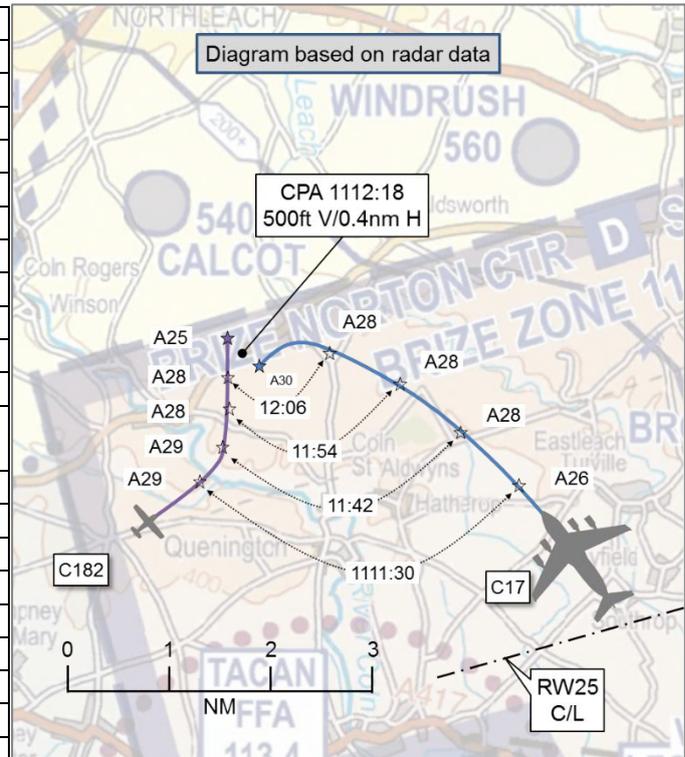


AIRPROX REPORT No 2018019

Date: 11 Feb 2018 Time: 1112Z Position: 5146N 00149W Location: 8nm W Brize Norton

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	C17	C182
Operator	HQ Air (Ops)	Civ Pte
Airspace	Brize CTR	Brize CTR
Class	D	D
Rules	IFR	VFR
Service	Radar Control	Radar Control
Provider	Brize Approach ¹	Brize Zone ¹
Altitude/FL	3000ft	2500ft
Transponder	A, C, S	A, C, S
Reported		
Colours	Grey	Blue, white
Lighting	Strobe, landing, nav, taxi	Strobes, beacon
Conditions	VMC	VMC
Visibility	40km	>10km
Altitude/FL	2800ft	2000ft
Altimeter	QNH (1005hPa)	NK
Heading	312°	'NW'
Speed	250kt	135kt
ACAS/TAS	TCAS II	Not fitted
Alert	RA	N/A
Separation		
Reported	0ft V/350m H	500ft V/500m H
Recorded	500ft V/0.4nm (~750m) H	



THE C17 PILOT reports departing from RW25 at RAF Brize Norton on a NAXAT SID, climbing FL080. Upon departure, prior to the 2.5DME right turn, ATC directed him to stop climb FL060. Very shortly after, ATC then directed him to stop climb at 3000ft due to traffic descending. He became visual with the traffic, a high-wing light-aircraft in a wings-level descent in the left 11 o'clock position at a range of 5-6nm, and decided to take evasive action. He deselected the autopilot and auto-throttle and performed an aggressive left-hand turn. The NHP informed ATC that they were taking avoiding action against the aircraft. At the same time, they received a TCAS TA. Very shortly after this, ATC directed him to stop climb at 2800ft, which coincided with a TCAS RA 'Climb, Climb' against the other traffic. At this point the C17 pilot was in a steep left-hand turn and he increased power and back pressure in order to initiate the climb. The stall warner and stick shaker activated so he slightly lowered the nose but remained within the TCAS required climb guidance. This event lasted for no more than 20secs and, upon completion, he turned the aircraft to regain the original course and descended to the assigned level of 2800ft. ATC were informed that he had had to take action following a TCAS RA.

