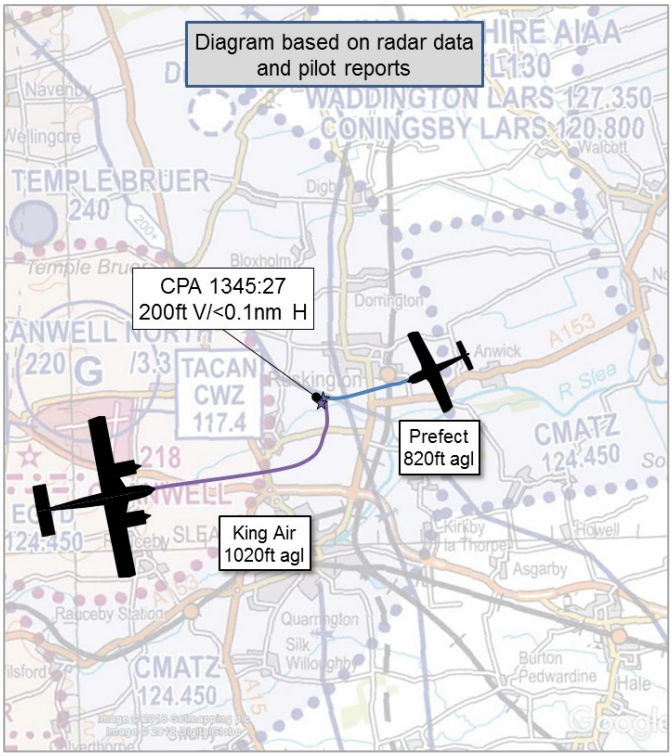
AIRPROX REPORT No 2018002

Date: 04 Jan 2018 Time: 1345Z Position: 5302N 00024W Location: RAF Cranwell MATZ

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Prefect	King Air
Operator	HQ Air (Trg)	HQ Air (Trg)
Airspace	Cranwell MATZ	Cranwell MATZ
Class	G	G
Rules	VFR	VFR
Service	Traffic	Aerodrome
Provider	Cranwell Talkdown	Cranwell Tower
Altitude/FL	FL019	FL021
Transponder	A, C, S	A, C, S
Reported		
Colours	White, Blue	White, Blue
Lighting	Strobe, Nav	Strobe, Nav, Beacon
Conditions	VMC	VMC
Visibility	>10km	10km
Altitude/FL	950ft	1000ft
Altimeter	QFE (977hPa)	QFE (977hPa)
Heading	260°	359°
Speed	100kt	170kt
ACAS/TAS	TAS	TCAS II
Alert	TA	None
Separation		
Reported	Just below /150m H	100ft V/100m H
Recorded	200ft V/<0.1nm H	



THE PREFECT PILOT reports that he was instructing a GH/IF sortie. The recovery consisted of a PAR to RAF Cranwell. Just after receiving their final clearance on the PAR, at approximately 3.5nm and 950–1000ft, the TAS sounded with a Traffic call. The handling pilot was instructed to continue his approach, whilst he, as the non-handling safety pilot, looked for the traffic. The TAS indicated the 10 o'clock and, on looking to that side of the aircraft, a King Air was spotted just below and in a left-hand turn towards his aircraft. He took control and initiated a go-around with a climbing turn to position above and behind the King Air. Approximately 1sec after he initiated the avoiding action, the King Air was seen to increase his AoB, as if to take his own avoiding action. The minimum separation was assessed as approximately 150m.

He assessed the risk of collision as 'Medium'.

THE KING AIR PILOT reports that he had returned to RAF Cranwell on a simulated asymmetric ILS approach to RW26 but ATC had directed them to break off the approach and join the visual circuit. He elected to remain simulated asymmetric for a subsequent circuit to touch-and-go for further circuits. He extended upwind on the deadside and turned prior to Caythorpe (approximately 4nm west) to re-join downwind. As they called re-joining downwind, Cranwell Tower informed them of instrument traffic at 7 miles so he continued the downwind leg. Just prior to reaching abeam the landing threshold, ATC informed them that the instrument traffic was at 4 miles. The student pilot then called for the gear to be selected down, which he discussed with him regarding what he now expected to do with traffic at 4 miles. The student stated the best plan would be to leave the gear up and go-around at circuit height, which he did. At 1000ft on the QFE (977hPa), and abeam the 400ft point, the student, as the handling pilot, commenced a level left-hand turn to position on the deadside again. Although not visual with the

