AIRPROX REPORT No 2023027

Date: 02 Mar 2023 Time: 1510Z Position: 5110N 00145W Location: Boscombe Down

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Tutor	PA31
Operator	HQ Air (Trg)	Civ Comm
Airspace	Boscombe ATZ	Boscombe ATZ
Class	G	G
Rules	VFR	VFR
Service	ACS	ACS
Provider	Boscombe Tower	Boscombe Tower
Altitude/FL	NK	NK
Transponder	A, C, S	A, C, S
Reported		
Colours	White	White/Blue
Lighting	NK	On
Conditions	VMC	VMC
Visibility	>10km	>10km
Altitude/FL	800ft	1000ft
Altimeter	QFE	QFE
Heading	180°	340°
Speed	80kt	120kt
ACAS/TAS	TAS	TAS
Alert	None	TA
Separation at CPA		
Reported	0ft V/ 200m H	200ft V/ 300m H
Recorded	NK	

THE TUTOR PILOT reports that, despite having 3 hours of endurance fuel available and flying in CAVOK conditions, Boscombe Down Approach ordered the 4 airborne Tutors on their frequency to recover to base due to the electrical power problems they were encountering. The aircraft were asked to stagger their recoveries and they [the Tutor pilot] were the third to enter the 'north lane'. On contacting Boscombe Tower they were given the information that there were 2 aircraft in the northern circuit (800ft light-aircraft circuit) and these were the 2 Tutors that had just recovered ahead of them. As they approached Stonehenge they requested an update on the position of the traffic in the northern circuit and were told that one Tutor had just landed on the north runway and the other Tutor was downwind. They therefore elected to do a standard join to RW05 north of Amesbury to the warehouses on Solstice Park "Bulford" and then a right turn onto downwind and gain visual contact with the Tutor downwind. Satisfied that they had sufficient spacing behind the Tutor ahead, they started the right-hand turn and called "Bulford" on the radio. At that point, they were surprised and alarmed to see another aircraft in front of them climbing through their height. They immediately requested an update on the circuit traffic in the northern circuit and were again told about the Tutor that had landed and the one ahead, now turning final. They then asked ATC to clarify what the twin-engine aircraft that had crossed ahead of them and climbed through their level was doing and were told it was a [Boscombe] callsign departing the airfield. The radios were busy but they had not heard this callsign call for take-off whilst they were on the frequency. They had also wrongly presumed that because all of the Tutors had been ordered to return to base that departures would not be authorised but, notwithstanding that, departing aircraft should not have been climbing through 800ft and conflicting with traffic downwind in the circuit pattern. The pilot opined that had they turned downwind slightly earlier they believed they may have been unsighted on this aircraft and there would have been a very real danger of collision, both aircraft being belly-up to each other at 800ft in the same piece of sky, and that there is also a possibility that this aircraft passed through the avoid set-up around the shooting range at Beacon Hill which should not be overflown below 1000ft. They landed without further incident and, from speaking to ATC after landing,

it appears the callsign of the twin engine aircraft was actually [not Boscombe] and it was a PA31 departing for [destination] having been refuelled at Boscombe Down earlier in the day.

The pilot perceived the severity of the incident as 'Medium'.

THE PA31 PILOT reports that the clearance was to depart left turnout downwind RW05, VFR west 4000ft. They reported ready for immediate departure, however, with a light-aircraft at 7NM, they were told to hold. A 20min delay at the hold then ensued as multiple aircraft commenced recovery to the airfield to a variety of runways, with multiple helicopters in the hover. ATC seemed to be working hard, and them [the PA31 pilot] being on VHF may have caused an increase in their [ATC] workload. "Mass Recovery" and "Power Failure" were mentioned. On the ground, distorted VHF from some aircraft and unfamiliar reporting points/joining procedures degraded their situational awareness (SA). Shortly before departure, the clearance was amended to 2000ft and the autopilot altitude warner was set. Take-off clearance was eventually given with no conflicting Traffic Information passed. The aircraft was hand-flown due to the proximity of danger areas and the approach lane. As they turned left downwind, TAS displayed 2 contacts at a similar level and relatively close range, probably <2NM, to the north and west respectively. At this point, with degraded SA, they assessed they were higher and visual with the northern traffic, and could climb clear of the western traffic. The pilot opined that they did feel that they should have done a better job of building their SA on the ground, despite the difficulties in comms, unfamiliar light-aircraft joins from the north, and lack of warning from ATC. They were not expecting joining aircraft to be approaching the circuit from the north as they turned downwind to follow their clearance.