He assessed the risk of collision as 'Medium'.

THE C182 PILOT reports in the cruise below cloud and 'working Brize'. He understood that he had been given a 'basic clearance' to cross the northwest corner of the Brize CTR and was aware from the controller of the imminent departure of C17 traffic from RW25. He saw the C17 on climb-out and, as it 'climbed through his heading', he carried out a descending left turn to minimise potential conflict. He noted that there was no intervention from ATC, and that the C17 was not on the same frequency.

He assessed the risk of collision as 'Low'.

¹ The Brize Approach and Zone frequencies were bandboxed, i.e. being operated by the same controller.

THE BRIZE APPROACH CONTROLLER reports that he was bandboxed with Zone and was the ATCO I/C at the time of the Airprox. He was providing a Basic Service to a transit aircraft on the VHF Zone frequency [the C182 pilot] which was 10-15nm west of Brize on an easterly heading at 4000ft. The Cessna pilot was not given a level or altitude to maintain because the projected track at the time was not deemed to be in conflict with the SID profile of the C17 and it was deemed that Traffic Information on the departing C17 would be sufficient for the Cessna pilot to maintain separation. The C17 departed on a NAXAT SID, cleared to FL080, and, after applying Radar Control and verifying the Mode C, the controller returned his attention to the C182, which had taken a north-easterly track and which the controller perceived would take it through the published NAXAT SID path. He instructed the C17 pilot to stop climb at 3000ft in order to provide separation between the aircraft and to retain controlled airspace protection. Traffic Information was passed to the C17 pilot on the C182 and, on returning his attention to the C182, the controller noticed it had started to descend (the Mode C was indicating 3700ft). He immediately asked the C182 pilot to what level he was descending, to which the pilot replied that he was descending to 3000ft. The controller informed the C182 pilot that he was not cleared to transit the Brize CTR (at no point had a clearance been given) and passed Traffic Information on the C17 to him, to which he reported 'visual' at about 4nm. The C182 pilot stated on frequency 'sorry I thought we had been cleared through'. The controller immediately stopped the C17 climb at 2800ft, having seen that it's Mode C was indicating 2700ft, and passed updated Traffic Information on the C182. The C17 pilot reported visual with the C182 and self-positioned off the NAXAT SID in order to pass behind the C182 whilst maintaining visual. The C182 pilot informed the controller that he was descending further and taking up a northerly heading. The C17 pilot stated that although he was visual with the conflicting traffic throughout, he had received a TCAS RA.

He perceived the severity of the incident as 'Negligible'.

Factual Background

The weather at Brize was recorded as follows:

METAR EGVN 111120Z NIL=

METAR EGVN 111050Z 27013KT 9999 BKN030 06/M03 Q1003 BLU NOSIG=

Analysis and Investigation

Military ATM

An Airprox occurred on 11 Feb 18 at approximately 1115hrs UTC, in the vicinity of RAF Brize Norton, between a C17 conducting an IFR departure from RAF Brize Norton and a C182 in transit. The C17 was receiving Radar Control (IFR) from the Brize Approach Controller and the C182 had been receiving Basic Service (BS) from the same controller, who was also operating as Brize Zone, though had descended into Controlled Airspace (CAS) under VFR. Figures 1 - 9 depict the C17 and C182 at relevant times in the lead up to and during the Airprox. Pictures are taken from NATS radar feed replays and therefore are not representative of the picture available to controllers in Brize ATC. Radar replays and transmission timings did not align and were therefore manually adjusted by 30 seconds to achieve the most accurate match.

At 11:10:35 (Figure 1), the Brize Controller instructed the C17 pilot to stop climb at 3000ft.



Figure 1: C182 (3701) and C17 (4775) at 11:10:35

At 11:10:44 (Figure 2), the C182 was inside the Brize CTR at an altitude of 3400ft. After the Brize controller queried his level, the C182 pilot stated that he was descending to 3000ft (Brize QNH 1003) to remain in sight of the ground. The Controller responded 'Roger', and asked the pilot to take up a north-easterly heading so that he could 'climb traffic through your six o'clock'. The C182 pilot responded that he was heading northeast.