instrument traffic he, as the QFI, calculated it was safe to turn at 1000ft at their current position believing that the Prefect would be separated from them vertically and/or laterally. There was also no traffic indicated on TCAS which reinforced his 'mental picture' of being separated from the Prefect. After they called going-around at circuit height, the student pilot states he heard another radio call from ATC giving the position of the Prefect at 3 miles. At this time, the instructor's attention was focused on looking up the approach lane to visually acquire the inbound traffic, which would be on his side of the aircraft. After approximately 90° of left turn from the downwind heading (of 085 degrees), he became visual with the Prefect in his right 2 o'clock position. It appeared to be very slightly above them through the aircraft DV window, and holding a constant position relative to them. He took control of the aircraft and increased the angle of bank from 30° to 50-55°, lowered the nose slightly descending to 850ft, and also began to reset symmetric power. The student pilot became visual with the Prefect as he continued the turn; it climbed into the airfield overhead. He climbed the aircraft back to 1000ft and positioned on the deadside. A further circuit was flown from which they were sent around at circuit height for instrument traffic. The subsequent circuit was flown to land without incident. Prior to the sortie, he had asked the student to book a PD to fly an instrument approach away from Cranwell. He tried Humberside (who were unable to accept him), Marham (who couldn't accept him for an instrument approach), Coningsby (who were closed) and so, with R313 active and Waddington above their crosswind limits, Cranwell was the only available local option. Whilst on approach to Cranwell he could hear on the radio that the circuit was busy but was now fully open without a restriction on the number of aircraft that had been in place when he took off 45 minutes earlier. At no point during this incident did the other aircraft appear on TCAS.

He assessed the risk of collision as 'High'.

THE CRANWELL TOWER CONTROLLER reports mixed types in the visual circuit to begin with and traffic on radar approaches. He was informed of a Prefect for radar, to touch-and-go for further so he made the relevant information broadcast, stating the Prefect at 6 miles as it was nearer that range than 7. The King Air pilot then reported re-joining the visual circuit downwind and he advised him of the position of traffic including the Prefect on radar now at 5 miles. The King Air pilot then called downwind to touch-and-go and he informed him he had one ahead, radar traffic at 4 miles, a Prefect. The King Air pilot did not acknowledge this, so he repeated that there was a Prefect on radar ahead, now inside 4 miles and would be going around. The King Air pilot reported going around. Satisfied the King Air pilot was aware of the position of the radar traffic and going around, his attention turned to other traffic. On subsequently looking at the Air Traffic Monitor (ATM) some moments later, he noted the King Air going around at approximately 3 miles extended downwind, just ahead of the Prefect. He had expected the go around to be earlier. He suspected that the radar returns on the ATM would likely merge, or be very close to one another at a similar height so he elected to warn the King Air first, by broadcasting radar traffic approaching 3 miles. Before he had the opportunity to warn radar of the King Air go around, he was informed that the Prefect had broken off to avoid the King Air. He subsequently learned that the Prefect reported this as an Airprox.

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

THE CRANWELL TALKDOWN CONTROLLER reports that she had just come down from the Ground Control position and was asked to take Talkdown 2 to assist with the workload. She took Prefect from the approach controller approaching the 7nm point. Standard identification took place, and she called the tower controller on the landline at 7nm for the usual liaison call. This was slightly protracted because the flight strip had the 7nm call logged as already completed but she had not heard the approach controller make the call so checked with tower. This subsequently lead to the range becoming 6nm. The remainder of the talkdown continued as standard, with the aircraft descending and gear check at 3.5nm. Before obtaining a clearance, she saw a contact which appeared to be in the visual circuit, and the aspect to the Prefect looked as if the aircraft would be going around behind so she was content and expected further information in the clearance. Just before the 3nm point she began the standard procedure for obtaining a clearance - selecting the radar clearance line. The comms panel for Talkdown 2 is on the opposite side to that of Talkdown 1 which is the console usually used. This meant that she needed to look down to ensure that she was selecting the correct line so had to momentarily look away from the screen. After selecting the button, she looked up again at the screen

ready to request the clearance and noticed that the contact had turned towards the Prefect. As she was about to transmit avoiding action, the Prefect pilot transmitted he was going around due to traffic. She acknowledged the pilot and spoke on the clearance line to tower that "[Prefect C/S] going around due to traffic, something just flew in front of him".

She perceived the severity of the incident as 'Medium'.

THE CRANWELL SUPERVISOR reports that she was Supervising from the ACR at the time of the incident. She was informed by the PAR controller as soon as the Prefect on the PAR had called an Airprox and broken off his radar approach. She also heard the pilot confirm his Airprox with a King Air when he conducted his break off and spoke to the Approach controller. She spoke to the PAR controller about what they had witnessed and she then went up into the VCR to inform the Duty Pilot as well as speak to the ADC, who was very busy with visual circuit traffic at the time. Once off console, the ADC informed her that the King Air in the visual circuit had been informed about the radar traffic, specifically that it was a Prefect on a couple of occasions. The tapes for the Tower frequency were then listened to by the ADC and they confirmed that the King Air had been passed information about the radar traffic on multiple occasions and in particular that the aircraft type was a Prefect (which is known not to always show up on King Air TCAS). Once she had all the information, she spoke to the Prefect pilot and the King Air pilot as well as the SATCO and OC Ops.

