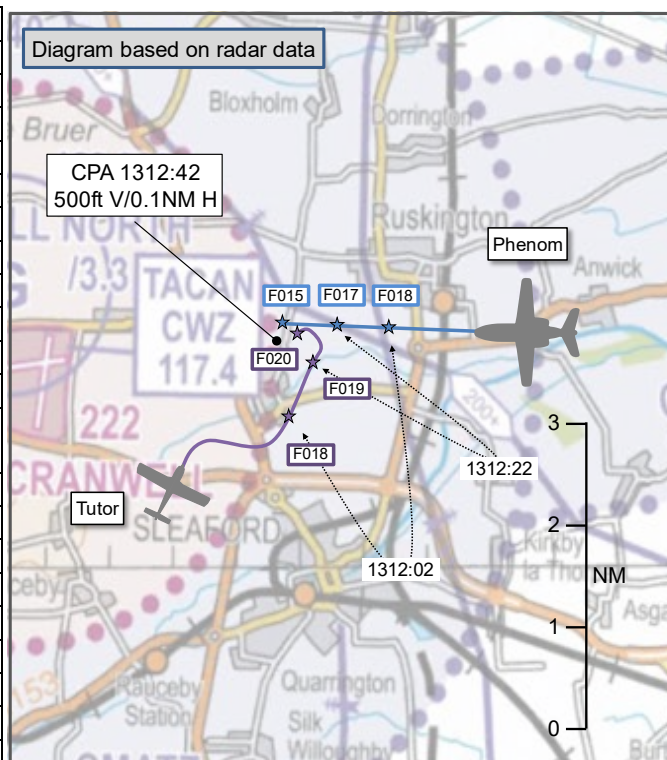


## AIRPROX REPORT No 2023005

Date: 18 Jan 2023 Time: 1312Z Position: 5302N 00024W Location: 3NM E Cranwell

### PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

| Recorded          | Aircraft 1      | Aircraft 2           |
|-------------------|-----------------|----------------------|
| Aircraft          | Phenom          | Tutor                |
| Operator          | HQ Air (Trg)    | HQ Air (Trg)         |
| Airspace          | Cranwell CMATZ  | Cranwell CMATZ       |
| Class             | G               | G                    |
| Rules             | IFR             | VFR                  |
| Service           | Traffic         | ACS <sup>1</sup>     |
| Provider          | Cranwell SRA    | Cranwell TWR         |
| Altitude/FL       | FL015           | FL020                |
| Transponder       | A, C, S+        | A, C, S              |
| Reported          |                 |                      |
| Colours           | White, Blue     | White                |
| Lighting          | NR              | Nav, Strobe, Landing |
| Conditions        | VMC             | VMC                  |
| Visibility        | >10km           | >10km                |
| Altitude/FL       | 1300ft          | 2000ft               |
| Altimeter         | QFE (988hPa)    | QFE                  |
| Heading           | 263°            | NR                   |
| Speed             | 130kt           | 120kt                |
| ACAS/TAS          | TCAS II         | TAS                  |
| Alert             | RA              | Unknown              |
| Separation at CPA |                 |                      |
| Reported          | 100ft V/0m H    | 100ft V/0.5NM H      |
| Recorded          | 500ft V/0.1NM H |                      |