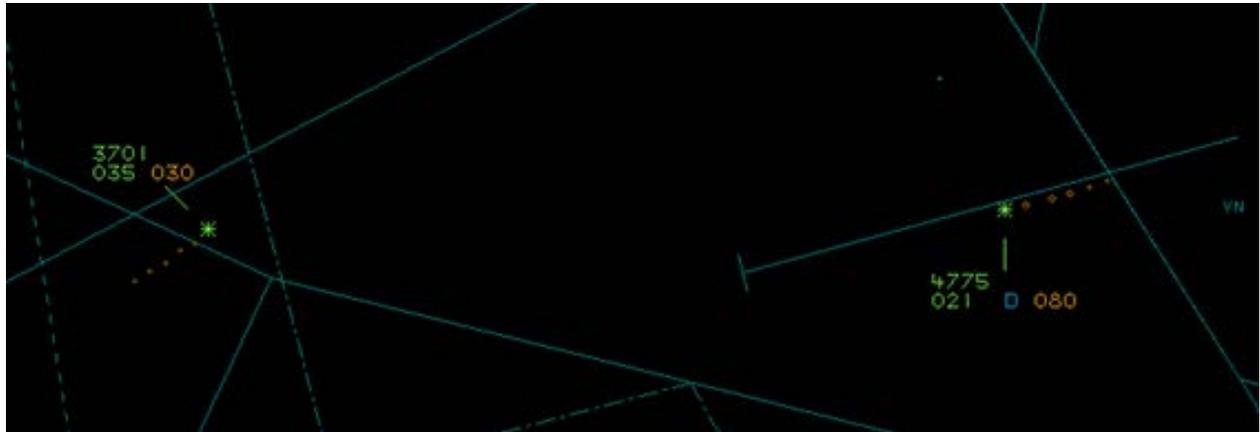


Figure 2: C182 (3701) at 11:10:44

At 11:11:02 (Figure 3), the Brize Controller instructed the C17 pilot to stop climb at 2800ft.

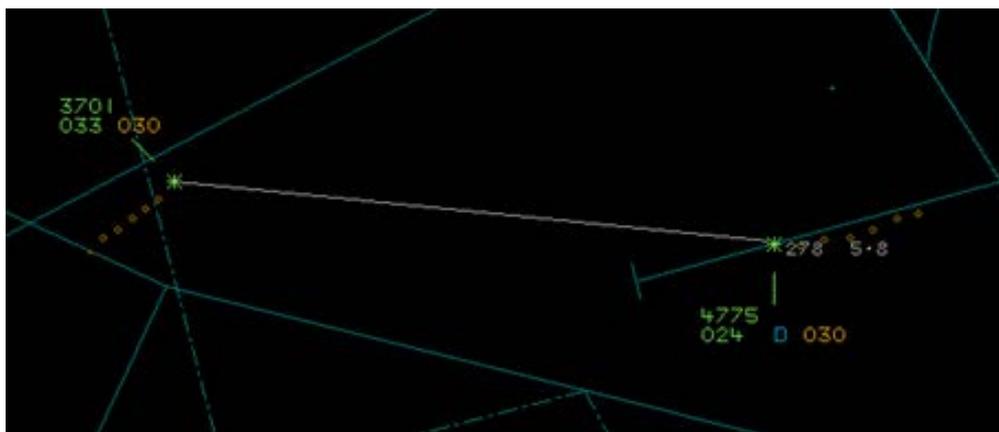


Figure 3: C182 (3701) and C17 (4775) at 11:11:02

At 11:11:09 (Figure 4), the Brize Controller passed Traffic Information to the C17 pilot on the C182 as 'west of you by 5nm, northeast bound, reported descending to altitude 3000ft'. The C17 pilot acknowledged the Traffic Information.