Factual Background

The weather at Cranwell was recorded as follows:

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METAR EGYD 041350Z 24019KT 9999 FEW022 BKN050 10/07 Q0984 BLU TEMPO SCT022 WHT
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Analysis and Investigation

Military ATM

At 13:42:29 (Figure 1), the Cranwell ADC made a broadcast on the 'Tower' frequency stating that there was a Prefect at 6nm, with the intention to touch-and-go for further instrument approaches.

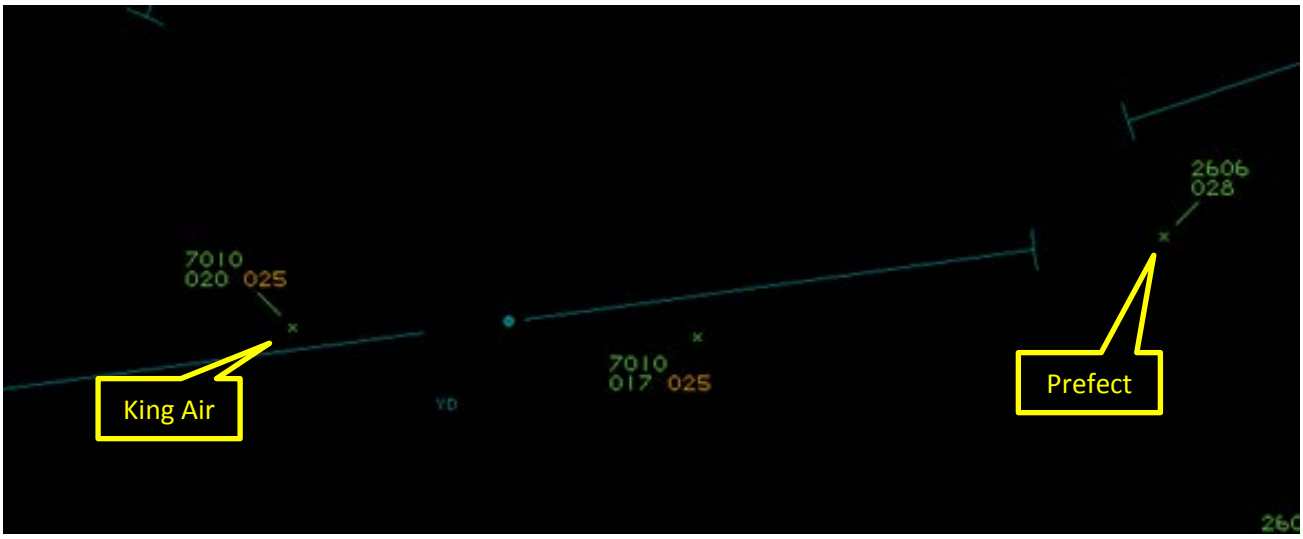


Figure 1: Geometry at 13:42:29

At 13:43:25 (Figure 2), in response to the King Air pilot reporting downwind, the Cranwell ADC informed the King Air pilot that there was an aircraft on the runway and that the Prefect radar traffic was at range 5nm from touchdown.

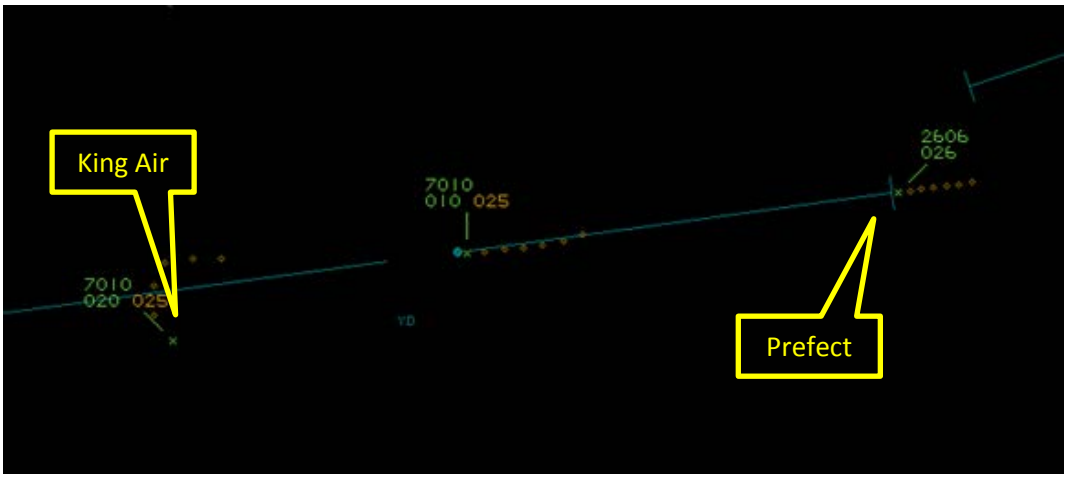


Figure 2: Geometry at 13:43:25

At 13:44:06 (Figure 3), in response to the King Air pilot reporting downwind (simulated asymmetric), the Cranwell ADC informed the King Air pilot that there was one aircraft ahead of him for the runway, the Prefect radar traffic at 4nm from touchdown.

