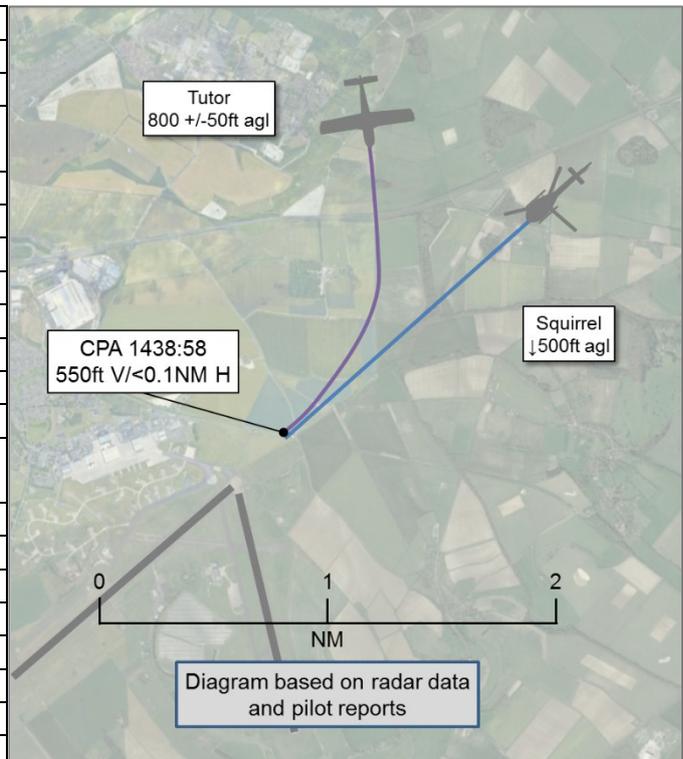


AIRPROX REPORT No 2019319

Date: 19 Nov 2019 Time: 1439Z Position: 5110N 00143W Location: Boscombe Down

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Squirrel	Tutor
Operator	Civ Comm	HQ Air (Trg)
Airspace	Boscombe Down ATZ	Boscombe Down ATZ
Class	G	G
Rules	'None'	VFR
Service	Traffic	ACS
Provider	Boscombe Down	Boscombe Down
Altitude/FL	680ft	1230ft
Transponder	A, C, S	A, C, S
Reported		
Colours		White
Lighting		Landing, Strobe, Navigation
Conditions	VMC	VMC
Visibility	30km	
Altitude/FL	120ft	800ft
Altimeter	QFE	QFE
Heading	231°	231°
Speed	100kt	80kt
ACAS/TAS	TCAS II	TAS
Alert	TA	TA
Separation		
Reported	200ft V/0m H	200ft V/400m H
Recorded	550ft V/<0.1NM H	



THE SQUIRREL PILOT reports that he was conducting an ILS approach to RW23 in VMC. He was the RHS pilot-in-command with a LHS safety pilot and his climb-out instructions were to climb on RW track to height 2000ft and contact Approach. During the approach, he was informed that a Tutor was going around at circuit height and both he and the LHS pilot sighted the aircraft downwind. He was cleared by ATC to conduct the low-approach to RW23 and he later glanced briefly to his right to observe the Tutor turning towards him but tracking behind his flightpath. At decision height, he levelled the aircraft but elected not to initiate a climb, as per his instructions, until the position of the Tutor was known to him. The aircraft was seen immediately above, maintaining station at an estimated height difference of between 100ft and 200ft. The vertical distance was suitably uncomfortable for him to descend to 100ft over the runway and contact Tower, whereupon his inability to conduct the low-approach was articulated and an Airprox declared. The Tutor subsequently began to turn downwind and he continued with the low-approach climb-out. Had he initiated a climb as per the standard ATC instructions, he is certain that the probability of mid-air collision would have been genuinely very high. Had he been very slightly ahead of the Tutor he would not have been in a position to have seen him at all. A climb would have equally resulted in a substantial risk of collision.