Figure 4: C182 (3701) and C17 (4775) at 11:11:09

At 11:11:18 (Figure 5), the Brize Controller asked the C182 pilot to remain outside controlled airspace, though the C182 had already entered the Brize CTR shortly before 11:10:44 (Figure 2). The C182 pilot stated that he thought he had been cleared to enter CAS, and that he was visual with the C17.

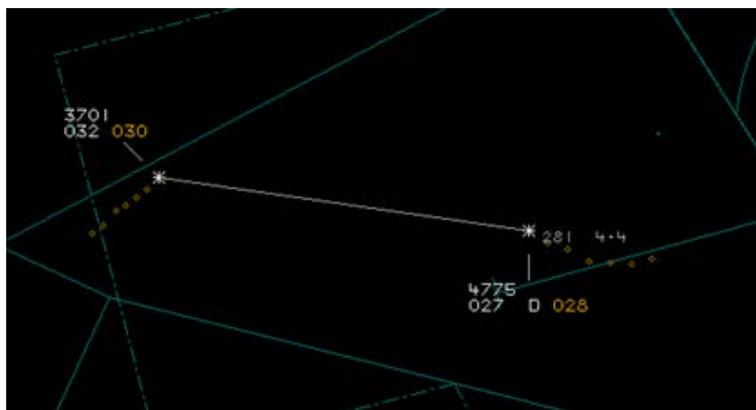


Figure 5: C182 (3701) and C17 (4775) at 11:11:18

At 11:11:34 (Figure 6), the Brize Controller passed updated Traffic Information to the C17 pilot, describing the C182's position as 'west of you by 2nm, northeast bound, visual with you, 200ft above'.



Figure 6: C182 (3701) and C17 (4775) at 11:11:34

At 11:12:05 (Figure 7), the C182 pilot informed the Brize Controller that he was descending to altitude 2000ft, visual with the C17 in his 3 o'clock.

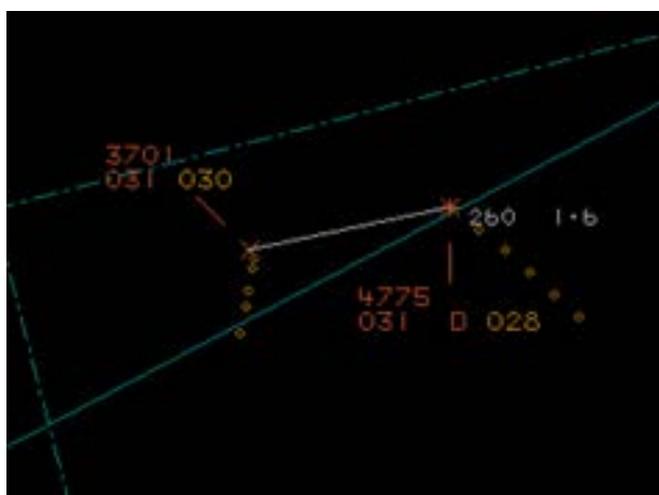


Figure 7: C182 (3701) and C17 (4775) at 11:12:05

At 11:12:10 (Figure 8), the Brize Controller informed the C17 pilot that the C182 was descending further and advised him to standby for further climb. He passed Traffic Information on further traffic 'north, 4nm, tracking south, indicating 400ft below'.

