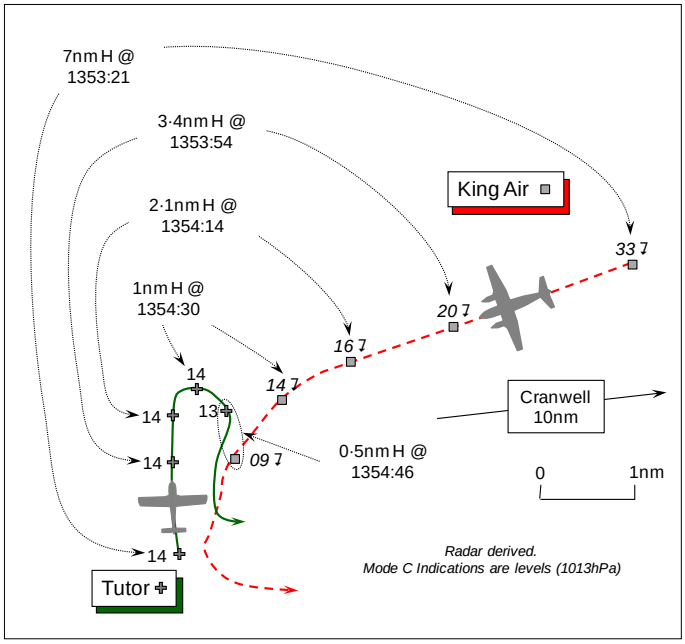
AIRPROX REPORT No 2012070

Date/Time: 25 May 2012 1354Z

Position: 5301N 00045W (10nm W of Cranwell A/D - elev 218ft)

Airspace: Lincolnshire AIAA (*Class: G*)

	Reporting Ac	*Reported Ac*
Type:	Grob Tutor TMk1	BE200 King Air
Operator:	HQ Air (Trg)	HQ Air (Trg)
Alt/FL:	1500ft QFE (1018hPa)	1000ft QFE (1018hPa)
Weather:	VMC In Haze	VMC CAVOK
Visibility:	30km	30km
Reported Separation:	½nm H	300-400ftV
Recorded Separation:	Nil V @ 1nm H 0·5nm Min H/400ft V	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE GROB TUTOR T Mk1 PILOT, a QFI, reports that whilst conducting a student pilot's Final Handling Test (FHT) they were being vectored under a TS from Cranwell DIRECTOR (DIR) at 1500ft QFE in VMC for a PAR to RW08RHC. The assigned squawk was selected with Mode C; elementary Mode S and TAS are fitted.

DIR passed TI about a contact at a range of 2nm, closing at the same height. Seconds later, in a position about 8nm W of the A/D, turning through 080° at 100kt, TAS indicated a contact less than 1nm away at the same height. As PIC, he took control to initiate appropriate action when a 'wing flash' indicated the contact's position. He spotted the other ac - King Air (A) - as it was about to pass down the starboard side of his Tutor less than 1nm away in an apparent decent to low-level but he took no avoiding action because it was then seen to manoeuvre. King Air (A) turned L and crossed ahead of his Tutor – he was unsure of the range - crossing through the extended centre-line of RW08RHC to join on the deadside. Minimum horizontal separation was ½nm and he assessed the Risk as 'medium'. The student then continued under vectors for the PAR, which was completed with no further incident.

He reported the Airprox to ATC after landing. The Tutor has a white livery; the HISLs, nav and landing lights were all on.

THE PILOT OF BEECH BE200 KING AIR (A), a QFI, reports he was conducting a dual local training flight from Cranwell and was in receipt of a BS from Cranwell TOWER on 268·625MHz. The assigned squawk of A2601 was selected with Mode C; TCAS and Mode S are fitted.

The student was the PF, on a visual simulated asymmetric recovery whilst positioning for Initials to RW08RHC. Heading 270° at 200kt, their ac had extended W of the A/D by about 8nm - some 3nm outside the MATZ - when a TCAS RA was enunciated demanding a descent. The RA was followed and he advised ATC. Whilst descending they saw the subject Tutor about 300ft away, which they later learned was radar traffic inbound to Cranwell. He estimated minimum separation was 300-400ft and when below the Tutor, commenced a L turn to join RW08RHC via Initials on the deadside. He perceived no threat of collision and assessed the Risk as 'low'; the sortie was then continued as

briefed. He stated that the student had extended further than usual outside the MATZ while dealing with the simulated asymmetric recovery.