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

THE TUTOR PILOT reports that, while conducting a low-level circuit consolidation syllabus sortie, he turned downwind for a touch-and-go on RW23 at 800ft as per the standard light-aircraft circuit. While conducting the downwind checks, radar traffic was called at 4 miles. Consequently, he elected to notify ATC of his change of intentions to go-around at circuit height, maintaining level at 800ft to deconflict with the radar traffic. Looking-out for the traffic, it was not sighted, although he monitored the TAS contact and the vertical separation was not seen to go below 200ft at any time. At late downwind (approximately parallel with the RW23 threshold), he called non-visual with the radar traffic and began

his level 800ft upwind turn onto RW track because there was no dead-side available to position into. He re-iterated to ATC that he was still not visual with the radar traffic while in the upwind turn; he was informed that it was below and to his left. Approximately 1/3 of the way along the RW on his upwind leg, the radar traffic came onto frequency and announced his intentions to file an Airprox.

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

THE TUTOR PILOT'S SUPERVISOR reports that he flew the previous syllabus sortie with the Tutor captain involved in this incident and was observing his solo from the ATC tower. MOD Boscombe Down is surrounded by ranges to the north and these ranges particularly affect RW23 and prevent Tutor aircraft extending downwind, while maintaining the standard downwind spacing. For this reason, students are briefed not to extend downwind so as not to enter the range. Whilst an instructor might consider an orbit, such activity is not recommended for students, particularly since another Tutor in the circuit could make this a hazardous option. Helicopters operate south of the main runway with no RT; for this reason there is no dead-side at Boscombe Down. 'The Channel', a small gap between the main runway and the helicopter operations south-side, does exist to allow faster aircraft to overtake slower aircraft, but not for slow aircraft to use in a go-around. At the time of the incident, the Tutor captain had been made aware of approaching instrument traffic in response to his downwind call and he had made the decision to go-around at circuit height. Part of the EFT syllabus includes a 'Safe Circuits' mass brief. This brief was given on 4th November 2019 and emphasized the dangers of turning finals towards instrument traffic when not visual. The student pilot made, he believes, a sensible decision to go-around at circuit height rather than continue towards the instrument traffic. He was not visual with the instrument traffic when initiating the go-around; however, the conditions were hazy and extending downwind to visually acquire the instrument traffic is not recommended at Boscombe Down due to the reasons listed above. He viewed the go-around from the ATC tower and it appeared that the Tutor pilot maintained approximately 800ft. His view from the tower meant it was not possible to judge lateral distance from the runway; however, vertical separation was judged to be approximately 500ft. He understands that the decision to submit an Airprox is purely subjective, however, from his view from the Tower, at no point did he consider there was a risk of collision with the flightpaths involved. In this incident, a Tutor pilot with low experience (20 hours) conducted a pre-emptive go-around to remain clear of instrument traffic. Notwithstanding that the Tutor pilot was not visual, the supervisor feels that his actions were consistent with his training so far; he maintained a predictable flightpath and informed ATC that he was not visual. Both he and the Tower controller were surprised by the call of Airprox from the instrument traffic due to the vertical separation as viewed from their position.

THE BOSCOMBE DOWN TALKDOWN CONTROLLER reports that the talkdown for the Squirrel was conducted as any other talkdown – it was standard throughout. After the 4-mile clearance, the phrase "*Tutor going-around circuit height*" was relayed to the pilot and Tower controller simultaneously. Then, shortly after passing his decision height, the pilot transmitted "*talkdown, to Tower now please*". The controller told [Squirrel C/S] to "standby" and then transmitted to Tower that [Squirrel C/S] had now changed intentions and would call Tower. The controller wasn't given any reason by the pilot as to why, but because it was at the critical stage of flight, the controller did not question the Squirrel pilot's decision and simply instructed him to "*continue with Boscombe Tower.....*".

