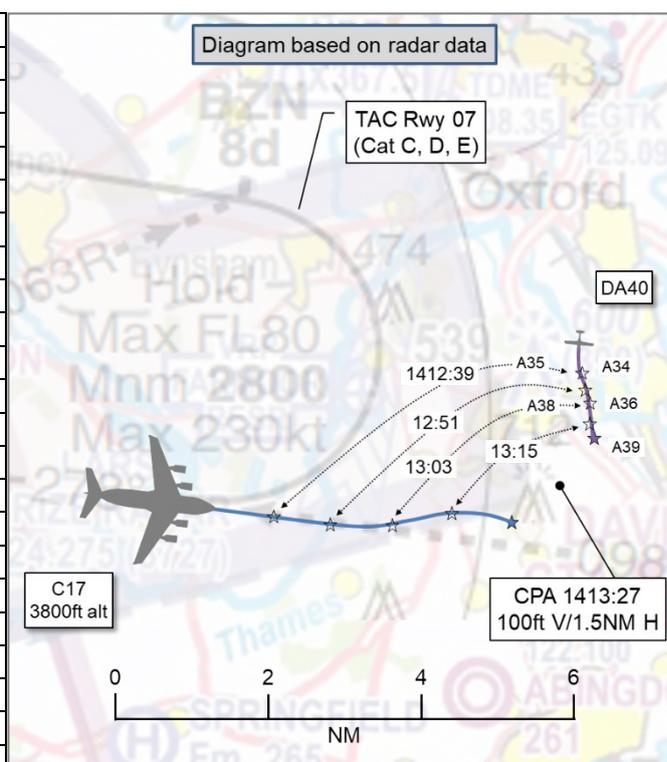


AIRPROX REPORT No 2022262

Date: 13 Nov 2022 Time: 1413Z Position: 5144N 00117W Location: 11NM E RAF Brize Norton

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	C17	DA40
Operator	HQ Air (Ops)	Civ FW
Airspace	London FIR	London FIR
Class	G	G
Rules	VFR	IFR
Service	Traffic ¹	Traffic
Provider	Brize Norton	Oxford
Altitude/FL	3800ft	3900ft
Transponder	A, C, S+	A, C, S+
Reported		
Colours	Grey	White
Lighting	NR	Strobes, nav
Conditions	VMC	VMC
Visibility	>10km	>10km
Altitude/FL	3500ft	NK
Altimeter	QNH (1017hPa)	QNH (NK hPa)
Heading	098°	'southerly'
Speed	220kt	120kt
ACAS/TAS	TCAS II	Not fitted
Alert	Proximate	N/A
Separation at CPA		
Reported	0ft V/<1-2NM H	0ft V/NR H
Recorded	100ft V/1.5NM H	



THE C17 PILOT reports returning to Brize Norton (BZZ) from an airfield in the Middle East. The Pilot Flying (PF) was in the left seat and was a qualified captain, acting as Co-pilot. The Pilot Monitoring (PM) was in the right seat and acting as aircraft Commander. There was a further qualified Captain [on the flight deck] acting as an additional pilot/safety pilot due to the fatiguing planned times of the task. Approximately 45min prior to arrival at BZZ, the crew received [information] that all BZZ radar services and the ILS were unserviceable and that the crew would need to be handed over from London Control to Oxford to fly a visual 10-mile straight-in [approach] to RW07. Due to the fatiguing task and the PF's currencies, the crew had previously decided that a procedural TACAN (TAC) to RW07 would be the safest and most appropriate approach to be flown on recovery. After [receiving the serviceability information], the crew decided that this was still a safe and sensible decision and [communicated their intentions to BZZ] that, whilst the TAC was an IFR procedure, given the VMC conditions and serviceability of the TAC, the crew could still safely fly the TAC approach. They also noted as a crew that this would remove any doubt over the procedure, provide additional time to prepare after experiencing a PF Head-up Display (HUD) failure during descent and would provide some protection by remaining within the vicinity of BZZ on a known and familiar procedure. Positioning for a visual 10-mile straight-in to RW07 would have had the aircraft spending considerable time in the vicinity of multiple TCAS contacts without a full Traffic Service due to being 7000ft above the straight-in point after handover from London. In the event, the crew was not handed-over from London to Oxford, but passed quite late to BZZ Director and, at this point, was reaching the end of their flight plan route, approaching point NAXAT [14NM west-northwest], still very high at approximately FL090 due to the nature of the clearances. The crew was then cleared to descend to 2800ft on BZZ QNH whilst also cleared to make a positioning parallel join at the BZN2d TAC 07 hold as published, before proceeding immediately outbound for the procedure (i.e. a non-standard join with no full hold). At approximately 2-4NM into the parallel join, whilst at about 4000ft, the crew was aware of traffic on TCAS looking to be close to, but a

¹ A Traffic Service limited by lack of SSR, i.e. PSR only.