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

THE BOSCOMBE TOWER CONTROLLER reports that it was a relatively busy period in CAVOK conditions. They gave 'take off' to a visiting PA31 who was cleared VFR left downwind, and at the time they had a rotary [aircraft] southside and two Tutors in the northern circuit, both inbound to land. The Tutor [pilot], who was number 2 in the circuit, requested an update on the traffic whilst turning downwind. This was after the PA31 was airborne and manoeuvring for their downwind departure. They stated that there was another Tutor in their circuit ahead who was to land, not mentioning the PA31 as it was a departure and would have been 400ft above their level once downwind. The Tutor pilot then asked about the PA31 and [ATC] explained how it was departing and also its type. Both UHF and VHF frequencies were in operation and they were also cross-coupled so pilots could hear each other on each frequency.

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

THE BOSCOMBE SUPERVISOR reports during this event the only thing to add was that the Tutors were recovered in a staggered manner as directed by the RA controller. Having listened to the tapes the Tutor pilot reported on frequency and received its join clearance before the [PA31] had departed and the frequencies were all cross coupled therefore all the information should have been heard on the radio. The Supervisor questioned, does cross coupling work? If not, then going forwards they should have two VHF frequencies and all aircraft should utilise VHF (Ground & Tower) with [pre-set frequencies] being backups should VHF radios fail.

Factual Background

The weather at Boscombe Down was recorded as follows:

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METAR EGDM 021620Z 04011KT CAVOK 08/M00 Q1024 NOSIG RMK BLU BLU=
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Analysis and Investigation

Military ATM has provided the following sequence of events utilising occurrence reports and information from the local investigation:

As a result of a Station mains power failure, the 4 Boscombe Down Tutors operating in the local area were instructed to recover. At the point that the PA31 pilot reported ready for departure, the Boscombe Down Tower controller was providing an Aerodrome Service to a Merlin operating southside, 2 Tutors established within the northern circuit (800ft), both to land, and a third Tutor on recovery.

1506:18, the PA31 [pilot] reported *"Ready for immediate departure"* and was instructed to line up and wait.

1506:52, the Airprox Tutor [pilot] requested to join via north lane.[4] The Boscombe Down Tower controller approved the north lane join, informing the Tutor [pilot] of the two Tutors within the northern circuit and Merlin operating southside: *"join northside details correct er.. one in er.. correction two in northside one southside".*

Following a request by the Tutor [pilot], visual circuit information for the northern circuit was updated at 15:08:22: *"er just got one Tutor ahead er starting his downwind leg".*

1508:30, the Boscombe Down Aerodrome controller cleared the PA31 for take-off.

1510:02, the Tutor pilot reported looking for traffic, but the transmission was not completed. The Boscombe Down Tower controller responded with an update regarding the northern circuit traffic *"currently err just er one Tutor in your northern circuit he's one ahead wind zero three zero….one zero".*

1510:22, the Tutor pilot clarified their traffic update request regarding the PA31: *"there's a twin aircraft er above and ahead of us now just an update on that traffic".* The Boscombe Down Tower controller responded, confirming the traffic as a PA31 departing.

CPA was unmeasured as, whilst both aircraft display on the NATS radar individually, the Tutor disappeared from radar at 1507:55 while the PA31 did not display until 1511:35. CPA was reported by the Tutor pilot as 0ft and 0.1NM.

Supporting Information

In lieu of any radar information, Figure 1 provides an illustration of the profile taken by the Tutor when conducting the join via north lane. It is based upon standard Boscombe Down operating procedures and therefore may not be an accurate representation of the profile flown.