The controller perceived the severity of the incident as 'Low'.

THE BOSCOMBE DOWN TOWER CONTROLLER reports that there was a Tutor in the circuit and a Squirrel inbound on radar to conduct a low-approach and then further approaches. At 4 miles, clearance was given for [Squirrel C/S] to '*low approach, one in north-side*'. A transmission was made '*Squirrel, 4 miles, Low Approach, Further*'; the [Tutor C/S] pilot reported he was going-around at circuit height and Talkdown was informed via the Radar Clearance Line of '*Tutor going-around, circuit height*'. The Tutor pilot was north-east of the threshold and reported 'not visual' with the RW, so the Tutor pilot was passed Traffic Information on the Squirrel which was just over the threshold. The Squirrel pilot called on the Ground frequency and so he dual-transmitted the location of the Tutor. The Squirrel pilot reported that the Tutor was above him and so the controller instructed the Tutor pilot to break downwind early. The Squirrel pilot called up on the Tower frequency and reported that he would be filing an Airprox.

The controller perceived the severity of the incident as 'Low'.

THE BOSCOMBE DOWN SUPERVISOR reports that he has nothing further to add. The Talkdown controller's action were completed in the same way as every other talkdown that includes essential calls. These were issued in a timely manner and via the radar clearance line. The ADC actions were appropriate for the conditions presented.

Factual Background

The weather at Boscombe Down was recorded as follows:

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METAR EGDM 191421Z 14007KT 9999 FEW025 BKN220 08/06 Q1014 NOSIG RMK BLU BLU=
METAR EGDM 191450Z 13007KT 9999 FEW015 BKN220 08/06 Q1014 NOSIG RMK BLU BLU=
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Analysis and Investigation

Military ATM

The Squirrel pilot was conducting an ILS approach to RW23 at Boscombe Down in VMC and was in receipt of a Traffic Service from Boscombe Talkdown. The Tutor was a solo Elementary Flying Training student conducting circuit flying in VFR conditions and receiving an Aerodrome Control Service from Boscombe Tower.

The Tutor pilot reported that, while downwind, they were informed of instrument traffic (the Squirrel) at 4NM ahead of them and, as extending downwind or orbiting is prohibited for students at Boscombe Down due to local airspace constraints, there was no option for the Tutor pilot except to conduct a go-around at circuit height (800ft). The Tutor pilot reported not being visual with the Squirrel throughout the incident but was monitoring the aircraft on TAS. This fact was reported to the Tower controller, who issued Traffic Information to the Tutor on the position of the Squirrel. Concurrent with this, a call was received from the Squirrel pilot (on the Ground frequency) reporting the Tutor as directly above them and the Tower controller instructed the Tutor to turn downwind early in an attempt to alleviate the situation.

The Boscombe Talkdown controller issued a clearance to the Squirrel pilot at 4 miles and included the details that there was one aircraft north-side (the Tutor); this was acknowledged by the Squirrel pilot. One minute later, the Talkdown controller informed the Squirrel pilot that there was a Tutor going-around at circuit height. Shortly after Decision Height, the Squirrel pilot changed frequency (to Boscombe Ground rather than Tower) to ascertain the intentions of the Tutor pilot and to declare an Airprox.

Both controllers involved passed information to their respective aircraft on each other and all RT and landline calls were standard. The Talkdown controller carried out all appropriate actions and would likely not have been concerned by the flightpath of the Tutor, given that it was operating in the visual circuit and therefore should have been visual with the Squirrel. The Tower controller informed the Tutor pilot that the Squirrel was ahead on radar and, when it became apparent that the Tutor pilot was not visual, passed relevant Traffic Information and issued an instruction for the Tutor pilot to turn downwind early and, therefore, also acted appropriately.