few miles beyond, the extent of the planned join and hold (in the rough vicinity of Abingdon-on-Thames at about 2000-4000ft throughout). This traffic [the crew believed] was called by ATC as “fast moving, thought to be in the upper air” due to ATC’s lack of height information. The crew observed it on TCAS to be at a similar level, appearing to be about 500-1000ft below at the time. It was difficult to establish exactly where the traffic was going and hence the best course of action to ensure safe separation. An altitude hold was initiated by the PF; unfortunately this came just as the two aircraft converged at a similar altitude due to the other traffic changing altitude also. The two aircraft remained indicating level with each other and proximate on TCAS. The aircraft Commander then told the PF to turn left inside the normal hold, to take avoiding action. Unfortunately, this seemed to coincide with the traffic also moving to the north [they believed] and immediately seemed to be making the situation worse. At this point the aircraft Commander and the 3rd pilot simultaneously called for an immediate turn reversal to the right (south) to prevent further convergence. At this point the TCAS display showed the traffic at the same altitude and within 1-2NM. As the crew turned away from the traffic they were expecting a TCAS TA or RA but this didn’t materialise and the traffic remained proximate (within 1200ft and 6NM but not considered a threat by TCAS due to trajectory). The crew never saw the traffic but were all extremely uncomfortable and felt unsafe whilst ultimately turning ‘belly up’ to unsighted co-altitude traffic, hence the aircraft Commander classed this by definition as a mild Airprox. The [military Airprox report] was written to highlight three key points after review: It is shocking that at one of the UK’s most crucial military flying bases, where multiple >£100M [aircraft] types are operated carrying hundreds of people and large amounts of [cargo], that flying operations are not afforded greater protection by the UK CAA via a larger area of restricted airspace, beyond the 3500ft Brize Norton CTZ [sic], despite commercial and legal constraints. This crew was reminded by this experience that if ATC is not able to monitor local traffic no protection whatsoever is provided against that traffic by being established in a BZN hold or on BZN IAPs above 3500ft, due to the extremely limited size of the Brize Norton CTZ [sic]. It was thought that this loss of safe separation occurred against civilian GA traffic which was almost definitely outside the Brize Norton CTZ [sic] throughout, highlighting that perhaps a safety barrier is missing or inadequate.

The pilot assessed the risk of collision as ‘Low’.

THE DA40 PILOT reports that the Oxford controller told them to look for traffic, which they saw and considered to be close but not a collision risk.

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

THE BRIZE DIRECTOR CONTROLLER reports that they were the ATCO I/C and Radar controller, bandboxing three frequencies. They took a handover with [C17 C/S] as the only speaking unit on all frequencies; they were on Director. They had been given own navigation to the IAF to enter the TACAN hold before conducting a TACAN procedure to land on RW07. Once they had taken the handover [C17 C/S] was given descent to altitude 2800ft, asked to report established in the hold ready for the procedure and also to report passing 3500ft. [C17 C/S] flew a profile through the BZN overhead and parallel to the RW07 departure lane. Traffic was called routing north to south and given as “believed to be in the upper air” due to the speed and profile of the track. When about 8 miles southeast of BZN, [C17 C/S] was asked to confirm they were flying the procedure for RW07. They replied as taking avoiding action to the south on traffic in their 12 o’clock and co-altitude. Upon this call a small spurious radar contact was noticed about 2 miles to the east of [C17 C/S], very slow moving about 1 mile outside BZN controlled airspace, and was called as such.

The controller perceived the severity of the incident as ‘Medium’.

THE BRIZE SUPERVISOR was the controller ATCO I/C.

THE OXFORD RADAR CONTROLLER reports that Brize had suffered a complete PSR and SSR failure earlier in the day and the PSR had been returned to service prior to this event. [DA40 C/S] was an IFR departure toward CPT climbing 2500ft requesting 4000ft. The aircraft had been placed under an ATS and cleared to CPT to 4000ft. During scanning, they noted the Brize aircraft south of their overhead and above the CTR but descending on a similar routing for an approach to runway 25 (but

they were promulgated RW07) and TI was passed to [DA40 C/S] who immediately reported visual. The Brize traffic was above the level of [DA40 C/S] with a descent profile to pass below but a generic wake turbulence warning was passed as a safety net. The Brize aircraft was seen to turn away from [DA40 C/S] when the aircraft were several miles apart and the controller gave the matter no further consideration.

Factual Background

The weather at Brize Norton was recorded as follows:

```
METAR EGVN 131420Z 10009KT CAVOK 15/11 Q1016 NOSIG RMK BLU BLU=
METAR EGVN 131350Z 10008KT CAVOK 15/11 Q1016 NOSIG RMK BLU BLU=
```

Analysis and Investigation

Military ATM

An Airprox occurred on 13 Nov 22 at approximately 1415 UTC, whilst a C17 was conducting a TACAN approach at Brize Norton against a DA40 departing Oxford Airport. The C17 pilot was in receipt of a limited Traffic Service from the Brize Norton Approach controller. The Brize Norton Approach controller was providing a limited Traffic Service to the C17 pilot, whilst band-boxing 3 frequencies. The C17 pilot was given own navigation to the Intermediate Approach Fix, entering the TACAN hold for RW07. Traffic Information was provided on a radar contact believed to be in the upper air, due to Brize Norton operating non-cooperative radar only. Approximately 8 miles southeast of Brize Norton controlled airspace, the C17 pilot reported taking avoiding action due to traffic in their 12 o'clock, co-altitude. The Brize Norton Approach controller reported a spurious radar contact, slow moving, approximately 1 mile outside Brize Norton controlled airspace. The Brize Norton Supervisor position is not established at weekends and outside normal operating hours.

Figures 1-3 show the positions of the C17 and DA40 aircraft at relevant times during the Airprox. The screenshots are taken from a replay using the NATS Radars which are not available to the Brize Norton controller therefore may not be entirely representative of the picture available.