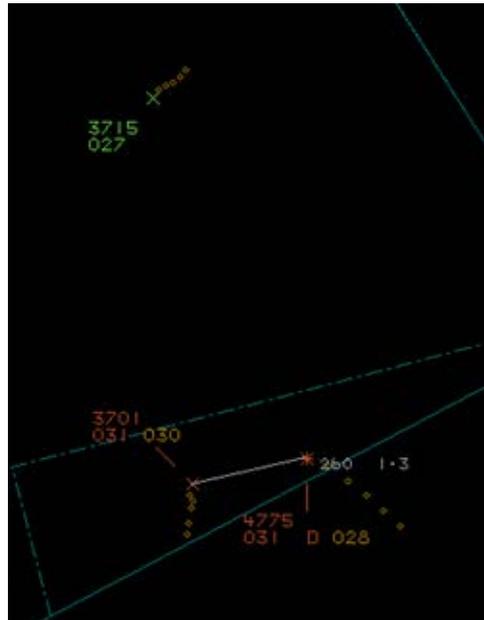


Figure 8: C182 (3701) and C17 (4775) at 11:12:10

At 11:12:23 (Figure 9), the C17 and C182 were at CPA, with approximately 0.4nm lateral and 500ft vertical separation. The C17 pilot advised the Brize Controller that he had received a TCAS RA and was maintaining visual with the C182.



Figure 9: C182 (3701) and C17 (4775) at 11:12:23

The Brize Controller was operating bandboxed as Approach and Zone, therefore providing ATS to departures, arrivals and to pilots crossing through the Brize CTR, which has a maximum altitude of 3500ft, Brize QNH. As it was outside of core hours, the team of three controllers was operating without a Supervisor, hence the Approach Controller was the ATCO I/C.

When the C182 pilot called on the Zone frequency for a Basic Service, he requested to transit 'through the north west tip of your Zone at this level'. The aircraft was at 4000ft and therefore above the CTR. The Controller informed the pilot that there was a C17 shortly departing from RW25, asked him to report visual with the traffic, and suggested an easterly heading if he was unable to remain in sight of the surface (therefore requiring descent). The C182 pilot responded that he was

'good VFR' and would look out for the traffic. The Controller did not explicitly give the C182 pilot a clearance to enter Controlled Airspace (CAS), expecting the pilot to maintain 4000ft. Not wanting to over control an aircraft receiving a Basic Service in Class G airspace, he turned his attention to two other transits on the Zone frequency.

The C17 pilot was conducting a NAXAT SID from RW25 at RAF Brize Norton, which requires a climb on runway track to 2.5d or 800ft QNH, whichever is later, then right turn onto track 312°, while climbing to FL80, therefore the Controller knew the aircraft's flight profile. Although the C17 pilot had stated that he would require Traffic Service on leaving the CTR, the C17 and C182 tracks appeared to be converging, therefore the Controller instructed the pilot to stop climb at 3000ft to remain inside the CTR, with the C182 believed to be remaining above.

When the C182 began to descend to 3000ft to remain in sight of the surface, this brought the aircraft inside CAS and removed the 1000ft separation that had been planned. The Controller asked the pilot to take up a north-easterly heading in order to route the C17 behind the C182; however, the aircraft was already heading northeast. The Controller instructed the C17 pilot to stop climb at 2800ft, based on seeing the Mode C indicating 2700ft. At this stage the two aircraft had more than 5nm lateral separation but the C17's turn onto 312° introduced greater convergence, with 200ft vertical separation.

The Controller passed Traffic Information on the C182 to the C17 pilot when the two aircraft had 5nm separation, and again when they had 2nm separation, after which the C17 pilot reported visual with the C182. The C182 pilot had reported visual with the C17 with 4nm separation, and reconfirmed that he was visual approximately one minute later, when he reported descending to 2000ft. At that time the tracks were still converging, with both aircraft Mode C indicating same altitude and lateral separation of approximately 1.5nm, but decreasing as both pilots maintained their current track. The Controller believed that, having passed Traffic Information and received confirmation that each pilot was visual with the other aircraft, that was sufficient for the C182 pilot to effect separation.

Although the Controller did not give the C182 pilot clearance to enter CAS, nor explicitly change the C182 pilot's Air Traffic Service to Radar Control, when the aircraft descended into Class D airspace, the pilot had stated that he was VFR, therefore he was responsible for separation from IFR traffic. That said, it is not good practice to route traffic through the climb out lane while another aircraft is conducting an IFR departure, and it is incumbent upon controllers to assess the developing scenario, use their professional judgement and take action to prevent collisions between known flights. The Controller attempted to separate the two aircraft by 1000ft and by airspace classification, but the C182's unexpected descent into CAS made that plan ineffective. The Controller tried to adapt by further restricting the C17's climb, but this served to aggravate the conflict as the C182 required further descent, which became the overriding requirement. With the C17 climbing out to join airways, a continued climb on runway track or other suitable vector to provide lateral separation until above the C182 would have been a more effective and expeditious solution.