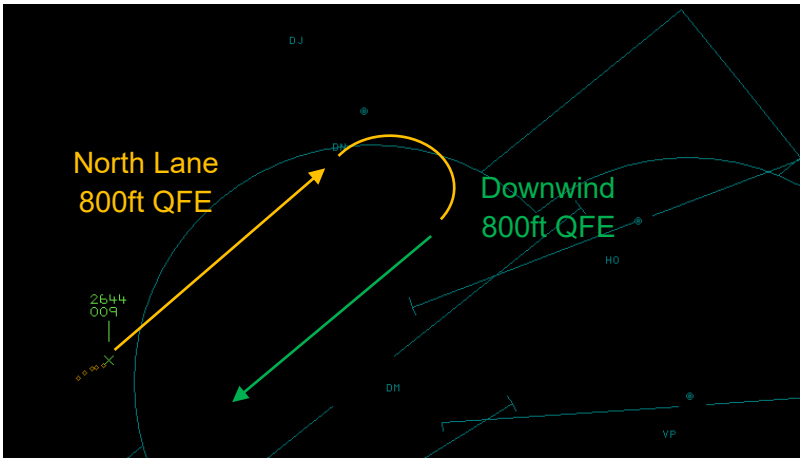

Figure 1: North Lane recovery profile to the Northern Circuit .

Local BM Investigation(s)

The local investigation conducted by MOD Boscombe Down identified the cause of the Airprox as a deviation from the standard VFR left downwind departure which resulted in a loss of separation with

[4] North Lane is a portion of airspace to the north of Boscombe Down established for transits between the visual circuit and Salisbury Plain Danger Area complex further to the north.

the Tutor. BM-related causal/aggravating factors were then identified that were believed to have contributed to the Airprox, along with mitigations to be taken:

The VFR Downwind departure profile is outlined within the Boscombe Down Aerodrome Order Book, specifying that aircraft are to climb to 1200ft QFE before commencing a turn. While the PA31 [pilot] reported familiar with Boscombe Down, the departure profile was not listed in Terminal charts meaning the PA31 [pilot] was unaware both of the requirement to climb to 1200ft QFE and the profile of the Tutor recovering via north lane.

The Boscombe Down Tower controller incorrectly assumed that the PA31 was familiar with the VFR departure profile based upon the Boscombe Down Defence Aerodrome Manual stating compliance with the Aerodrome Order Book is mandatory for all involved in flying at Boscombe Down. However, the PA31, as a non-station-based aircraft, was both not able to access the Boscombe Down Aerodrome Order Book or required to comply with it.

As a result of the causal factors identified, the following mitigations for local action were proposed:

A review of the Boscombe Down Defence Aerodrome Manual and Aerodrome Order Book to ensure that the relevant information for non-station-based aircraft is captured within the Terminal Charts. This will ensure that there is clarity for ATC regarding which procedures are standard aerodrome procedures outlined in Terminal Charts and which are local procedures for station-based Flying Order Book signatories.

2 Gp BM Analysis

The standard departure profiles at Boscombe Down are established to ensure safe separation between departing and arriving traffic. In this scenario, had it been recognised that the PA31 pilot was unaware of the specifics of the departure profile, the Boscombe Down Tower controller would have been required to amend the departure clearance or pass the specifics of the departure with the requirement for a climb to 1200ft before commencing a turn. This would have ensured 400ft separation was maintained between the Tutor in the northern circuit and the PA31. Traffic Information was not provided to the Tutor regarding the PA31's departure, this was based upon the PA31 not being classed as part of the visual circuit due its intentions to depart and not interact with the circuit traffic. This decision was based upon the incorrect assumption by the Boscombe Down Tower controller that when the PA31 pilot had reported familiar with Boscombe Down it included the specifics of the VFR downwind departure profile [for station-based aircraft].

The review conducted by the unit regarding the interaction between the Boscombe Down Defence Aerodrome Manual and Aerodrome Order Book will ensure there is clear delineation for controllers regarding what procedures aircrew are aware of.

There are no additional BM-related causal or aggravating factors identified by 2 Gp BM.

UKAB Secretariat

The Tutor and PA31 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]

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

Comments

HQ Air Command

Boscombe Down is hemmed-in for airspace due to an adjacent airfield to the south east and SPTA[3] to the north, which results in some non-standard recovery and departure profiles to ensure safe separation between departing and arriving traffic.

In this scenario, the controller's decisions on departure information and Traffic Information passed were based on the assumption that the PA31 crew was familiar with the locally published departure procedure. Details of this departure profile are only contained in the Boscombe Down Aerodrome Order Book (AOB). Due to several sorties flown from Boscombe Down by the PA31 in the preceding week, the PA31 was incorrectly considered familiar – it was assumed the AOB had been read and signed for – and a climb to 1200ft before turning downwind would be carried out.