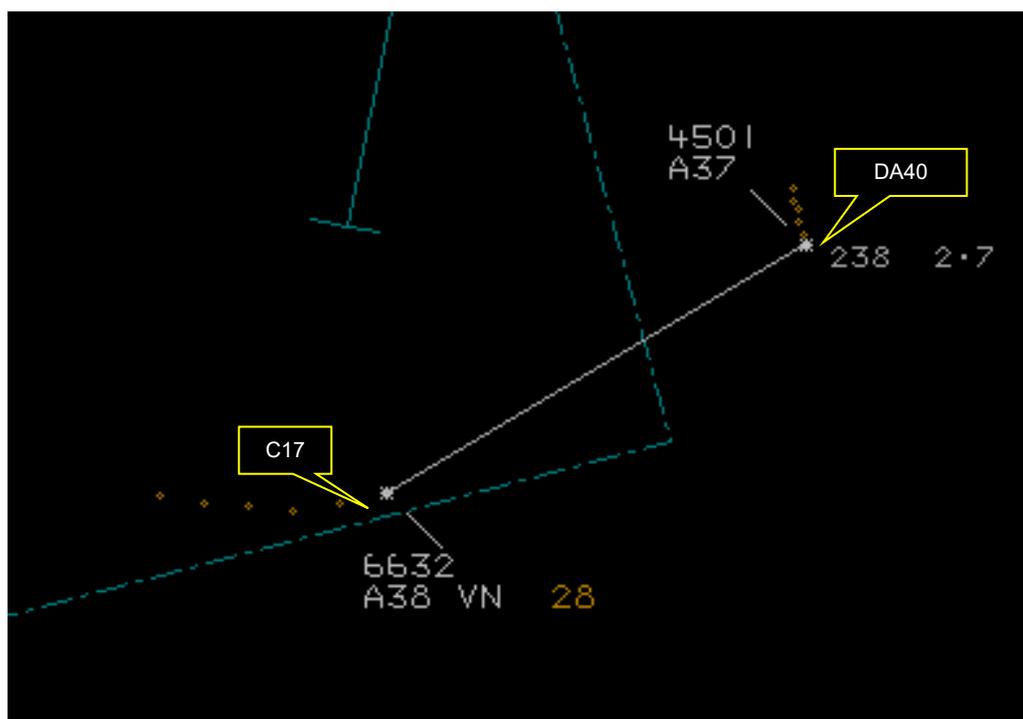


Figure 1: 1413:09 - Controller queries C17 procedure

At 1413:09 the Brize Norton Approach controller questioned the C17 pilot on their procedure “*just confirm you’re doing the procedure for 07*”. Prior to this transmission, the Brize Norton Approach controller warned-in the C17 aircraft with the Brize Norton Aerodrome controller, stating “*going outbound on the procedure in a second*”. The Brize Norton Aerodrome controller acknowledged this and then questioned “*for 07 yeah*”. Measured separation was 2.7NM and 100ft.

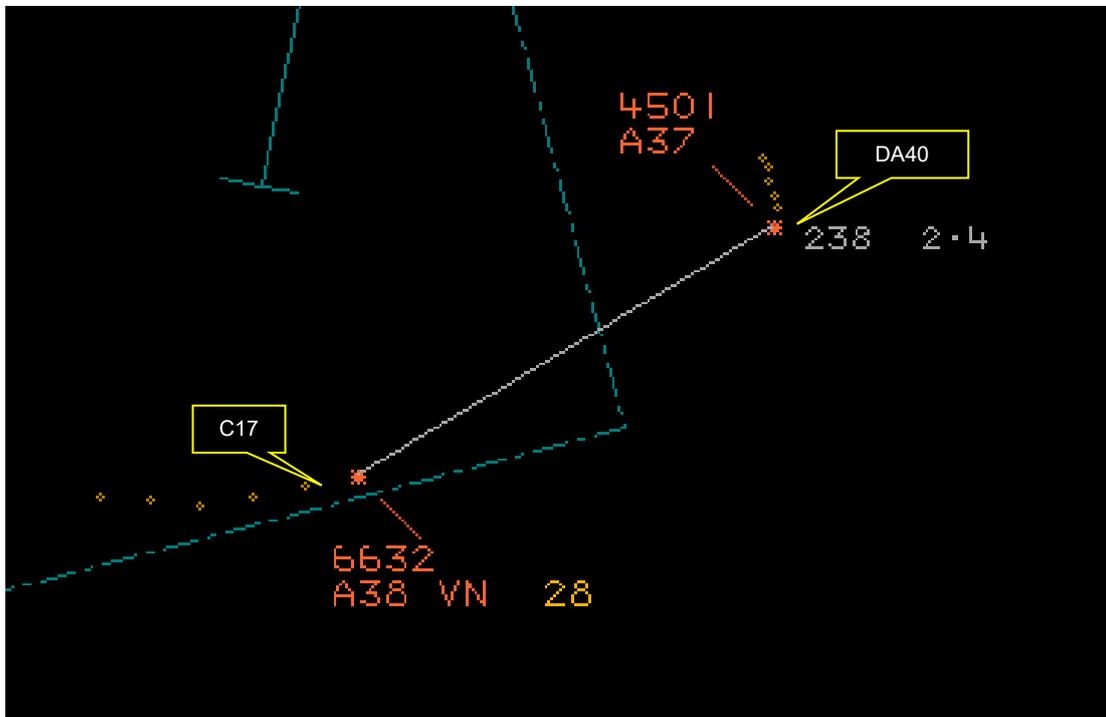


Figure 2: C17 initiates avoiding action

At 1413:12 the C17 pilot reported “*we’re just having to make er avoiding action from traffic er same alt, on er*”. The Brize Norton Approach controller reported “*that traffic appearing outside of controlled airspace*”. Measured separation reduced to 2.4NM and 100ft.