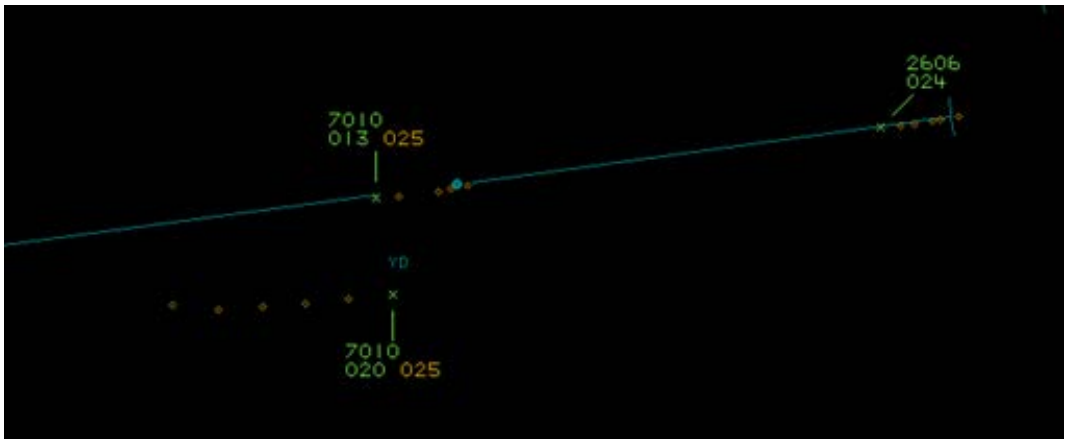


Figure 3: Geometry at 13:44:06

At 13:44:27 (Figure 4), the Cranwell ADC reiterated to the King Air pilot that he had one aircraft ahead of him to use the runway, the Prefect radar traffic by then inside 4nm, and asked the pilot if he would be initiating a go around. The King Air pilot responded that he was going around at circuit height.

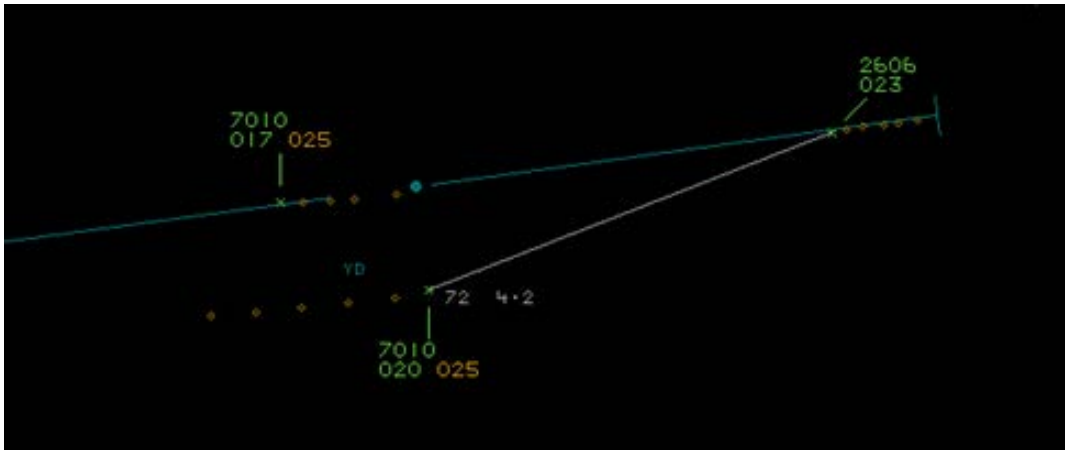


Figure 4: Geometry at 13:44:27

At 13:45:03 (Figure 5), the Cranwell ADC informed the King Air pilot that the Prefect was at 3nm from touchdown.