UKAB Secretariat

The incident occurs below the coverage of NATS radars. However, a recording of the Precision Approach Radar (PAR) was provided from which it is possible to determine at least one plane of separation. The Tutor first appears on the elevation radar at a range of approximately 1.2NM from touchdown and at a height of 800ft; the Squirrel is, at this point, at 500ft and following the glideslope. The radar recording of the elevation radar shows that the Tutor pilot did not descend below 750ft agl up until the point at which elevation contact is lost (see Figure 1); the Squirrel pilot has continued to descend to a height of 280ft. Additionally, at the time radar contact is lost on the Tutor on the azimuth radar, the aircraft are separated by 400ft laterally, albeit the Tutor's track is converging with

that of the Squirrel. Thus, it is possible to resolve a CPA of 550ft V/ <0.1 NM H at the point at which the Tutor fades from the PAR. The radar trace from the PAR has been used to deduce the ground track of both aircraft as depicted in the diagram at the top of page 1 of this report.

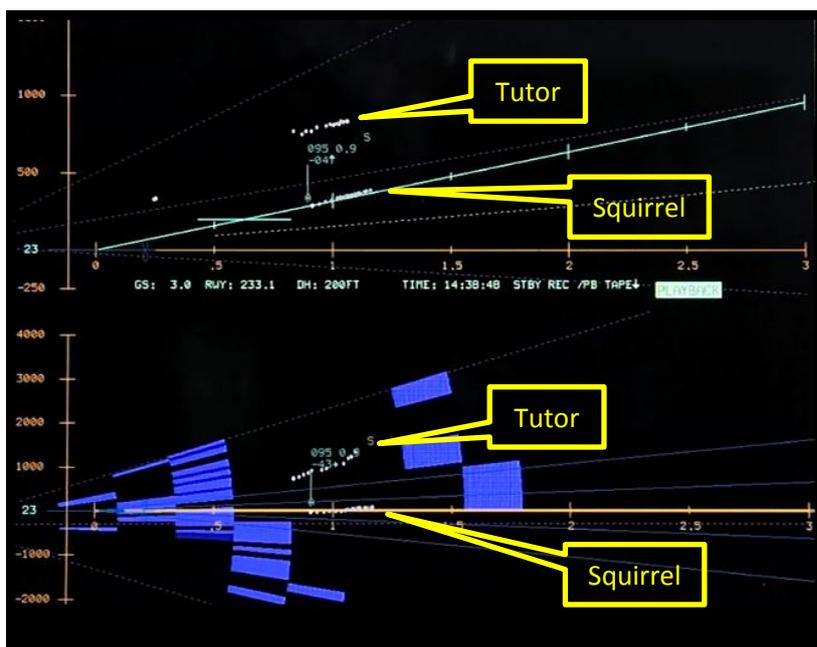


Figure 1

The Squirrel and Tutor 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

Occurrence Investigation

QinetiQ/MOD Boscombe Down

The Squirrel pilot was conducting an instrument approach to RW23 as part of routine continuation training (CT). Weather conditions on the day were good, no cloud below 2,000ft, visibility 10km in the clear, temperature 8°C. An Elementary Flying Training (EFT) Student flying [the Tutor] was also in the circuit, conducting a variety of differently configured touch-and-go landings as part of a circuit consolidation exercise. The EFT Student was flying solo at the time, after having completed a 45min flight with an instructor who disembarked and relocated to the Tower to monitor the remainder of the exercise flight.

The images taken from the media playback of the PAR broadly align to the narrative of the reported events from all crews involved. The PAR replay provides further details on the actual recorded separation distances as opposed to the perceived distances reported by the crews. All heights are stated as QFE.

Figure 2 below shows the vertical (upper image) and horizontal (lower image) approach to RW23. The Squirrel (identified in red) can be seen on its instrument approach tracking the vertical and horizontal glide paths, at 400ft and 1NM. The Tutor (identified in yellow) is at circuit height turning onto the horizontal track for RW23.