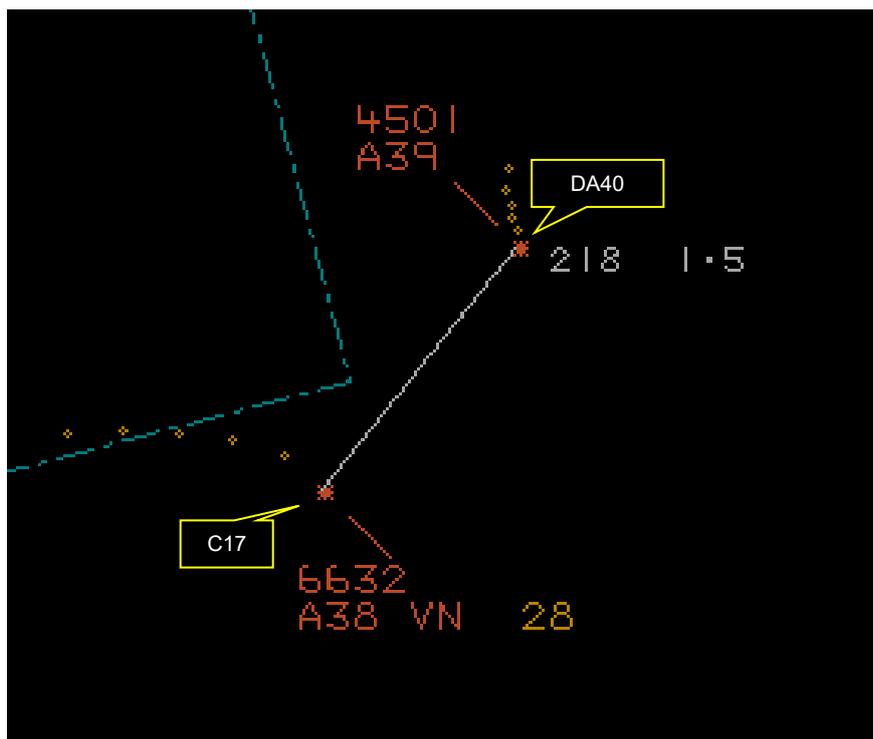


Figure 3: CPA

CPA timed at 1413:32 and measured separation 1.5NM and 100ft.