**THE PHENOM PILOT** reports that they were flying a vectored SRA to RW26 at CWL with the trainee as PF and QFI as PM. The approach was flown with autopilot engaged, receiving a service from CWL SRA1. While discussing ways to fly the approach, the QFI spotted a Tutor co-alt and called the contact to the crew and ATC. This was followed by a TCAS “Traffic, Traffic” alert at approximately 1300ft agl. The TCAS traffic corresponded with the previously sighted Tutor which was now co-altitude in their 11 o’clock approximately half a mile, seemingly turning to join. It appeared to the crew that the Tutor was going to pass behind/overhead (as they continued the descent) and thus wouldn’t be an immediate factor. The crew lost sight of the Tutor as it passed overhead/behind and continued to fly the approach. A few seconds later a TCAS “Descend” RA was generated. The trainee disconnected the autopilot and descended in accordance with the RA. As the aircraft descended through 1000ft, the RA resolved to “monitor vertical speed” and the aircraft was levelled at 700ft when all TCAS warnings ceased. The aircraft was no longer stabilised on the approach, so the QFI instructed the trainee to go-around. The assumption was that they were clear of conflict. However, after responding to the PF call for flap 1 (limiting speed <200kts) and gear up, the QFI noted that the TCAS contact was still indicating on top of their aircraft +01, suggesting only 100ft vertical separation at 700ft agl. The QFI then took control and descended to gain separation and tried to acquire visually. Whilst looking for the other aircraft at approximately 400ft agl, the audio warner sounded indicating flap overspeed. Flap was selected up and the aircraft was accelerated to increase separation from the TCAS contact. During the incident the aircraft was being controlled by CWL SRA, but at no time was any Traffic Information received. The visual contact with the Tutor was reported to CWL SRA1 at approximately 1400ft, as well as the TCAS RA at approximately 1200ft. During the go-around, CWL SRA1 was informed of intentions and instructed them to contact CWL TWR. They flew through the deadside at 500ft and then departed

<sup>1</sup> At the time of the Airprox the Tutor pilot was on Cranwell Tower and receiving an ACS, in the lead-up to the Airprox they had been receiving a Traffic service from Cranwell Approach.

upwind. After Take-Off checks were performed and they climbed and levelled at 2500ft for a Radar-to-Visual recovery.

The QFI notes that the initial phase with acquiring the Tutor visually in busy Lincolnshire airspace is normal at Cranwell, but they were surprised that [the Tutor] had not been called or deconflicted by radar. They judged visually that [Tutor C/S] was giving them safe separation, but anticipated that the reduced lateral and vertical separation would trigger a TCAS RA. By following the TCAS RA, they were confident of safe separation. On descent iaw the TCAS RA, below 1000ft agl +/-100ft TCAS RA is inhibited and "monitor vertical speed" is a less familiar scenario. With all TCAS alerts cleared they assumed that the conflict with [Tutor C/S] was now resolved and that they were ahead of it. As the approach was no longer stabilised, they felt that it was appropriate for the trainee to initiate the go-around. After responding to PF request for Gear and Flap they then noted on the TCAS display that [Tutor C/S] was indicating on top +100ft. The trainee recollects it being rear right quarter. They [the QFI] had electronic information telling them there was a high risk of collision at a low altitude and approaching a visual circuit. They knew TCAS would not give an RA at this altitude and without being visual with [the Tutor], they were in a very uncomfortable situation. They had initially assumed [Tutor C/S] had been visual with them at 1400ft, but it made no sense to their mental model why they would descend on top of the Phenom. They therefore thought they [the Tutor crew] were not visual and that they needed to rely on their TCAS display to maintain separation as they approached the CWL circuit.

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

**THE TUTOR PILOT** reports that they initiated a visual recovery to Cranwell for a normal join to RW26 and were handed over to Cranwell Approach as per SOP. Approach advised them of visual circuit traffic and a Phenom on an instrument approach as they approached the airfield on a roughly northerly heading from south of Sleaford at around 2000ft QFE – they were not visual with any reported traffic at that point, and Approach requested they flew one orbit for spacing for recovering and departing traffic. On completion of the orbit and heading approximately north again, they requested the position of the instrument traffic, which was reported at 5 miles – as they were still not visual with the instrument traffic, they were conscious to remain well to the south of the centreline and elected to turn left (the long way around) onto east away from the instrument traffic i.e. towards the airfield initially to ensure separation. Approach advised of traffic departing downwind on RW26, which would become a potential conflict for their left turn and recommended (not directed) a turn right onto east instead, which they expedited to ensure they still remained sufficiently south of the centreline to stay clear of the instrument traffic. They immediately became visual with the Phenom on its approach at a range of about 2NM from their aircraft and laterally separated, although at a similar level. They informed Approach that they were visual with the radar traffic and that they would position behind for initials, at which point they were handed over to Cranwell Tower. They called Tower to join and were cleared, so continued to position visually for Initials behind the Phenom (rear right quarter as reported in their Airprox DASOR). From Initials, the Phenom was ahead, low and left of their position with increasing separation, exactly as they would expect from an aircraft on final approach, before initiating its Missed Approach. From initial sighting they remained visual with the Phenom at all times and maintained separation accordingly, whilst informing air traffic control of their position and intentions throughout.