His ac has a white livery; the HISLs, nav and landing lights were all on.

CRANWELL DIRECTOR (DIR) reports the Tutor crew called airborne on 284·325MHz from Barkston Heath for a PD to Cranwell. The ac was vectored downwind for RW08RHC under a TS, descended to 1500ft QFE and the crew instructed to report cockpit checks complete. The Tutor crew was given a slightly extended feed through the extended centreline because of 2 other ac ahead in the combined pattern with only 1 PAR controller available. As the Tutor crossed the extended centreline, a possible confliction was spotted 5nm NW of Cranwell heading towards the radar traffic about 1500ft above it and descending rapidly, so TI was requested from APP. The conflicting traffic was identified as a Radar to Visual join positioning for Initials working TOWER – King Air (A). At a range of 7nm the conflicting King Air (A) was called to the Tutor crew; when the range had decreased to 3nm he was instructed by the SUP to turn his ac away to try and avoid the conflicting King Air (A). As he turned the Tutor onto S, the conflicting King Air (A) also turned resulting in a situation where the 2 ac were within ½nm of each other at the same height. The conflicting King Air (A) subsequently turned about onto a NW'ly heading and positioned for Initials ahead of the Tutor. He assessed the Risk as 'high'.

THE CRANWELL AERODROME CONTROLLER (ADC) reports that one Tutor ac was in the visual circuit with another King Air (B) joining Tower-to-Tower from Waddington when the crew of King Air (A) called and requested to join; this was approved and the relevant RW, QFE and circuit information provided. As there were two King Air aircraft conducting standard joins through Initials at a similar time he elected to use the Hi-Brite ATM to update King Air (A) crew on the position of King Air (B). Whilst using the Hi-Brite to provide this information he noticed a contact that he believed was a potential confliction for the subject King Air – but not the subject Tutor. He passed TI in the standard format used for un-identified traffic and the crew of King Air (A) reported visual. Turning his attention to the visual circuit, King Air (B) was approaching Initials, he was now unaware of the position of the King Air (A) as the aircraft had transited away from the visual circuit to the W of Cranwell. It was at this point that the crew of King Air (A) reported a TCAS RA, which he acknowledged. Asking the crew of King Air (A) to confirm their position, there was no response so he elected to stop transmitting due to the perceived high workload in the cockpit - he even suspected that they might have decided to change frequency back to APP. After a short period of time he asked the crew of King Air (A) to confirm their position by squawking ident; once he was aware of their position he offered a straight-in-approach, which was declined, the crew continuing with the join through Initials. He was unaware of the location of King Air (A) when the TCAS RA occurred; his priority as the ADC was the control of aircraft in the visual circuit area.

THE CRANWELL ATC SUPERVISOR (SUP) reports that he witnessed the event as it occurred. He called the ADC to enquire on the position of King Air (A), as he believed it might be fast approaching the Tutor that was turning inbound for a PAR to RW08RHC. At the same time he instructed the DIR to turn the Tutor onto a heading of 180° in an attempt to position it away from King Air (A) that was indicating 2000ft. Whilst the Tutor was in the R turn onto 180°, King Air (A) also turned L onto S and descended close to the Tutor; minimum horizontal separation was about ½nm. The DIR's workload was assessed as 'low' with the overall workload on the unit 'medium to low'.

BM SAFETY MANAGEMENT reports that this Airprox occurred between a Tutor being vectored for a PAR, in receipt of a TS from DIR, and King Air (A) positioning to join through Initials in communication with TOWER.

DIR reported that his workload and task complexity were low, with only the Tutor on frequency; the ADC reported his workload as medium to low (3 ac on freq), with low task complexity.