Traffic information was not provided to the Tutor [pilot] regarding the PA31's departure based upon the PA31 not being classed as part of the visual circuit due its [pilot's] intentions to depart. Through the use of cross coupling of the VHF and UHF, it was also assumed that the Tutor [pilot] had heard the PA31 [pilot]'s take-off call. Given the interaction between the flight profiles (even if the PA31 [pilot] had followed the published procedure), it would have been prudent to provide this SA to both the Tutor and PA31 [pilots]. Regarding the power failure and requirement to recover all aircraft, the execution of the recovery plan ended up in a staggered yet compressed recovery of 4 aircraft. Risk balance should be considered; there was no urgency to have all aircraft recover in such a compressed manner. Even if the conditions had been inclement, diversions would have been held. In addition, and with the benefit of hindsight, the PA31 could have been held on the ground until all aircraft had been recovered (the Airprox involved the 3rd of 4 aircraft recovering). The Local Investigation into this incident made two recommendations: to review the Aerodrome Order Book to ensure that all relevant information is captured in the Mil AIP and DAM and to confirm VHF/UHF cross coupling effectiveness.

AOPA

Proper planning from an unfamiliar airfield is always recommended ensuring accurate knowledge of procedures is understood before starting engines.

Effective lookout and listening in the visual circuit are the primary tools for mid-air collision avoidance, this should be assisted by ATC and, if anyone is uncertain, ask.

Summary

An Airprox was reported when a Tutor and a PA31 flew into proximity at Boscombe Down at 1510Z on 2nd March 2023. Both pilots were operating under VFR in VMC, and both pilots were in receipt of an ACS from the Boscombe Down Tower controller.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from both pilots, 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 considered the actions of both pilots and those of the controller. Members noted that the Tutor pilot had had no situational awareness of the departing PA31 (**CF11**) and had been passed no Traffic Information on it (**CF3**) until the Tutor pilot had called for information on the departing 'twin' after

[3] Salisbury Plain Training Area.

having become concerned by its proximity to them joining the circuit (**CF14**), and that the Tutor pilot had not received an alert on the PA31 from their TAS equipment (**CF13**).

They also noted that the PA31 pilot had been given a departure clearance which had not meet their expectations and despite having heard multiple returning aircraft had not questioned local procedures (CF10), and the Board felt that the PA31 being held for some time while awaiting the return of the recalled Tutors may have presented an opportunity for the PA31 pilot to have clarified their clearance with the Tower controller. It was discussed that the PA31 pilot had not been made aware of the full and correct local procedure (**CF8**) and had also assumed that the circuit was clear once they had been departing, which resulted in the PA31 pilot turning downwind towards joining traffic (**CF9**) as per their perceived clearance, but before having reached the required 1200ft in accordance with the local procedure (**CF2**). The Board noted that the PA31 pilot had received a TAS alert on the Tutor (**CF12**) during their climbing turn and had continued to climb.

The Board examined why neither pilot had had awareness of the other despite the cross-coupling of the different frequencies used, and it became apparent that the technology in current use at Boscombe Down may not always provide full situational awareness to pilots operating on different frequencies. Members further explored why Traffic Information had not been passed to the Tutor pilot, regardless of whether the PA31 had departed using local procedures or otherwise, and discovered that the controller had not considered departing traffic as circuit traffic, with the departing traffic in the climb at 400ft or more above the circuit pattern when following local procedures and explaining why the controller had not expected the PA31 to make an early turn (**CF4**). The Board also considered that the controller had also assumed that the PA31 pilot would have been at 1200ft prior to making that turn (**CF5**). In the event, the controller had only given Traffic Information to the joining Tutor pilot on another Tutor in the circuit ahead, as they had been unaware of the potential of the departing PA31 conflicting with joining traffic (**CF6**). Civilian ATC members considered that it would have been expected for a civilian controller to have passed Traffic Information to both the recovering Tutor pilot and the departing PA31 pilot, whereas military controller members informed the Board that it is normal procedure to not pass Traffic Information on non-circuit traffic (in this case, departing) to pilots joining the circuit.

The lack of availability to visiting pilots of the local procedures (**CF7**) caused some concern to the Board, especially when attempts had been made independently by some Board members to avail themselves of those procedures. Only locally-based pilots had the capability of reading the necessary brief via an intranet with restricted access and signing the Aerodrome Order Book (AOB), and the Board concluded that the controller had assumed that the PA31 pilot had done this (**CF1**). The Board had been heartened to learn that Boscombe are reviewing their processes to ensure that ATC have an awareness of which pilots have received a local briefing, and that the briefing is made accessible to all aircrew, and that this review will be taken to other units.