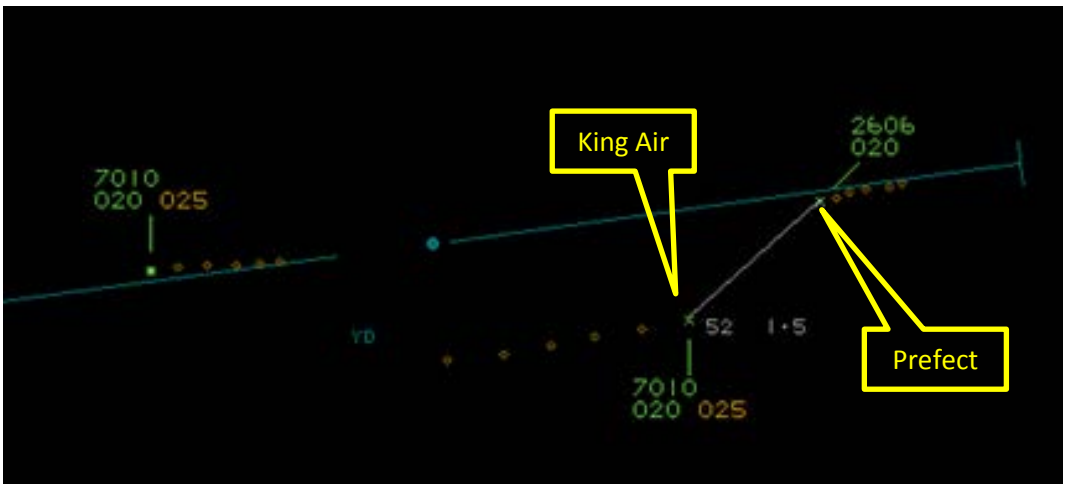


Figure 5: Geometry at 13:45:03

At 13:45:21 (Figure 6), the Cranwell Talkdown Controller informed the ADC that the Prefect was going around due to traffic.

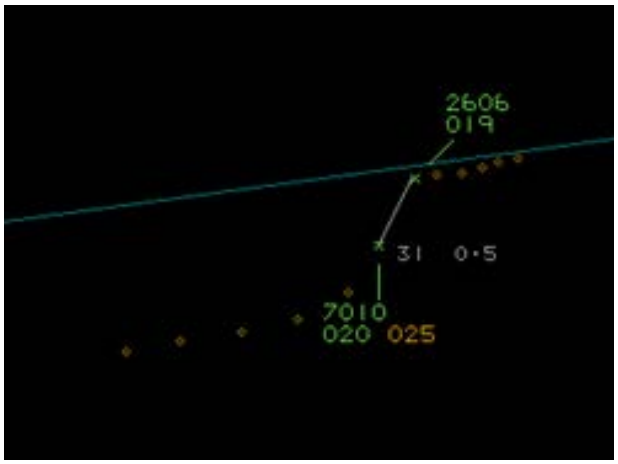


Figure 6: Geometry at 13:45:21

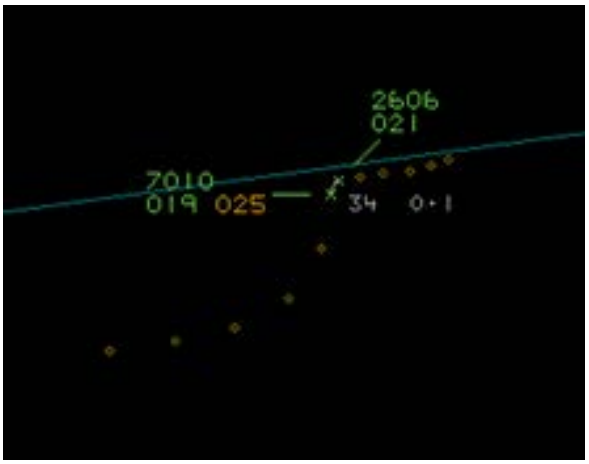


Figure 7: Geometry at 13:45:24

At 13:45:24 (Figure 7), the King Air and Prefect were at their closest point seen on radar replay, with approximately 0.1nm lateral and 200ft vertical separation.

The Cranwell ADC had a high workload with a complex visual circuit including mixed aircraft types, radar integration and simulated emergencies. When he received the standard warning call from the Talkdown Controller informing him of the Prefect's range and intentions, the subsequent broadcast was made to the visual circuit traffic to give all pilots situational awareness. When the King Air pilot reported turning downwind, the ADC informed him that the Prefect radar traffic was at range 5nm from touchdown, followed by two more updates on the Prefect's position before asking the King Air pilot if he would be initiating a go around. When the King Air pilot reported that he was going around at circuit height, the ADC was satisfied that the King Air pilot was aware of the position of the Prefect, now just less than 4nm from touchdown, and turned his attention to other traffic. Approximately 30 seconds later, the ADC saw on the Air Traffic Monitor (ATM) that the King Air had just started to turn and, concerned that the two aircraft would cross in close proximity, warned the pilot that the Prefect was now 3nm from touchdown.

Although the ADC assumed that the King Air pilot was aware of the position of the Prefect, there was never any verbal confirmation of that being the case, and in fact the King Air pilot was not visual with the Prefect. The Controllers' Order Book has since been amended to seek a positive acknowledgement that pilots of visual circuit traffic going around are visual with any radar traffic that they may encounter in the process.