¹ SERA.3205 Proximity. MAA RA 2307 paragraphs 1 and 2.

² SERA.3225 Operation on and in the Vicinity of an Aerodrome. MAA RA 2307 paragraph 15.

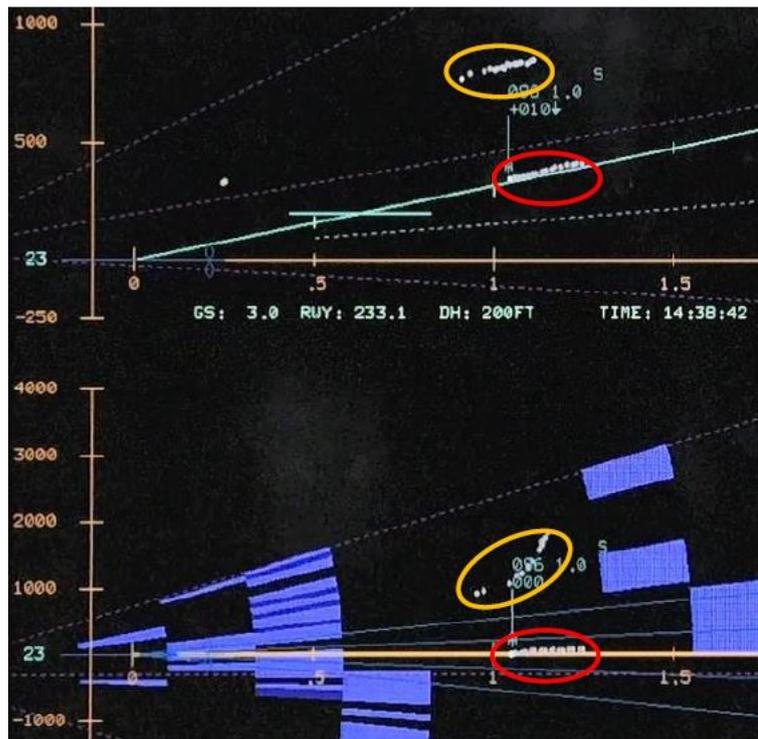


Figure 2

In Figure 3, the Squirrel can be seen initiating its climb-out from the instrument approach, the lateral separation with the Tutor reducing to 400ft as the paths begin to coincide, vertical separation of over 500ft taken from the last displayed recorded altitude of the Tutor. The Squirrel pilot reported to the Tower that he was not visual at this stage.

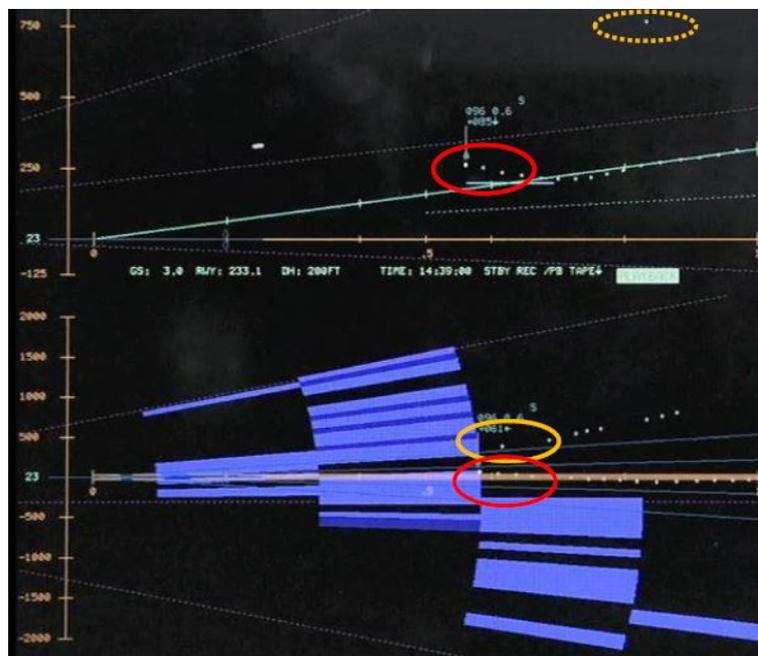


Figure 3

In Figure 4, the Squirrel can be seen to descend from its initial climb-out to increase vertical separation, as reported by the pilot. Post this action, recorded vertical separation increased to approximately 500ft as lateral separation tended towards 0ft.