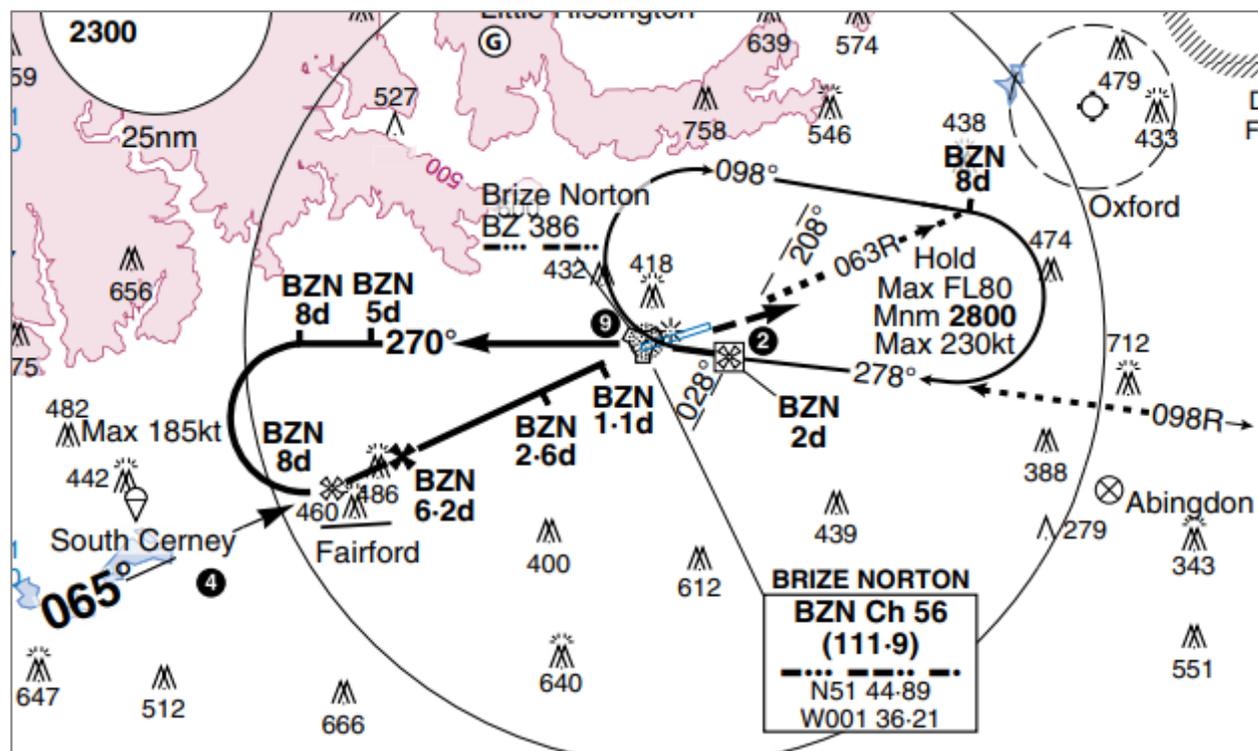


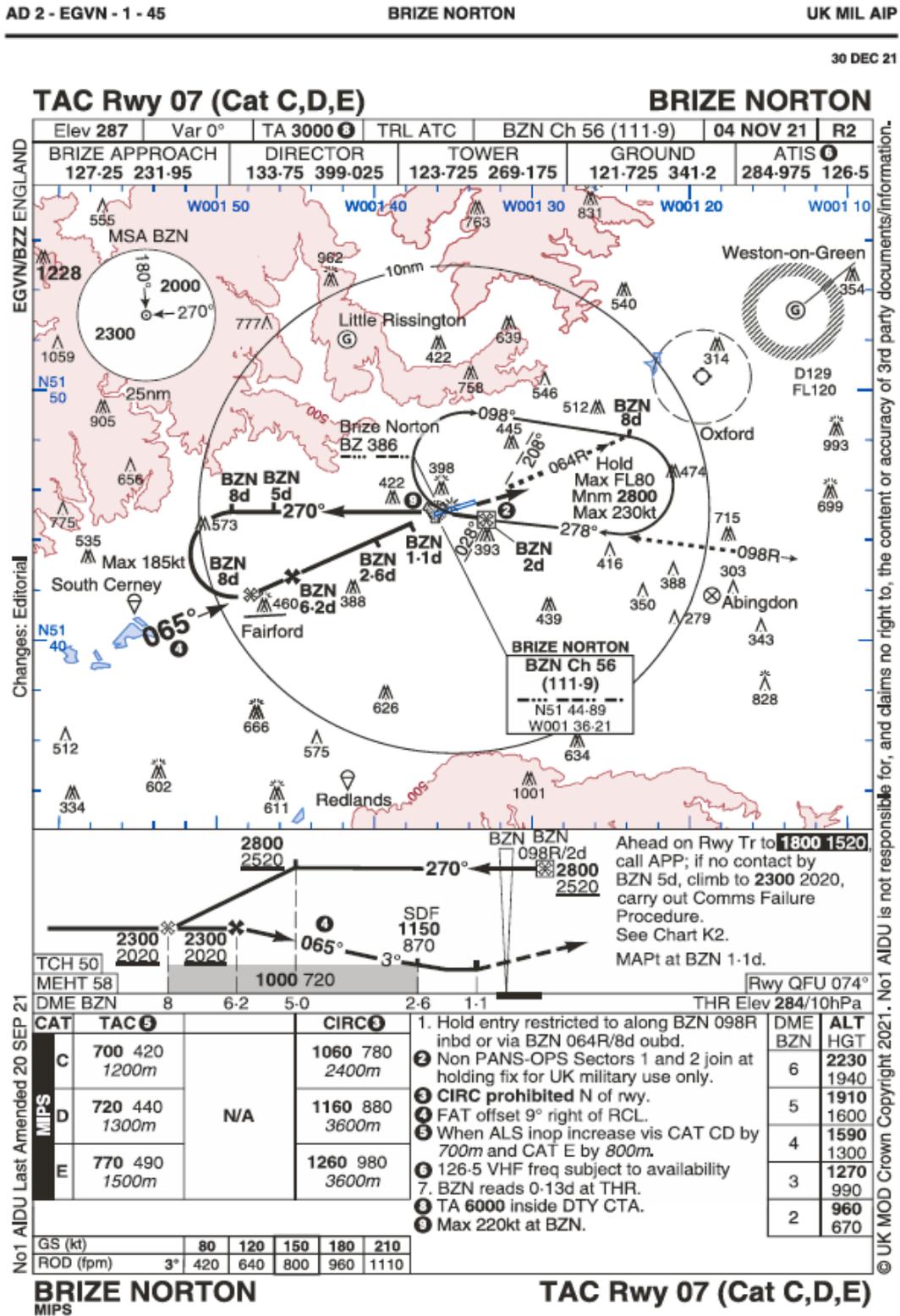
Figure 4: Runway 07 TACAN procedure and Hold

The above figure 4 is taken from the published Terminal Approach Plates for a TACAN approach into Brize Norton for RW07. The C17 pilot reported they were cleared to make a positioning parallel join at the BZN 2d TAC 07 hold, before proceeding immediately outbound for the procedure (a non-standard join with no full hold).

Due to the non-standard approach conducted by the C17 crew, this took the aircraft outside controlled airspace. With the DA40 appearing as a spurious radar contact, the Brize Norton Approach controller was unable to provide early Traffic Information to the C17 crew. The Brize Norton Approach controller appeared to lack awareness of the type of approach the C17 was conducting, with the Brize Norton Aerodrome controller questioning the type of approach due to the C17 position at the time, shortly to leave controlled airspace.

UKAB Secretariat

The C17 and DA40 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 If the incident geometry is considered as converging then the DA40 pilot was required to give way to the C17.³



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

³ (UK) SERA.3210 Right-of-way (c)(2) Converging. MAA RA 2307 paragraph 12.

Brize Norton Occurrence Investigation

The Brize Norton Investigation established the following outcome, cause, causal factors with mitigations and a recommendation:

Outcome: Although described as a 'mild Airprox' the crew assessed that they were close enough to unsighted TCAS traffic that they needed to take avoiding action and manoeuvred laterally. [C17 C/S] ended up within 2 miles of another aircraft. TCAS traffic remained proximate.

Cause: The cause was a sequence of events which, from the perspective of the crew at the time, led them to think they were closing on an aircraft that was heading north, when the traffic in question was actually headed south. **Mitigation:** C17 Flight Safety Newsletter Item. Reminder to crews on limitations of TCAS lateral depictions.

Causal Factor: TCAS depicted traffic in an approximate location [similar] to [that of] high speed traffic passed by ATC. Interpretation of TCAS displays, the lack of altitude information available to ATC, the lack of visual acquisition and apparent pop-up traffic, led to a confused air picture of conflicting traffic. **Mitigation:** C17 Flight Safety Newsletter Item. Reminder to crews on limitations of TCAS lateral depictions.