The Cranwell Talkdown Controller, who had recently been called down from the Ground position due to high volume of radar traffic, was utilising the 'Talkdown 2' console. The console has the same buttons and switches, but is set up in a mirror image of the more frequently used Talkdown 1 console, therefore the Controller felt less familiar with the button/switch positions. She made the standard liaison call with the ADC when the Prefect was at 7nm, in order that circuit traffic could be made aware of the approaching radar traffic. The Talkdown Controller reported that she saw the King Air appear on the PAR display but, because its track was still downwind when the Prefect was at 3.5nm, she expected it to go around behind the Prefect. Having glanced away to ensure that the radar clearance line was correctly selected, she looked back to see that the King Air was actually going around directly in front of the Prefect. This Human-Machine Interface (HMI) distraction meant that there was not time to issue avoiding action or traffic information before the Prefect pilot reported that he was going around due to the traffic.

UKAB Secretariat

The Prefect and King Air 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

A comprehensive Occurrence Investigation took place at RAFC Cranwell. It was identified that, although there are robust procedures directing the integration of instrument traffic with visual circuit traffic, Airprox continue to occur, particularly at high workload points such as aircraft going around, and despite Traffic Information being provided by ATC. Additional measures have recently been introduced at Cranwell, with focus on improving ATC-pilot communication thus Situational Awareness for both parties. There are also plans to formulate a broader, systemic solution that considers the operating environment and recovery barriers in place rather than purely the operators, who by nature will always reach a limit of capacity when operating in a high-task-load environment.

Whilst there was no malicious intent, a simple mistake nearly became a tragedy but for the vigilance and quick thinking of the crew of Prefect who gained visual contact with a co-alt King Air (KA) which was in the turn across the Prefect's approach lane; the Prefect took avoiding action and averted a more serious outcome. The panel reviewed the notes and recommendations and were satisfied that the OSI team had identified the significant outcome, cause and contributory factors, and made appropriate recommendations for consideration. This incident is similar in nature to 6 previous Airprox events at Cranwell. The panel understands that following those incidents, DASORs were raised and investigated however, in the case of 4 of the DASORs, the subsequent investigation did not result in any recommendations, whilst the 5th DASOR, the recommendations were closed; it is unclear what action was taken if any. The final and most recent DASOR (May 17) there were 9 recommendations, most of which have been actioned, rejected and/or closed. The investigations and subsequent recommendations (where applicable) from the previous DASORs do not appear to have dealt with the underlying issue of maintenance of separation of concurrent instrument pattern and those in the visual circuit. The recommendations made after this latest incident focus however on how best to maintain separation of instrument pattern and visual circuit traffic and mitigate against these differing activities resulting in an Airprox event. The panel were cognisant of the operational and training imperative for Cranwell to remain as flexible as possible to maximise opportunities for dissimilar Ac types to undertake concurrent dissimilar training activities. The panel felt that the Airprox issue needs urgent addressing if conflictions at Cranwell are to be reduced to as low as is practicable and before a catastrophic event occurs. However, it was felt that whilst consideration should be given to this particular Airprox, it was essential to future-proof policy and procedures to meet the challenges in terms of training activities, airspace utilisation and ATC support that the new aircraft, the Prefect and the Phenom, will undoubtedly bring. On this occasion,

[1] SERA.3205 Proximity.
[2] SERA.3225 Operation on and in the Vicinity of an Aerodrome.