The incident sequence commenced at 1351:41 as the crew of King Air (A) requested to join the visual circuit and were passed the A/D details and circuit state. At this point, King Air (A) was 2.7nm

N of Cranwell, tracking 260°, descending through 6500ft Mode C (1013hPa). In reply, at 1352:13, the crew of King Air (A) stated that they were, "*simulated asymmetric currently descending heading out to the west before joining through Initial",* which was acknowledged by the ADC. At 1352:23, the ADC passed the crew of King Air (A) TI derived from the Hi-Brite display (ATM) on King Air (B) conducting a Tower-to-Tower transfer from Waddington. [This was followed at 1352:58, by TI on an unrelated ac – not the subject Tutor.]

At 1353:21, DIR provided TI to the Tutor crew on King Air (A), "…*traffic right 2 o'clock 7 miles crossing right-left 1 thousand 5 hundred feet above descending*", which was not acknowledged. King Air (A) was 6nm ENE of the Tutor, tracking 260°, descending through 3300ft; the Tutor was indicating 1400ft Mode C (1013hPa), tracking N'ly. After passing TI, DIR immediately asked APP "*what's the 2-6-0-1* [King Air (A)] *doing north-west of us by 6 miles - descending for visual*?" APP replied that King Air (A) was in the visual circuit, causing DIR to enquire, "*whose visual circuit*?"

Immediately after this liaison between DIR and APP, at 1353:52, DIR instructed the Tutor to, "*turn right heading 1-8-0 degrees*", which was acknowledged. Both DIR and the SUP report that the SUP instructed DIR to turn the Tutor 'on heading 180° to attempt to position away from King Air (A) that was presenting at 2000ft at that time.' DIR did not tell the Tutor crew that the turn onto S was to deconflict them from King Air (A). [At 1353:54, King Air (A) was 3.4nm ENE of the Tutor, tracking 260°, descending through 2000ft Mode C; the Tutor was marginally left of King Air (A)'s 12 o'clock.]

At 1353:56, the crew of King Air (B) requested to convert from a cct join through Initial, to a straight-in approach. The ADC was then involved in liaison with the crew of King Air (B) until approximately 1354:11. The ADC reported that integrating King Air (B) with an un-related Tutor operating in the Cranwell visual circuit was the focus of his attention.

At 1354:01, DIR accurately updated the TI on King Air (A) to the Tutor crew stating, "…*previously called traffic north-east 4 miles tracking west 5 hundred feet above descending rapidly*", which was acknowledged by the crew.

At 1354:11 the ADC answered an incoming landline call from the SUP, seeking information on King Air (A) crew's intentions. The ADC replied, "*I called the traffic to him that came right-to-left across his nose, the 0-1* [not the Tutor but unrelated traffic referred to in the ADC's TI at 1352:58]." The SUP acknowledged this and stated in reply that, "*we've got a Tutor the 2-6-0-7 as well*." This was acknowledged by the ADC and the landline call terminated at approximately 1354:28.

During this liaison, at 1354:14, DIR provided further updated TI to the Tutor on King Air (A) stating, "*previously called traffic east 2 miles tracking west slightly above descending*"; this was acknowledged by the Tutor crew as *"..looking.."* who then reported at 1354:22, "..*visual with the King Air* [King Air (A)]". Based upon the Tutor pilot's report, this TI was co-incident with their TAS providing a warning of King Air (A). At 1354:14 King Air (A) was 2.1nm ENE of the Tutor, tracking 260°, descending through 1600ft; the Tutor had also just commenced the turn instructed at 1353:52 and was marginally right of King Air (A)'s 12 o'clock. At the point that the Tutor crew reported visual (1354:20), 1.8nm lateral separation existed.

At 1354:35, the crew of King Air (A) reported, "..*TCAS R-A*", which was acknowledged by the ADC. King Air (A) was 0.8nm ESE of the Tutor, tracking 260°, indicating 1400ft; the Tutor was also indicating 1400ft, maintaining a right turn passing through 070°. At 1354:38, it is evident on the radar replay that King Air (A) had entered a L turn and had reacted to the RA; the crew reported that they became visual with the Tutor during the RA descent.