Causal Factor: The TCAS display is designed to assist the crew's air picture and give 'approximate bearing' to known traffic. It has accurate range information, but the bearings can suffer from lag and can be inaccurate by up to 30°. It is known to be difficult to deduce the track of other aircraft by using a TCAS display. The potential lack of fidelity of the displayed information may have been a causal factor in the crew reaching their decision to take avoiding action in the way they did. **Mitigation:** C17 Flight Safety Newsletter Item. Reminder to crews on limitations of TCAS lateral depictions.

Causal Factor: On the day of the occurrence the SSR was not functioning. This caused the passing of Traffic Information to be without 'height information' which added to the confusion of the air picture. It appears that the conflicting aircraft was not shown on Brize radar until after avoiding action had been taken. **Recommendation:** It is recommended that RAF Brize Norton aircraft are equipped with ADS-B receivers and displays to improve aircrew situational awareness of other air traffic. Within the AMF,⁴ the AW109 already has a stand-alone ADS-B receiver. Trial activity is already underway for read-across to fixed wing platforms.

Causal Factor: Fatigue is mentioned in the summary as a reason for electing to fly the well-known and predictable TACAN procedure and approach. Fatigue was a factor in this occurrence. **Mitigation:** All tasks are routinely scrutinised at sqn level to ensure that timings are legal and safe. Where risks exist, further scrutiny is applied via FAST analysis iaw existing DHOI 09/23. Mitigations are routinely applied, as in this case, for example by utilising a third pilot.

Oxford Occurrence Investigation

Unit Assessor [UA] review: A (UA) reviewed a snapshot of this incident (1405-1415) from a standards perspective. Oxford Runway 19, Brize Runway 25, the observed traffic level appeared to be light/moderate. The Oxford radar task was not split at this time. The summary is as follows:

1407: [DA40 C/S], an IFR departure eventually to route towards CPT, was released by the Oxford radar controller. The recording reviewed did not cover the co-ordinated departure instructions for [DA40 C/S], but the aircraft departed on a heading that was approximately south-southeast, slightly diverging from the eastern boundary of the Brize CTR. At this moment [C17 C/S] was ~15NM WNW of [Brize Norton], turning right towards [Brize Norton] and descending through FL85.

1408: [DA40 C/S] took off. [C17 C/S] was ~12NM NW of [Brize Norton], descending through FL73.

⁴ Air Mobility Force.

1410: [DA40 C/S] checked in with radar. It was placed under a Traffic Service and instructed to resume own navigation towards CPT.

1411: A conversation began with TC, passing an inbound estimate and requesting a release level for the same. The conversation lasted more than one minute.

1412: [DA40 C/S] was ~3.5NM SSE of [Oxford] climbing through A2.6. [C17 C/S] was ~3NM ESE of [Brize Norton] tracking ESE (roughly conflicting track), apparently commencing an IFP for [Brize Norton] Runway 25, descending through A4.3. The radar controller passed TI to a training aircraft [other C/S], routeing to the OX, on reciprocal transit traffic at a similar altitude.

1412:09 [DA40 C/S] was ~4NM SSE of [Oxford], climbing through A3.0. [C17 C/S] was ~5NM ESE of [Brize Norton] descending through A4.0.

1412:33 [DA40 C/S] was climbing through A3.2, [C17 C/S] was descending through A3.8. The two aircraft were now ~5NM apart. At this time the radar controller was passing missed approach instructions to [other C/S].

1412:42 [C17 C/S] appeared to level out at A3.8, still on a conflicting track.

1412:52 The Radar controller passed [DA40 C/S] TI on [C17 C/S], with a "below and behind" wake turbulence warning. [DA40 C/S] reported visual with the other aircraft.

Although the radar controller was slightly late in passing Traffic Information to [DA40 C/S] on [C17 C/S] ("Controllers shall aim to pass information on relevant traffic before the conflicting aircraft is within 5 NM, in order to give the pilot sufficient time to meet his collision avoidance responsibilities" – CAP 774 Para 3.5) this was by a small margin, and the 5NM is an aim rather than a requirement. The controller was also occupied with passing Traffic Information to another aircraft under a Traffic Service, the nature of which was more urgent. [DA40 C/S] received Traffic Information in sufficient time to sight the other aircraft, at which point [C17 C/S] was ~3NM away and began turning away to the south. The pilot of [DA40 C/S] did not request deconfliction advice, and both aircraft were in Class G throughout.

The event was not reported or logged in the watch log - the controller presumably unaware that an Airprox was being filed - and no remark was made by [DA40 C/S] during the period reviewed. The controller is currently on long term absence, and for that reason an interview has not yet been possible.

From knowledge of operational practices between the two units, the Oxford controller may have observed [C17 C/S] but anticipated it would continue descending into the Brize CTR, routeing beneath [DA40 C/S]. However it appears that [C17 C/S] was somewhat high for their stage of the approach, leading to a pattern which was somewhat elongated and which, had it continued, would have passed the eastern boundary of the Brize CTR. [DA40 C/S] was not abnormally close to the Brize CTR, it was the apparent wide pattern taken by [C17 C/S] which introduced the conflict. The Brize controller did not attempt co-ordination with Oxford radar during the period reviewed.

The UA was satisfied with the standard of ATS that [DA40 C/S] received from Oxford, and that it did not contribute to this event.