Throughout the Airprox, both pilots were visual with the other aircraft, however the conflict was not broken until the C17 pilot turned left, off the SID profile, to route behind the C182, at the same time responding to a TCAS RA.

UKAB Secretariat

The C17 and C182 pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard². If the incident geometry is considered as converging then the C182 pilot was required to give way to the C17³.

² SERA.3205 Proximity.

³ SERA.3210 Right-of-way (c)(2) Converging.

Comments

C17 Squadron Flight Safety Officer

Crews are not currently trained to handle TCAS RA in the turn, nor is guidance contained within Sqn SOPs. We will engage with [another C17 squadron], and request that they investigate and present their findings to Trg Flt for inclusion in the Sqn SOP.

HQ Air Command

An IFR departure from Brize Norton and transition into London controlled airspace is one of the most demanding departures that C17 crews undertake. During this particularly busy phase of flight (changing aircraft configuration, navigating the SID, communicating with ATC and conducting checklist activity) the crew were aware of the presence of the C182 but also aware of the efforts of the controller to maintain separation. The controller passed timely and accurate Traffic Information to both aircraft but the Cessna pilot's requirement to descend to maintain VMC was not fully articulated to the controller. This, coupled with what appeared to be a misunderstanding on the part of the Cessna pilot that he was cleared into the Brize CTR, led to separation being eroded. The C17 pilot did not recall TCAS indications prior to the RA being issued, but confirmed that as soon as he was visual with the Cessna he deemed that avoiding action was necessary and so took appropriate action to increase separation. All of the available barriers to MAC (a surveillance-based ATS, electronic conspicuity and lookout) played a part in maintaining separation between the aircraft; both pilots' lookout was guided by Traffic Information and the TCAS issued an RA. It is notable that the Cessna pilot was visual with the C17 at around 2-3nm and appeared comfortable with the separation, though this did trigger an RA on the C17. The C17 pilot became visual with the Cessna at a range of approximately 2nm and immediately manoeuvred to increase separation, though clearly this took time to effect in a large heavy aircraft. This Airprox is a reminder to all crews that vigilance is essential during all phases of flight, and that the 'protection' offered by controlled airspace can be fragile.

Summary

An Airprox was reported when a C17 and a C182 flew into proximity at 1112 on Sunday 11th February 2018. Both pilots were operating in VMC, the C17 pilot under IFR in receipt of a Radar Control Service from Brize Approach and the C182 pilot under VFR in receipt of a Basic Service from Brize Zone, both from the same boxed controller.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from both pilots, transcripts of the relevant R/T frequencies, radar photographs/video recordings, a report from the air traffic controller involved and reports from the appropriate ATC and operating authorities.

The Board first discussed the chronology of the incident. The C182 pilot had contacted the Brize controller and informed him that he was level at 4000ft and requested 'permission to just go through the northwest tip of your zone at this level'. The C182 pilot did not seem to be aware that the Brize CTR only extends to an altitude of 3500ft and his request to 'go through the north west tip of your zone' was not refused because there was no reason for the controller to do so. However, members felt that this request laid the ground for the C182 pilot's belief that he had been cleared through the Brize CTR. The controller passed a squawk and agreed a Basic Service. The controller later informed the C182 pilot of the soon-to-depart C17 but it then became apparent to him that the C182 pilot was descending. On questioning him, the C182 pilot responded that he was 'going to level at three thousand feet'. He was now inside the Brize CTR and, although technically under a Radar Control Service, the controller responded with 'Roger can you take a north-easterly heading just so I can climb traffic through your six o'clock'. Members agreed that this R/T exchange provided tacit clearance to the C182 pilot to enter the CTR and probably cemented the impression in his mind that he had been cleared into the CTR,

whereas in fact he had not received permission to do so. Members agreed that his descent into the Brize CTR without clearance was contributory.