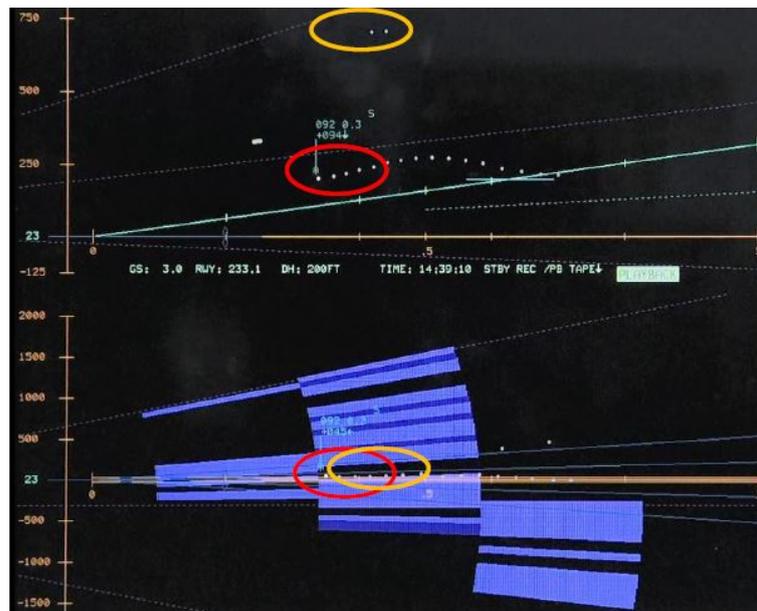


Figure 4

At no point during these stages of the event had the Tutor pilot been visual with the Squirrel; during interview with the Tutor pilot the non-visual status was reiterated during the recall of events. The Tutor pilot discussed the decision to declare a 'go-around at circuit height', stating they identified it as the only method they had to aid in the deconfliction with the radar traffic. The Tutor pilot discussed alternative options that might have been better alternatives, such as an orbit or extended downwind leg, however, as a student, these options are not permitted to be undertaken. During the EFT training programme, the students are specifically taught not to conduct these alternative options during the module 'Safe Circuits', which was shown during interview with the Chief Flying Instructor. A copy of the material was requested from the Chief Flying Instructor – the module provided differed to that shown during interview. The Chief Flying Instructor later confirmed that these were from two different sources, one version from 3FTS (shown during the interview) and one from 6FTS (later provided). The student involved in the Airprox is technically part of 3FTS, but is flying with SUAS who come under 6FTS. The Chief Flying Instructor had never given the 3FTS version before, as they teach their students with the 6FTS documentation. It is understood that the Chief Flying Instructor started to give the 3FTS version, but changed to the 6FTS version during delivery as they believed the case studies were better suited to Boscombe Down and gave more relevant examples.

As the Tutor pilot turned upwind at circuit height, they stated they were not aware of the intentions of the Squirrel and, as such, tried to remain predictable by staying at circuit height (800ft) and following the RW as per the declared go-around. The Squirrel pilot had been cleared for a low-approach; had the crew continued to climb-out from this approach as shown in Figure 3, mid-air collision would have almost certainly occurred.

With the information available to them, all crews took what they believed to be the most appropriate action at the time in order to increase safety and avoid conflict; these actions followed current procedures.