The Unit Safety Officer [USO] Review: Having reviewed the incident [the USO was] content with the analysis captured in the initial UA review. With the absence of hindsight bias and considering operational norms it would have been difficult for the radar controller at the time to predict that [C17 C/S] would route east of the Brize Norton CTR and thus be in conflict with [DA40 C/S]. The operational norm would be for the aircraft to descend into (and then remain within) the confines of CAS. Traffic Information was passed by the Oxford Radar controller (albeit later than would have been hoped as captured above and would likely have been passed sooner had it not been for the controller engaging in phone calls that would usually have been taken by an ATCA had one been in position) and TI to other aircraft in receipt of a radar service. [DA40 C/S] reported visual with [C17

C/S] and therefore the risk of collision was deemed minimal; likewise, the controller was proactive in issuing a potential wake turbulence warning below and behind. [...], Traffic Information was passed to [DA40 C/S] at time 1412:50 and the CPA occurred at 1413:25. Brize Norton was contacted as part of this investigation. They report that at the time of the Airprox they were providing a radar service using PSR only. It was disappointing that coordination between the two units didn't occur, when it was known that [C17 C/S] wouldn't descend into the Brize Norton CTR prior to the eastern boundary of the zone (as would be considered standard) it was agreed that coordination to ensure vertical separation was maintained would have been considered prudent. That said, with Brize Norton operating with only PSR they noted that the controller in position at the time of this incident had discounted the return of [DA40 C/S] as radar clutter and wasn't aware that it was in fact an aircraft working Oxford radar. Likewise, once the Oxford Radar controller had seemingly spotted the conflict, the closing speeds between the aircraft was such that co-ordination would likely not have been achieved within a reasonable timeframe as to be considered effective.

PROBLEM STATEMENT: Two aircraft flew in such proximity that a pilot on board felt safety of the aircraft involved may have been compromised. Airprox occurrences have the potential to lead to a MAC and subsequent loss of life.

DIRECT CAUSE: Aircraft operated in such proximity to each other as to create the collision hazard.

CAUSAL FACTORS: Variance from operational norms on behalf of the Brize Norton controller & expectation bias in anticipating [C17 C/S] would descend and remain within the confines of the Brize Norton CTR. Lack of coordination between the two units to ensure collision avoidance when it was evident the two aircraft would be operating in close proximity. Brize Norton was operating with only PSR and discounted the appearance of [DA40 C/S]'s return as radar clutter and therefore its inferred that TI was not passed.

CONTRIBUTING FACTORS: Lack of Radar ATCA meant the controller was taking phone calls/completing tasks that would usually be taken by the ATCA which adds to workload and distraction.

ROOT CAUSE STATEMENT: Aircraft operating close to the boundary CAS working different ATC units with an expectation bias that the other unit's traffic was going to act in a certain way together with Brize Radar operating a reduced (PSR only) service which reduced the barrier of effective Traffic Information being passed by that unit.

Comments

HQ Air Command

A local investigation revealed that the crew was attempting to fly a benign recovery profile; the crew being cognisant of pilot fatigue and potential for distraction at the end of a long sortie. A rapid descent into the CTR was not considered due to the proximity of the ground and the added distraction of a HUD failure. They favoured a controlled loss of height during the join to the hold. Anecdotally, Brize Norton has a history of airspace infringements. Crews can be influenced by this and might not consider the CTR a zone of guaranteed protection. It was challenging for the crew to create a mental picture of the traffic when comparing potentially inaccurate primary radar calls from ATC and TCAS, which is subject to angle of arrival errors. Factoring all of this, it is logical to see why the crew exited the confines of the hold as they felt they were doing their best to ensure safe separation with the information presented. A larger CTR would be desirable, although the provision of this could be complex and create unintended consequences. An Airspace Change Proposal (ACP) has previously been submitted but was unsuccessful and work is underway for a renewed submission. Improved coordination with Oxford would help but is subject to controller workload. With hindsight, entry into the CTR and following published procedures would have offered the best procedural de-confliction. After doing this, waiting for a TCAS RA may have offered a better solution in the absence of SSR or visual contact.

Summary

An Airprox was reported when a C17 and a DA40 flew into proximity 11NM east of RAF Brize Norton at 1413Z on Sunday 13th November 2022. Both pilots were operating in VMC, the C17 pilot under VFR in receipt of a limited Traffic Service from Brize Director and the DA40 pilot under IFR in receipt of a Traffic Service from Oxford Radar.

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 felt that the C17 crew had been concerned by their perceived proximity to the DA40 due to TCAS information and that their course of action had been influenced in part by a cultural history of airspace infringement of the Brize Norton CTR. Confirmation bias had then played its part in their avoiding action turns when radar replay had shown that the DA40 had in fact been outside the Brize CTR and maintaining a southerly track. Members agreed that this Airprox was a textbook example of the danger of using a TCAS contact to manoeuvre one's own aircraft, due to TCAS intrinsic angle of arrival inaccuracies. In this case, the C17 crew's perception that the TCAS contact was also turning north resulted in their reversal of turn direction to the right and subsequent significant additional reduction in separation than if their original left turn had been maintained. Members agreed that ICAO design of TCAS procedures places an emphasis on crews not to manoeuvre in response to a TCAS TA and, by inference, also not to proximate traffic. TCAS functionality is assured to reduce the risk of mid-air collision to ALARP and tolerable when allowed to function to its fullest extent and in this case the C17 crew would have been better served by descending into the Brize CTR, flying the TAC 07 join and actioning a TCAS RA should it have occurred. In the event, the DA40 pilot was given Traffic Information and saw the C17 and separation at CPA was such that, in the context of an Airprox in Class G airspace, normal safety parameters had applied, risk E. The following Contributory Factors were felt to be relevant:

CF1: The Brize radar was operating without SSR, displaying primary returns only without altitude information.

CF2: The Brize controller issued Traffic Information at a late stage, when the primary return of the DA40 was noticed. Members felt that low arousal of the Brize controller may have played a part.

CF3: The Brize controller had generic situational awareness in that the radar was displaying primary returns only without altitude information.