the evidence indicated to the panel that all the KA Bowtie Barriers failed to prevent the top event (Loss of Safe Separation) and it was in fact a Recovery Measure (Prefect Visual Sighting) that prevented a catastrophic outcome. The panel agreed that a review of the KA Bow-tie was required as, in this instance none of the current Barriers prevented the KA conflicting with the Prefect. However, the panel further stated that this process should not cease once the KA is withdrawn from service but a Bow-tie review, using lessons identified from previous similar incidents, should also be undertaken by 6 FTS for the Tutor Ac and by those operating the new Prefect and Phenom Ac looking at what Barriers need to be in place to prevent Airprox events in the future. The panel agreed that a major contributing factor in this particular incident appeared to be the asymmetric element of the flight which, by its very nature, is a demanding part of the flying training syllabus. As a consequence, the panel supported recommendations which recognised the additional workload experienced by a crew undertaking asymmetric training, to recommend better protection by establishing additional deconfliction measures, and by the use of additional crewmen to assist with lookout/listen out duties. These are further supported by the recommendation to establish a SQEP panel to assess concurrent instrument pattern and visual circuit activity and the likelihood that these types of concurrent activities will lead to an increased chance of conflictions and how best to prevent such incidents occurring. The panel understood that those undertaking asymmetric training flying training on the Phenom, will, in the main, be conducted in the simulator; this may reduce the need to conduct as many `live' asymmetric sorties. If this is indeed the case and the number of asymmetric sorties is much reduced, this may also give weight to the recommendation to deconflict the fewer asymmetric sorties from other dissimilar training events undertaken by 3 and/or 6 FTS sqns. Another element from the OSI was the number and complexity of sorties undertaken on the first day back at work after a prolonged down-period (Christmas grant), that both aircrew and ATC staff undoubtedly were a little `rusty' and that the situation became `very busy very quickly'. The panel supported the recommendation that following a prolonged down-period, a more coordinated and measured return to flying should be agreed with all stakeholders. The OSI report also painted a picture where a number of assumptions were made as to the likely CoA that the KA crew would take. To try to break that cycle of assumptions, it was noted that some work has already been done (such as the most recent entry into the ATCOB Order 4.1 with regards to Visual Circuit Traffic Information), but a more holistic review is required to ensure that dissimilar aircraft types with differing training requirements can co-exist safely at Cranwell. This incident could have been a tragedy but for the vigilance of the Prefect crew and it demonstrated that a significant number of Barriers which had been painstakingly put in place, failed to prevent the KA aircrew from turning across the approach lane and conflicting with a Prefect on a PAR. It is therefore imperative that a review is conducted to identify procedures which will afford aircrew the freedom they require to undertake their training, whilst also protecting them when they undertake sorties that are complex in nature and require more support to maintain their separation and achieve their goal.

Comments

HQ Air Command

This Airprox was the latest in a number of similar occurrences at this unit and generated an in-depth safety investigation. Several recommendations have been made to help to address the systemic issues that are agnostic of aircraft type, but some of the issues are particular to the types involved. At the time of writing, King Air operations have ceased as the aircraft is now out of service, but some lessons from these incidents are valid for the new aircraft coming into service.

Changes to the Controllers' Order Book, seeking confirmation that the circuit traffic is visual with the instrument traffic, is a positive step but it should be remembered that this process is also liable to failure (e.g. controller busy and doesn't receive an acknowledgement or assumes that there was one) so it is encouraging to see that the unit is reviewing possible ways of maximising use of other barriers available (such as flying program deconfliction or use of the synthetic environment). In this encounter, the pilot of the King Air *believed* that his intended flight path was clear and it was the vigilance of the Prefect pilot that prevented the separation being eroded further, once again demonstrating the importance of a good lookout scan at all stages of flight coupled with maintaining a good level of *accurate* SA.

Summary

An Airprox was reported when a Prefect and a King Air flew into proximity at RAF Cranwell at 1345 on Thursday 4th January 2018. Both pilots were operating under VFR in VMC, the Prefect pilot in receipt of a Traffic Service from Cranwell Talkdown and the King Air pilot in receipt of an Aerodrome Service from Cranwell 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.

The Board began by hearing from the military member who noted that this incident was similar to a number of previous incidents at Cranwell, and that Cranwell were reviewing procedures to try to prevent any further recurrence of this problem. In that respect, he commented that asymmetric approaches involved a high workload for the King Air pilots, but that this should be mitigated somewhat through the replacement of the King Air with the new Phenom aircraft type.

Turning to the actions of the King Air pilots, members noted that ATC had provided accurate and timely Traffic Information regarding the position of the Prefect to the King Air crew but that, nonetheless, it appeared that although the instructor had been aware of its presence on the PAR, the crew had not fully assimilated this information to the extent that they had a flawed mental model of their propinquity. As a result, they had turned towards the Prefect without either being visual with the aircraft or having full SA on its position. Some members questioned military methods of controlling aircraft in the visual circuit, and opined that a more directive culture would have meant that the controller could have intervened to prevent the King Air crew from turning when they did. This difference in controlling culture to the civil environment had been commented on before in previous military Airprox within the visual circuit, but the military Board members explained that the cultural difference was deliberate to ensure that military pilots were used to maintaining their own separation in deployed locations rather than rely on ATC. This was acknowledged, but members opined that the procedure for military controllers asking an aircraft if they were visual with the aircraft ahead needed to be reinforced with a positive control instruction if the pilot answers 'no', to ensure safe separation was maintained. The military member agreed, and said that he had would undertake to ensure that the Cranwell review of procedures took this into account. The Board agreed that, ultimately, the King Air instructor should have been able to assimilate the Traffic Information about the Prefect, and had even questioned the student on his intended actions regarding the Prefect on the instrument approach; however, he still allowed the student to turn in front of the Prefect without being visual and thus assure separation.

The Board then looked at the actions of the Prefect pilot. They quickly agreed that he had responded as soon as his TAS had indicated and had become visual with the King Air soon after. Members acknowledged that, albeit later than desirable, it had been his actions that had resolved the conflict through a combination of the successful use of the CWS and see-and-avoid barriers when the King Air crew turned towards him.