The CPA occurred at 1354:46, at a position 10nm W of Cranwell some 1.7nm N of the extended RW centre-line (CL) for RW08, as King Air (A) passed 0.5nm S of the Tutor and 400ft below it.

Before considering the ATM aspects of this Airprox, it is worthy of note that the crew of King Air (A) was operating outside the visual circuit for an extended period in what is considered busy airspace; yet throughout the incident sequence, the crew maintained a closing heading toward the extended CL. Whilst the decision to head W to lose height and facilitate the handling of the Simulated Asymmetric emergency was understandable in isolation, the duration of that extension W whilst on the TOWER frequency, coupled with the closing heading to the CL conspired to place King Air (A) in confliction with the instrument pattern. Although there is little detail in the written account from the PIC of King Air (A), it is worthy of consideration that their lookout may have been affected by their requirement to deal with the simulated emergency.

In terms of the ATM aspects of this Airprox the ADC clearly understood the requirements of his Duty of Care, having perceived that there might have been a conflict between the 2 King Airs by passing TI at 1352:58. Subsequently, the controller's focus of attention sequencing the unrelated King Air (B) and Tutor was understandable, more so when it is considered that King Air (A) was operating VFR and the crew had stated an intention to head W prior to joining through Initials. Finally, the ADC had little time to act on the SUP's landline warning at 1354:23. Consequently, the ADC was unable to affect the outcome of this Airprox.

In the ACR, DIR provided timely and accurate TI with multiple updates to that TI, which assisted the Tutor crew in visually acquiring King Air (A). On that basis alone, it enabled the Tutor crew to discharge their responsibility to 'see and avoid' in a timely fashion. However, whilst issued in good faith, as a result of the 22-sec gap between the turn instruction onto 180° being issued by DIR and the turn being followed by the Tutor, this resulted in separation that was less than it would have been without the turn. That said, the Tutor crew reported visual with King Air (A) at the point that they commenced the turn and continued into that turn; therefore, whilst the turn can be viewed as contributory to the Airprox, it was not causal.

The decision to step beyond the bounds of a TS and provide de-confliction advice in order to attempt to prevent a perceived mid-air collision is difficult and post-incident assessments of such a decision are fraught with difficulty, given the potential for hindsight bias. It should be taken in the light of specific factors, for example the weather and whether the pilot has stated that he is, or is not, 'visual' or 'IMC'. In this instance, given the good weather conditions and that 3.8nm separation existed, a better course of action might have been to provide updated TI and then to assess the Tutor pilot's response. A final point worthy of consideration is the potential for the seniority/experience gradient to have affected the outcome of the SUP and DIR's liaison, which resulted in the turn onto S being issued; DIR was a relatively inexperienced first tourist, whilst the SUP was a multi-tourist, highly experienced controller. In that situation and cognisant that the risk of mid-air collision is a topic at the forefront of Defence aviation currently, it is unlikely that DIR would have questioned the SUP's direction. It is important to stress that this is not intended to criticise the personnel involved in what was a rapidly evolving situation, but to highlight areas that warrant further consideration in the broader ATM sphere.

Following a heading that was closing the extended CL, the King Air flew into conflict with a Tutor in the instrument pattern, causing ATC concern. The combination of an ATC issued instruction and a delay in following that instruction contributed to further reduced separation.

Recommendations:

RAF ATM Force Cmd is requested to:

> Consider whether current Human Factors training for ATM personnel addresses Team Resource Management (TRM) awareness: specifically, seniority/experience gradient.
>
> Consider, in consultation with the MAA and CAA SRG, providing guidance to RAF ATM personnel on discharging their responsibilities under MAA RA 3001 to prevent Mid-Air Collisions.