CF4: The Brize radar STCA could not function without SSR.

CF5: The C17 crew did not turn inbound on the hold join for the TAC 07 procedure at the correct point, no doubt due to their concern with the DA40 TCAS contact.

CF6: The C17 crew manoeuvred their aircraft on the basis of their incorrect situational awareness, formed at least in part by intrinsic TCAS inaccuracies.

CF7: Members felt the C17 crew had mitigating options available such as a Traffic Service from Oxford, a direct join and descent in the hold into the Brize CTR or a visual approach.

CF8: The C17 crew had incorrect situational awareness with regard to the DA40's track.

CF9: The C17 crew was concerned by their proximity to the DA40.

CF10: The C17 crew did not optimally action the TCAS in that they manoeuvred in response to proximate TCAS traffic.

CF11: The C17 crew did not see the DA40.

CF12: The C17 crew was fatigued.

Finally the Board commended Oxford for their thorough Unit Investigation, which had thrown much light on the situation, and expressed their own disappointment that Brize Norton had not coordinated the C17's arrival with Oxford, given the known lack of SSR at Brize. Members noted the C17 pilot's comments regarding operations at Brize Norton and were of the opinion that rather than warranting a larger area of controlled airspace, existing Brize Norton airspace should perhaps be used in accordance with its design, that protection had in fact been provided by TCAS, the Oxford Traffic Service to the DA40 pilot and the DA40 pilot's see-and-avoid and that the perceived loss of safe separation could have been avoided by adherence to current procedures.

PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK

Contributory Factors:

	2022262			
CF	Factor	Description	ECCAIRS Amplification	UKAB Amplification
Ground Elements				
• Manning and Equipment				
1	Technical	• Radar Coverage	Radar Coverage	Non-functional or unavailable
• Situational Awareness and Action				
2	Human Factors	• ANS Traffic Information Provision	Provision of ANS traffic information	TI not provided, inaccurate, inadequate, or late
3	Contextual	• Traffic Management Information Action	An event involving traffic management information actions	The ground element had only generic, late, no or inaccurate Situational Awareness
• Electronic Warning System Operation and Compliance				
4	Technical	• Conflict Alert System Failure	Conflict Alert System did not function as expected	The Conflict Alert system did not function or was not utilised in this situation
Flight Elements				
• Regulations, Processes, Procedures and Compliance				
5	Human Factors	• Flight Crew ATM Procedure Deviation	An event involving flight crew deviation from applicable Air Traffic Management procedures.	
• Tactical Planning and Execution				
6	Human Factors	• Action Performed Incorrectly	Events involving flight crew performing the selected action incorrectly	Incorrect or ineffective execution
7	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				
8	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
9	Human Factors	• Unnecessary Action	Events involving flight crew performing an action that was not required	Pilot was concerned by the proximity of the other aircraft
• Electronic Warning System Operation and Compliance				
10	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				
11	Human Factors	• Monitoring of Other Aircraft	Events involving flight crew not fully monitoring another aircraft	Non-sighting or effectively a non-sighting by one or both pilots
• Any other events				
12		• Any other event	Any other event not listed elsewhere within the event types list.	Crew fatigue

Degree of Risk:

E.

Safety Barrier Assessment⁵

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

Ground Elements:

Manning and Equipment were assessed as **partially effective** because the controller was operating without SSR (primary contacts only with no altitude).

Situational Awareness of the Confliction and Action were assessed as **ineffective** because the Brize controller was not able initially to detect the DA40 on radar and so could not provide Traffic Information to the C17 crew until at a late stage.

Electronic Warning System Operation and Compliance were assessed as **ineffective** because STCA could not function without SSR.

Flight Elements:

Regulations, Processes, Procedures and Compliance were assessed as **partially effective** because the C17 crew manoeuvred their aircraft in response to the DA40 TCAS return, precluding their inbound turn to the beacon.

Tactical Planning and Execution was assessed as **ineffective** because the C17 crew based their actions on assumptions regarding the safety afforded by the Brize Norton CTR and TCAS bearing information that erroneously indicated the DA40 turning northwards.

Situational Awareness of the Conflicting Aircraft and Action were assessed as **partially effective** because, although the C17 crew's situational awareness was incorrect, the DA40 pilot had received Traffic Information and subsequently saw the C17.

Airprox Barrier Assessment: 2022262		Outside Controlled Airspace						
Barrier	Provision	Application	Effectiveness Barrier Weighting					
			0%	5%	10%	15%	20%	
Ground Element	Regulations, Processes, Procedures and Compliance	✓	✓	[Green bar to 5%]				
	Manning & Equipment	⚠	⚠	[Yellow bar to 5%]				
	Situational Awareness of the Confliction & Action	✗	✗	[Red bar to 15%]				
	Electronic Warning System Operation and Compliance	✗	✓	[Red bar to 5%]				
Flight Element	Regulations, Processes, Procedures and Compliance	✓	⚠	[Yellow bar to 10%]				
	Tactical Planning and Execution	✓	✗	[Red bar to 10%]				
	Situational Awareness of the Conflicting Aircraft & Action	✓	⚠	[Yellow bar to 20%]				
	Electronic Warning System Operation and Compliance	⚠	✓	[Green bar to 15%]				
	See & Avoid	✓	✓	[Green bar to 20%]				
Key:								
	Full	Partial	None	Not Present/Not Assessable	Not Used			
Provision	✓	⚠	✗	●	○			
Application	✓	⚠	✗	●	○			
Effectiveness	■	■	■	■	□			

⁵ The UK Airprox Board scheme for assessing the Availability, Functionality and Effectiveness of safety barriers can be found on the [UKAB Website](#).