The Board then turned to the cause of the Airprox. They agreed that, having been given timely and accurate Traffic Information on the Prefect, the King Air pilot had not ensured that he had been visual with the Prefect before he had turned onto base-leg. The Board therefore agreed that the cause of the Airprox was that the King Air pilot had turned into conflict with the Prefect. Turning to the risk, a debate ensued about how early the Prefect pilot had received TAS indications, and whether his reaction could be described as timely or whether it was emergency avoiding action. Some members thought that the Prefect pilot had reacted early enough to mean that there had been no risk of collision. Others noted that the King Air pilot had assessed the risk of collision as high and, because he had not seen the Prefect until the Prefect pilot had initiated his go-around, the King Air pilot's avoiding action constituted a situation where safety had been much reduced below the norm. The Chairman took a vote and the latter view prevailed. Accordingly, the risk was determined as Category B.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The King Air pilot flew into conflict with the Prefect.

Degree of Risk: B.

Safety Barrier Assessment[3]

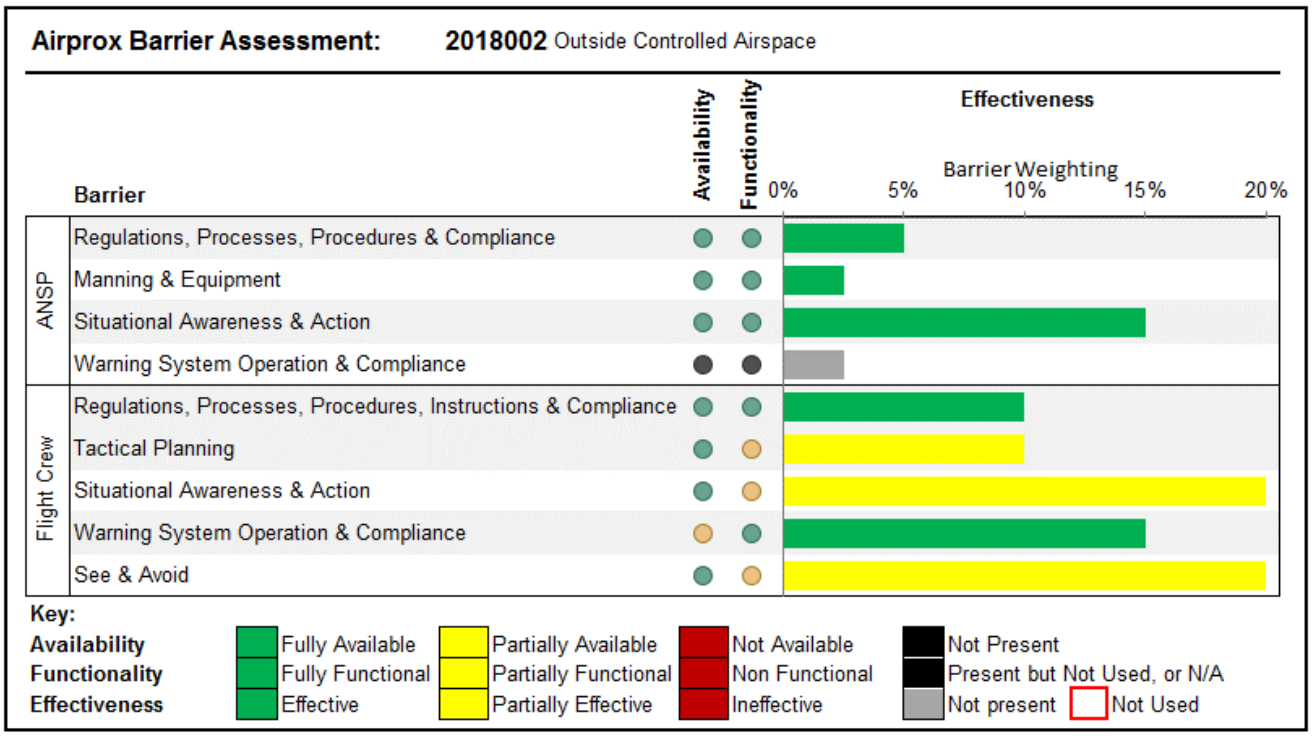
In assessing the effectiveness of the safety barriers associated with this incident, the Board concluded that the key factors had been that:

Flight Crew:

Tactical Planning was assessed as **partially effective** because although the King Air instructor questioned his student on the actions he would take with radar traffic at 4nm, the resulting plan was not appropriate to ensure adequate separation.

Situational Awareness and Action were assessed as **partially effective** because although the King Air crew were passed Traffic Information on the Prefect on a number of occasions, they did not fully use the information they received.

See and Avoid were assessed as **partially effective** because the King Air crew and Prefect pilot saw each other later than desirable and took emergency avoiding action.



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