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

**THE CRANWELL SRA CONTROLLER** reports that the Phenom was handed over from Radar Approach (RA) in the standard format. They identified it on Stud 13 and the approach continued normally. When [the Phenom] had roughly 4 miles to run, they noticed an RA squawk at the [Phenom's] 11 o'clock, 3 miles. They were preparing to confirm with RA that their traffic was visual with [the Phenom] so they could pass this message to the pilot. They delayed this until after the 3.5NM call and gear check. They transmitted '3.5 miles, 950 ft, check gear acknowledge'. The Phenom pilot replied with roughly '[C/S] is visual with the traffic at 11 o'clock.' They acknowledged the call and continued the approach. At 3NM, they transmitted on the radar clearance line (RCL) for [Phenom C/S] clearance, at this point, they realised that they hadn't received a positive gear check from the pilot due to the previous transmission reporting the traffic visual. They therefore asked the pilot to confirm gear was down, which was confirmed, before finishing the clearance call on the RCL. CWL TWR cleared [Phenom C/S] to low-

approach, with one in the visual circuit, they transmitted this to the pilot followed by acknowledge. There was no acknowledgement from the pilot and they could tell that the pilot was preoccupied, so they allowed the track to run for another ½NM before asking the pilot to acknowledge their clearance. At this point [the pilot] informed them that they would be levelling off and flying straight ahead. They asked [the pilot] to confirm that their intention was to 'fly through deadside RW26'. The answer was affirmative, so they gave a positive instruction to 'fly through deadside RW26, continue with CWL APP stud 5'; this message was transmitted on stud 13 and the RCL, to give CWL TWR awareness. [The Phenom pilot] also informed them that they were having to level off due to a TCAS RA that was caused by the traffic that they had earlier reported visual with, that was described as 'on top of us'. The pilot changed frequency at this point.

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

**THE CRANWELL RA CONTROLLER** reports they were working 3 aircraft on frequency. A Phenom in the radar training circuit (RTC), a Tutor for visual recovery from the south and a Prefect recovering from the northeast. Conscious that the Prefect and Phenom may end up in close proximity on approach, given their relative positions and speeds, they focused on height separating the Prefect from the Phenom, before calling them to each other. The Prefect was restricted to not below 2500ft until visual with the radar traffic or positioned well ahead on the approach. Traffic Information on the Prefect was passed to the Phenom pilot prior to handover to the SRA controller. Once the Prefect was established well ahead of the instrument traffic, they removed the height restriction and instructed the pilot to continue with Tower. The Tutor recovering from the south posed a further complication on being south of the centreline, with Initial being on the north side. This would require the Tutor to cut across ahead of the Phenom. The Mode C indicated the aircraft was already below a suitable height for them to suggest positioning for an overhead join. They reassessed that, with the relative speed of the Tutor slowing vs the other two recoveries converging, allowing the Tutor to proceed any further inbound would involve cutting across in front of the Phenom on an instrument approach and would have only added to the complication. Applying a height restriction to the Phenom would also have been impractical because of their planned further departure. This may also have introduced a point of conflict between the Prefect and Tutor both reaching Initial at the same time. They elected to hold the Tutor off to the south, until visual with the Phenom, to then route behind. They asked the Tutor pilot to perform a left-hand orbit, in the vicinity of Sleaford, for sequencing against the Prefect ahead for visual recovery and the Phenom on an instrument approach. On completion of the first orbit the Tutor pilot asked for the range of the instrument traffic. This was passed, along with its relative position and height, along with its planned intentions (low-approach, depart west). The Tutor pilot said they were conducting a further orbit, the controller assumed this was because they were yet to be visual with the Phenom, and this time their attention was drawn to a departing aircraft from Cranwell toward the now orbiting Tutor, this time in a right-hand orbit indicating the same height. They suggested the Tutor take up an easterly heading to maintain separation against both tracks. The Tutor pilot called "visual with the Phenom and positioning for Initials behind him", they called the departing traffic in the Tutor's 6 o'clock, 1 mile, for a second time, at the same level, the Tutor pilot reported visual with that traffic also and was transferred to ADC. The SRA controller reported the Phenom was declaring a TCAS RA and conducting a fly-through deadside at high speed. On further climb-out the Phenom pilot declared they were levelling out and would require some time. Assuming something may have been amiss, they positively controlled the Phenom, instructed them to report steady and level and asked if they required further assistance. The Phenom pilot requested a Radar-to-Visual recovery. This was completed as requested. They [the controller] elected to hold off a further recovering Tutor to the northeast to minimise the delay for the Phenom on recovery. The radar-to-visual recovery was flown without further incident. They did not recall an Airprox being mentioned on frequency but were informed later in the afternoon that the Phenom pilot had assessed this incident as such.

