the human factors issues associated with radar performance, distraction and workload priority, resulted in the DA40, in receipt of a BS, passing close to the ATZ unobserved by the RADAR Controller.

The Radar controller was familiar with the general route to be flown by the DA40. Pilots flying in the vicinity of aerodromes are strongly encouraged to attempt to establish RT contact with the notified ATS provider. It would therefore, have been appropriate, on initial contact, for the controller to have provided TI, in general terms, to assist with the pilot's situational awareness regarding aerodrome activity. This was a missed opportunity on the part of the controller that could have provided an early warning to the pilot and thus influenced the routeing and flight profile of the DA40 pilot. Both flights were operating VFR in Class G airspace and were ultimately responsible for their own separation and collision avoidance.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authority.

It was evident that the unusual cct pattern flown by the C510 to achieve the steep angle of approach had necessitated the ac flying well outside the conventional downwind cct area to pick-up the desired glide path. Thus well outside the normal sanctuary afforded to cct traffic by the ATZ, in unregulated airspace, the C510 crew had to rely on visual acquisition of transiting traffic in addition to any information on aerodrome traffic provided by TOWER. The ATSI report makes it clear that the ADC had not been appraised of the DA40's transit in the vicinity of the aerodrome by RADAR. Neither was the ADC aware of the potential conflict to the NE of the airport from the ATM. Consequently, the ADC was unable to provide any warning about the other ac before the C510 pilots spotted the DA40 themselves, passing an estimated 300ft to starboard during their base-leg turn. The C510 pilots were thus unaware of the DA40 until that point, so whatever separation that did exist was purely fortuitous. The Board agreed unanimously that this late sighting by the C510 pilots was part of the Cause.

The ATSI report highlighted that the DA40 had apparently passed close to the ATZ unobserved by the RADAR Controller. Aware that the DA40 pilot's intended routeing would take it close to the aerodrome, it should have been plain to RADAR that the DA40 would potentially conflict with the C510's extended ccts downwind that he was sequencing other IFR traffic around. Whilst RADAR might have been distracted by other higher priority tasks, and the reported radar clutter had possibly masked the conflict, if the opportunity had been available, it would have been appropriate for RADAR to co-ordinate the DA40's routeing through the extended visual traffic circuit with the ADC.

Under the provisions of a BS there was no obligation upon RADAR to pass radar-derived TI to the DA40 pilot about the C510 and Members were keen to emphasise that if such radar assistance was required then a TS should be requested. Here, however, RADAR's priorities might have been the other IFR inbounds and he might not have had the capacity to offer a TS to transit traffic. Nonetheless, a general warning about visual cct traffic extending 4nm downwind at 1600ft QNH would have been beneficial; it was unfortunate that RADAR did not pass such a warning as it might well have prevented this Airprox.

The Board was appraised of the DA40 pilot's subsequent comments that he did not consider that the weather conditions were such that a TS was warranted and that he expected to be able to fulfil his responsibilities to 'see and avoid' other ac in Class G airspace without radar assistance from ATC. A GA pilot Member noted that when passing close to an aerodrome it was always worthwhile looking into the cct area to try and see arriving or departing traffic. Indeed pilots in transit close to aerodromes are encouraged to call for an ATS and here the DA40 pilot did just that. Therefore, it was unfortunate that he did not receive any benefit from it and he flew by unaware of the close quarters situation with the C510. The Members agreed that the non-sighting by the DA40 pilot was the other part of the Cause.

Turning to Risk, it seemed that the C510's TIS had not alerted the pilots beforehand and, although they had spotted the other ac late, in the reporting pilot's view it had passed safely down their

starboard side with a ‘low’ Risk. As he was unsighted, neither was the DA40 pilot able to affect the outcome of this close quarters encounter. At these distances with only 100ft of vertical separation as the two ac passed a mere 200yd apart the Board concluded that the safety of the ac involved had certainly been compromised.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A non-sighting by the DA40 pilot and a late sighting by the C510 pilots.

Degree of Risk: B.