Whilst the airspace at Boscombe Down is Class G, it is also a Military Air Traffic Zone (MATZ) and an Aerodrome Traffic Zone (ATZ); as such permissions from ATC must be sought to enable the flight to be conducted safely within the ATZ, and any instructions given to flight crews are to be followed. During the event, all controllers involved followed current ATC procedure; it is permissible in current procedure that additional instruction and control of the situation could have been provided in both events; however, the decision to provide this instruction is based on the experience of the individual controller.

The Flying Order Book Section A6-1.C details 'The Channel' and states "...This airspace should always be clear of aircraft; it can therefore be used by any aircraft in an emergency requiring a 'low-approach' or 'go-around' with a slower aircraft ahead...". In this event, the relative speeds of the different platforms were not significantly different enough to improve the outcomes had 'The Channel' been used by either party. There was no instruction to use 'The Channel' issued by ATC to any of the crews; the decision to use 'The Channel' was left to the individual crews, which could potentially lead to a situation where the pilots of both aircraft make the decision to move into 'The Channel', further increasing the risk of MAC. As a concept, 'The Channel' has real benefit when deconflicting fast-jet platforms from other traffic in the circuit, given the airspeed differentials involved. However, for anything other than fast-jet platforms, the aircraft are likely to be in a situation where vertical and lateral separation are within 500ft with the aircraft flying parallel to each other down the RW at subtly different airspeeds.

The procedures and practices in current operation allow for visual and practise instrument traffic to come together in close proximity with no external control applied to maintain safety levels during critical stages of their approaches.

Comments

HQ Air Command

The Tutor pilot complied with the requirements of the relevant orders and, as the situation developed, had no option but to continue at circuit height and communicate their intentions over RT while looking out for the other aircraft. The Squirrel pilot chose a sensible option in levelling his aircraft rather than fly the low approach and continue into conflict with the Tutor. ATC did a good job in informing each aircraft of the other, aiding in their situational awareness. This Airprox serves to highlight the circumstances that can develop at an airfield where a VFR circuit pattern is combined with an instrument approach pattern, with no dead-side and when neither pattern has priority over the other in these specific circumstances.

The QinetiQ-led investigation into this Airprox made six recommendations, for QCFO, the Aerodrome Operator, Aerodrome Individual Operator Units and the Tutor Operating Organisation, to reduce the likelihood of a similar occurrence in the future. The establishment of a Boscombe Down User Community, as recommended, should increase collective awareness of the complexities and constraints of each individual unit operating at Boscombe Down. A recommendation to review the procedures surrounding practise instrument approaches within the visual circuit at Boscombe Down is welcomed.

Summary

An Airprox was reported when a Squirrel and a Tutor flew into proximity in the Boscombe Down circuit at 1439hrs on Tuesday 19th November 2019. Both pilots were operating under VFR in VMC, the Squirrel pilot in receipt of a Traffic Service from Boscombe Down Talkdown and the Tutor pilot in receipt of an Aerodrome Control Service from Boscombe Down Tower.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from the pilots of both aircraft, transcripts of the relevant RT frequencies, radar photographs/video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and 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.

Due to the exceptional circumstances presented by the coronavirus pandemic, this incident was assessed as part of a 'virtual' UK Airprox Board meeting where members provided a combination of written contributions and dial-in/VTC comments. Although not all Board members were present for the entirety of the meeting and, as a result, the usual wide-ranging discussions involving all Board members

were more limited, sufficient engagement was achieved to enable a formal assessment to be agreed along with the following associated comments.