The controller had planned to allow the C17 to pass behind the C182, but it quickly became apparent that this would not work. With the separation reducing through 3nm, the controller belatedly told the C182 pilot to 'remain outside of controlled airspace please until cleared' to which the C182 pilot replied 'eh that's copied, I thought we had a clearance through but no we are good, good visual with that C17 and now we are coming left onto a heading north'. In his efforts to provide some degree of deconfliction, the controller had instructed the C17 pilot to level at 2800ft, coincident with the altitude of the C182 as displayed on area radar.

Shortly afterwards, the C17 pilot became visual with the C182 and decided to turn left to avoid it. Members surmised that it had been this turn that had taken his flight vector towards the C182, which in turn resulted in a TCAS RA. Members were not familiar with C17 performance characteristics, and were wary of providing a commentary on pilot actions when they themselves had not been in the situation; however, some members wondered whether it would have been preferable instead for the C17 pilot to have increased the climb rate at the point he became visual with the C182 rather than turn towards it. Notwithstanding this would take him through the late level-off clearance of 2800ft, it would probably have resulted in a more controlled avoiding action; that the C17 pilot then experience stick-shaker as he attempted to climb whilst in the turn was a source of concern to the whole Board. Some airline pilot members commented that this indicated a serious lack of training in the RAF C17 community, and the Board was heartened to note that the RAF was planning to include suitable guidance in C17 SOPs.

Members discussed how this situation had arisen and commented that such circumstances had been seen in previous Airprox where no-one involved had taken adequate action. In this case, the C182 pilot under VFR was obliged to remain clear of the C17 under IFR; the controller was obliged not to introduce a risk of collision by vectoring the C17 towards another aircraft; and the C17 pilot was required not to create a collision hazard with the C182 (which he had reported first sighting at 5-6nm as he commenced his SID right-turn) recognising that he could not be sure that a TCAS RA would be generated if the other aircraft was not transponding. ATC members commented that by introducing a level-off height, the Brize controller had taken the C17 off the planned SID and that this then constituted 'vectoring' of the aircraft. Much discussion then followed regarding the degree to which the various parties held a responsibility to prevent collision. After a prolonged debate, members agreed that, although all parties were responsible for avoiding collision or proximity, in this incident it was largely for the Brize controller, with the best SA available of them all, ultimately to take control of the situation. Members agreed that, by levelling the C17 at 3000ft (and subsequently 2800ft when the aircraft were separated by 5.2nm), the controller had applied a vector, in this case in the vertical, and had therefore unwittingly vectored the C17 into conflict with the C182; had he allowed the C17 to continue the SID climb it would likely have out-climbed the C182 well before they came into proximity. After further discussion, members therefore agreed that it had been the controller's vectoring that had been the cause of the Airprox. Turning to the risk, some members felt that the separation at CPA coupled with the dynamics of the C17's manoeuvre were such that safety had been much reduced. Others felt that because both pilots were visual with the other aircraft in good time it had been a case of effective, if not timely, avoiding action. The Chairman took a vote, whereby it was established that the majority felt that the latter was the case and that, although the subsequent stick-shaker event was a cause for concern, it was not for the Airprox Board to consider that aspect of risk within the incident.

PART C: ASSESSMENT OF CAUSE AND RISK

<u>Cause:</u>	The Brize controller vectored the C17 into conflict with the C182.
<u>Contributory Factor:</u>	The C182 pilot descended into the Brize CTR without clearance.
<u>Degree of Risk:</u>	C.

Safety Barrier Assessment⁴

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

ANSP:

Regulations, Processes, Procedures and Compliance were assessed as **ineffective** because the C17 was vectored into conflict in height.