Turning to the risk involved in this event, after some discussion the majority of the Board agreed that a number of barriers to mid-air collision had either failed or had been weakened in this Airprox. Equally, the fact that both pilots had been 'belly-up' to each other in the moments preceding CPA meant that the separation that had existed at CPA had been, for the most part, serendipitous. Neither pilot had received information regarding the presence of the other aircraft until the PA31 pilot had received an alert from their TAS and the Board agreed that the reported separation at CPA indicated that safety margins had been much reduced below the norm (**CF15**). Therefore, the Board assigned a Risk Category B to this event.

PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK

Contributory Factors:

	2023027			
CF	**Factor**	**Description**	**ECCAIRS Amplification**	**UKAB Amplification**
	Ground Elements			
	• Regulations, Processes, Procedures and Compliance			
1	Organisational	• Aeronautical Information Services	An event involving the provision of Aeronautical Information	The Ground entity's regulations or procedures were inadequate

2	Human Factors	• ATM Regulatory Deviation	An event involving a deviation from an Air Traffic Management Regulation.	Regulations and/or procedures not fully complied with
	• Situational Awareness and Action			
3	Human Factors	• ANS Traffic Information Provision	Provision of ANS traffic information	TI not provided, inaccurate, inadequate, or late
4	Human Factors	• Conflict Detection - Not Detected	An event involving Air Navigation Services conflict not being detected.	
5	Human Factors	• Expectation/ Assumption	Events involving an individual or a crew/ team acting on the basis of expectation or assumptions of a situation that is different from the reality	
6	Contextual	• Traffic Management Information Action	An event involving traffic management information actions	The ground element had only generic, late, no or inaccurate Situational Awareness
	Flight Elements			
	• Regulations, Processes, Procedures and Compliance			
7	Organisational	• Flight Operations Documentation and Publications	Flight Operations Documentation and Publications	Inadequate regulations or procedures
	• Tactical Planning and Execution			
8	Organisational	• Flight Planning Information Sources	An event involving incorrect flight planning sources during the preparation for a flight.	
9	Human Factors	• Monitoring of Environment	Events involving flight crew not to appropriately monitoring the environment	Did not avoid/conform with the pattern of traffic already formed
	• Situational Awareness of the Conflicting Aircraft and Action			
10	Human Factors	• Lack of Communication	Events involving flight crew that did not communicate enough - not enough communication	Pilot did not request additional information
11	Contextual	• Situational Awareness and Sensory Events	Events involving a flight crew's awareness and perception of situations	Pilot had no, late, inaccurate or only generic, Situational Awareness
	• Electronic Warning System Operation and Compliance			
12	Contextual	• Other warning system operation	An event involving a genuine warning from an airborne system other than TCAS.	
13	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			
14	Human Factors	• Perception of Visual Information	Events involving flight crew incorrectly perceiving a situation visually and then taking the wrong course of action or path of movement	Pilot was concerned by the proximity of the other aircraft
	• Outcome Events			
15	Contextual	• Near Airborne Collision with Aircraft	An event involving a near collision by an aircraft with an aircraft, balloon, dirigible or other piloted air vehicles	

Degree of Risk: B

Safety Barrier Assessment[4]

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

Ground Elements:

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

Regulations, Processes, Procedures and Compliance were assessed as **ineffective** because local procedures were not available to the PA31 pilot, and no specific briefing on local procedures had been provided by ATC.

Situational Awareness of the Confliction and Action were assessed as **ineffective** because the Boscombe Down controller's situational awareness was reduced due to the PA31 departure not being executed as expected by them.

Flight Elements:

Regulations, Processes, Procedures and Compliance were assessed as **ineffective** because the PA31 pilot was not aware of the local procedures due to their being published on a restricted access webpage.

Tactical Planning and Execution was assessed as **ineffective** because the local departure procedures were not available to the PA31 pilot.

Situational Awareness of the Conflicting Aircraft and Action were assessed as **ineffective** because the Tutor pilot had no awareness of the presence of the PA31 and the PA31 pilot had not been informed of the Tutor's presence in the northern circuit.