The Board first considered the actions of both pilots and members agreed that, although the IFR approach had had priority for use of the runway, it had been for the Squirrel pilot to integrate with the Tutor already established in the visual circuit. The Board discussed the particular constraints at Boscombe Down with respect to airspace and parallel runway operations with no dead-side, and concluded that the local procedures for the integration of instrument approaches with visual circuit traffic were lacking in some respects and had therefore contributed to the Airprox (**CF1**). Notwithstanding the fact that both pilots had been acting in accordance with extant procedures, members felt that, given the constraints on the Tutor pilot (his only option had been to go-around at circuit height), the Squirrel pilot's decision to continue with his approach on sighting the Tutor downwind had placed his aircraft in a situation where he had essentially become trapped beneath the Tutor (**CF2**), had become concerned by its position relative to his flightpath (**CF4**) and, therefore, limited his options for resolution of the conflict. For his part, members considered that the Tutor pilot had acted in accordance with his training when, having received Traffic Information and a TAS warning of the presence of the Squirrel (**CF3**) and having been unable to acquire the aircraft visually (**CF5**), he had gone-around at circuit height.

Turning to the actions of the controllers involved, the Board heard from a military member that the integration of practise IFR approaches and visual circuit traffic is commonplace at military airfields. However, Boscombe Down has its own particular constraints which mean that deconfliction options that are used at other military airfields are not available at Boscombe Down – in particular, there being no dead-side. The Board was heartened to hear that, as a result of this Airprox and another incident on the same day (Airprox 2019318), the integration procedures at Boscombe Down were being reviewed. Members agreed that the controllers involved had acted in accordance with extant procedures and that there was little more that either of them could have done to prevent the Airprox occurring.

When considering the risk of this event, the Board took into account the fact that the Squirrel pilot had been visual with the Tutor downwind but that the Tutor pilot was not visual with the Squirrel. However, members agreed that both pilots were aware of the relative position of the other aircraft and that this had effectively removed any risk of collision. However, members felt that the constraints of the visual circuit pattern left pilots in that pattern without the options of extending downwind/upwind or, in the case of student pilots, conducting an orbit downwind, which degraded the safe integration of IFR and VFR traffic. Consequently, the Board assigned a Risk Category C to this event.

PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK

Contributory Factors:

	2019319		
CF	Factor	Description	Amplification
	Flight Elements		
	• Regulations, Processes, Procedures and Compliance		
1	Organisational	• Flight Operations Documentation and Publications	Inadequate regulations or procedures
	• Tactical Planning and Execution		
2	Human Factors	• Insufficient Decision/Plan	Inadequate plan adaption
	• Electronic Warning System Operation and Compliance		
3	Contextual	• ACAS/TCAS TA	TCAS TA / CWS indication
	• See and Avoid		
4	Human Factors	• Monitoring of Other Aircraft	Non-sighting or effectively a non-sighting by one or both pilots
5	Human Factors	• Perception of Visual Information	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:

Flight Elements:

Regulations, Processes, Procedures and Compliance were assessed as **partially effective** because the local procedures at Boscombe Down do not fully account for the integration of practise instrument approaches with visual circuit traffic.

Tactical Planning and Execution was assessed as **partially effective** because the Squirrel pilot, having been informed of the Tutor’s presence by ATC and after becoming visual with the Tutor, continued his approach to the point where he underflew the Tutor.

Airprox Barrier Assessment: 2019319		Outside Controlled Airspace		Effectiveness				
Barrier		Provision	Application	Barrier Weighting				
				0%	5%	10%	15%	20%
Ground Element	Regulations, Processes, Procedures and Compliance	✓	✓					
	Manning & Equipment	✓	✓					
	Situational Awareness of the Confliction & Action	✓	✓					
	Electronic Warning System Operation and Compliance	○	○					
Flight Element	Regulations, Processes, Procedures and Compliance	⚠	✓					
	Tactical Planning and Execution	✓	⚠					
	Situational Awareness of the Conflicting Aircraft & Action	✓	✓					
	Electronic Warning System Operation and Compliance	✓	✓					
	See & Avoid	✓	✓					
Key:		Full	Partial	None	Not Present/Not Assessable	Not Used		
Provision	✓	⚠	✗	○				
Application	✓	⚠	✗	○	○			
Effectiveness	■	■	■	■	□			

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