Situational Awareness and Action were assessed as **partially effective** because the Brize controller did not ensure the safe, expeditious and efficient flow of traffic, namely the departure of the C17 and the transit of the C182.

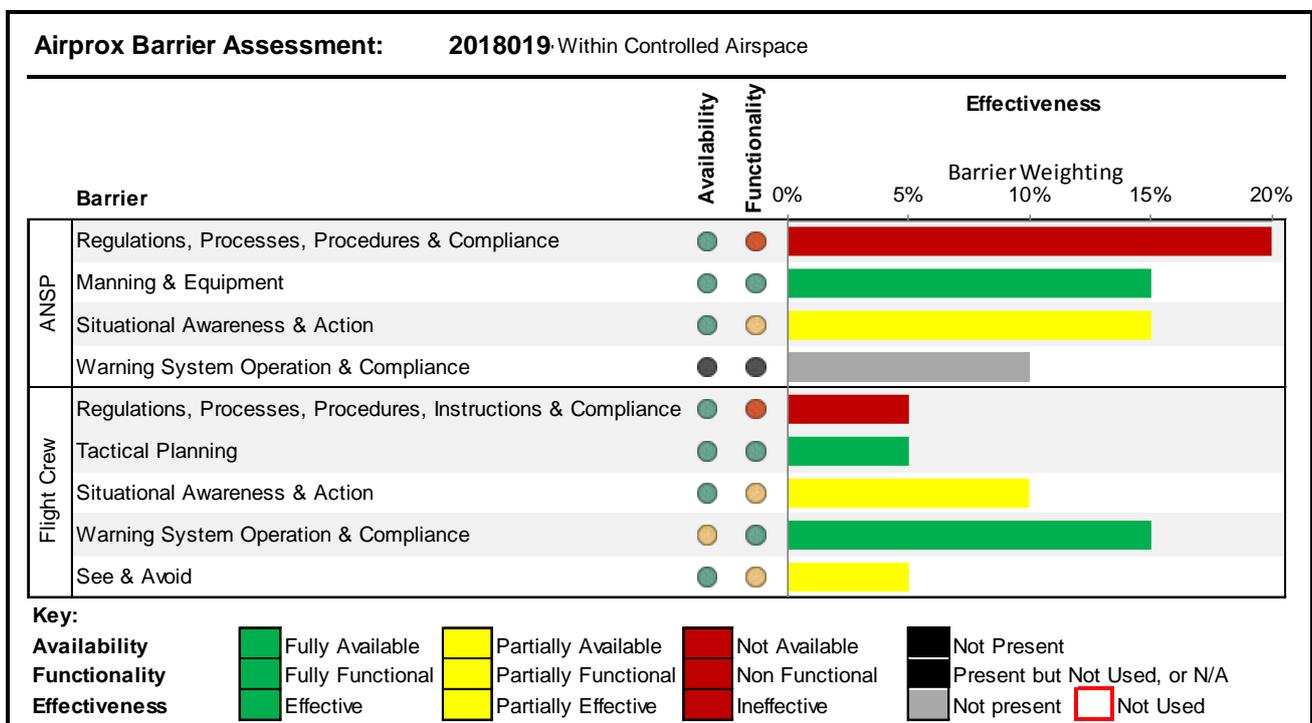
Flight Crew:

Regulations, Processes, Procedures, Instructions and Compliance were assessed as **ineffective** because the C182 pilot flew into the Brize CTR without clearance.

Situational Awareness and Action were assessed as **partially effective** because the VFR C182 pilot did not effectively manoeuvre to give way to the IFR C17.

Warning System Operation and Compliance were assessed as **effective** albeit with partial availability because the C182 was not fitted with a TAS.

See and Avoid were assessed as **partially effective** because although both pilots saw the other aircraft at range, neither manoeuvred in a timely manner.



⁴ The UK Airprox Board scheme for assessing the Availability, Functionality and Effectiveness of safety barriers can be found on the [UKAB Website](#).