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

## Factual Background

The weather at Cranwell was recorded as follows:

METAR EGYD 181250Z 29010KT CAVOK 05/M01 Q0995 NOSIG RMK BLU BLU=

## Analysis and Investigation

### Military ATM

Utilising occurrence reports and information from the local investigation, outlined below are the key events that preceded the Airprox. Where available they are supported by screenshots to indicate the positions of the relevant aircraft at each stage. The screenshots are taken from a combination of replays using both Unit and NATS radars. As NATS radars are not available to the controllers they may not be entirely representative of the picture available, however the Unit radars provide the exact radar view seen by the controllers.

The Cranwell Approach controller was providing a Traffic Service to 3 aircraft, all recovering to RW26 at RAF Cranwell. The Phenom was established within the radar training circuit, whilst Prefect #1 was conducting a Radar-to-Initial recovery from the northeast under a Traffic Service, and the Tutor a visual recovery from the south on a Traffic Service.

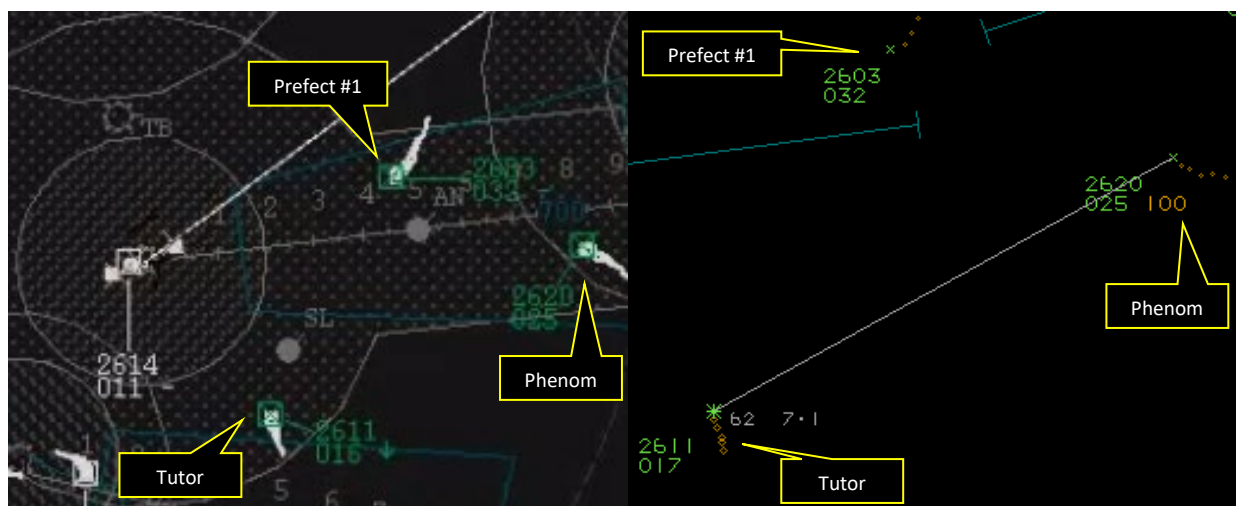


Figure 1 (1309:39): Traffic Information to Tutor on Phenom and Prefect #1.  
Separation 7.1NM

At 1309:39 the Cranwell Approach controller passed the Tutor pilot Traffic Information on both the Phenom and Prefect #1, “Instrument traffic 8 miles Phenom, Prefect positioning northeast 4 miles tracking west visual joiner in front of you”.