HQ AIR (TRG) comments that both ac received more information and assistance from ATC than was warranted by their choice of ATS and both also received in-cockpit indications permitting an early visual sighting and avoidance. BM SM's comments regarding King Air (A) crew's decision to extend so far to the W are valid; a switch to APP, or at least a request for information on instrument traffic, might have allowed for more coordination. Relying on ATC to go beyond the service selected by the pilot is not robust, particularly where the cockpit environment is busier than normal during simulated emergency handling. The routine use of a DS for any ATC vectored approach should also be considered. The main limitations of a DS are the requirement to obtain clearance for all heading and height changes and the perception that progress will be hampered by incessant avoidance turns. The former is not an issue as the aircraft is already under ATC vectors, and the latter is ameliorated by the 'if not sighted' caveat on avoiding action call and the extant ability for pilots to reject avoiding action against traffic where they are content that no conflict exists. Regardless of the ATSOCAS selected, pilots remain responsible for collision avoidance outside CAS.

HQ Air supports the recommendation for a review of the guidance to RAF ATM personnel.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

It was plainly unusual for visual cct traffic to fly as far as this away from an A/D, but it was evident from the QFI's account that the student flying King Air (A) had extended downwind well outside the MATZ because he was dealing with a simulated asymmetric recovery. The HQ Air (Trg) Member explained that the majority of sorties at this busy training aerodrome could potentially end with a practice emergency; he emphasised the high student/instructor workload, the difficulties of mixing different ac types operating at significantly different speeds - here King Air (A) was flying at twice the Tutor's speed - that results in a complex traffic scenario at Cranwell.

Outside visual range from the A/D it was evident the ADC could provide only limited assistance to the crew of King Air (A). The ADC was understandably focused on traffic in the cct and in the immediate vicinity of the A/D but had conscientiously used the ATM to issue TI to the crew of King Air (A) about other traffic; nonetheless, he could not follow the ac continuously and was thus not aware of the conflict developing with the Tutor 10nm W of the A/D. In the Board's view, it would have been preferable if the crew of King Air (A) had been with APP or DIR at this range from the A/D, perhaps with the benefit of a radar service to assist them with their lookout responsibilities whilst mingling with the instrument pattern. Nevertheless, the ADC had been advised when King Air (A) was N of the A/D that the crew were extending downwind before joining through initial, but he had kept that information to himself and had not liaised with the ACR. Both APP and DIR needed to know that King Air (A) was extending out of the cct area to the W and it would have been wiser if the ADC had prewarned the radar controllers - as might normally be expected a controller Member previously validated at Cranwell suggested - which controller Members recognised as good practice and better teamwork.

When DIR spotted King Air (A) and issued TI to the Tutor crew he was still not aware what it was doing and the information gleaned from APP that King Air (A) was in the visual cct was not an accurate statement. Crucially, it was at this point that DIR, at the SUP's direction, instructed the Tutor crew to turn R onto S. Whilst the crew did not react promptly to this R turn - the Tutor was in King Air (A)'s 11:30 position some 3.4nm away when this instruction was issued - controller Members recognised that this R turn southerly was a poor choice and had the opposite effect to that of positioning the Tutor away from King Air (A). DIR was a relatively inexperienced controller and unlikely to question the SUP's intervention and Members noted BM SM's recommendation on this TRM issue. Whilst not wishing to stifle any controller's initiative for taking positive action to forestall a conflict, and recognising the Tutor crew was in receipt of TS where separation is not applied against other traffic, nevertheless, Members noted that the Tutor was being vectored in the radar pattern and

the crew could reasonably expect not to be steered into close quarters with another ac. Many other options were available to DIR: it was suggested that a wiser choice might have been a L turn away from King Air (A) or, in the prevailing good weather conditions, as suggested by BM SM issuing further TI to the Tutor crew; however, it was the turn instruction that perpetuated the conflict with King Air (A) as it descended through the Tutor's level. The Board concluded, therefore, that this Airprox resulted because ATC vectored the Tutor into conflict with King Air (A).

After the third transmission of TI and as the Tutor's turn becomes apparent on the radar recording, the Tutor crew reported visual contact with King Air (A) over 1nm away. Although primed by the TCAS TA, the crew of King Air (A) saw the Tutor somewhat later, but the subsequent RA ensured that the crew descended clear of the Tutor before it was acquired visually. Taking all these factors into account, the Members agreed unanimously that there was no Risk of a collision in the circumstances conscientiously reported here.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: ATC vectored the Tutor into conflict with King Air (A).

Degree of Risk: C.