At 1310:16, following an abbreviated radar handover, the Cranwell Approach controller instructed the Phenom pilot to contact Cranwell Surveillance Radar Approach.

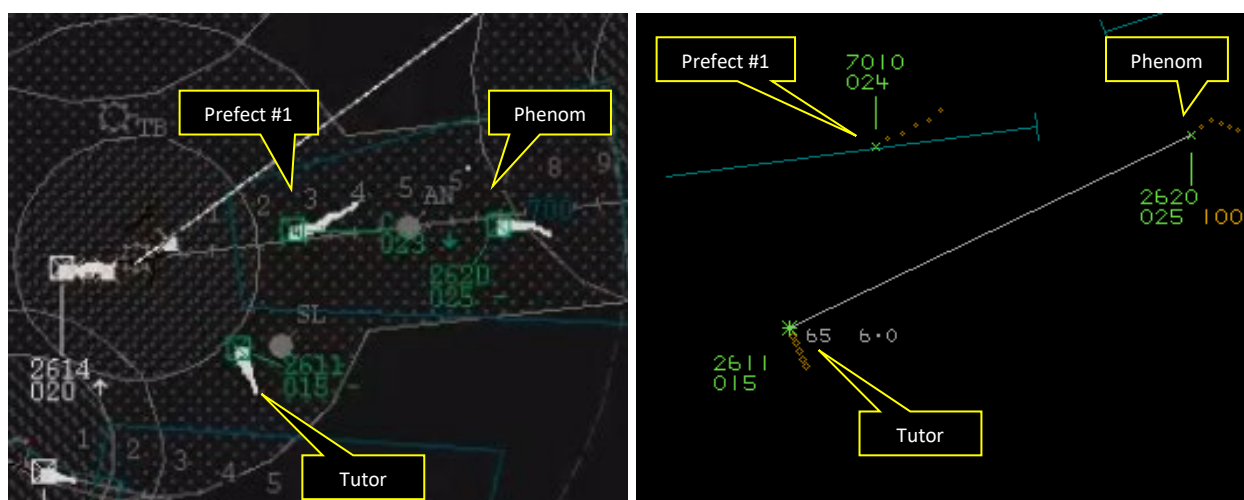


Figure 2 (1310:24): Traffic requested to conduct a left-hand orbit.  
Separation 6.0NM

At 1310:24 the Cranwell Approach controller requested the Tutor pilot conduct an orbit along with providing further Traffic Information on Prefect #1 and the Phenom, “*Can you perform one left-hand orbit for separation and sequencing against the visual joiner ahead of you and instrument traffic at 6 miles final*”. This Traffic Information was updated at 1311:09 following a request from the Tutor pilot, “*Instrument traffic is at 5 miles 1... correction 900ft above for low approach further, ermm departure to the west*”.

At 1311:35 the Tutor pilot declared their intention to conduct another orbit in that position to visually acquire the Phenom. The Cranwell Approach controller passed the Tutor pilot Traffic Information regarding Prefect #2, which was conducting an end of downwind leg departure at a similar level to the Tutor. At 1311:49, to separate the Tutor and Prefect #2, the Cranwell Approach controller then suggested a suitable routing to the Tutor “*suggest you pick up an easterly heading to route onwards wide to position behind the instrument traffic*”.

At 1311:53 the Tutor pilot declared visual with Phenom, “*visual with instrument traffic positioning for Initial behind*”. After providing further Traffic Information to the Tutor regarding Prefect #2, the Cranwell Approach controller instructed the Tutor pilot to contact Cranwell Tower at 1312:06.

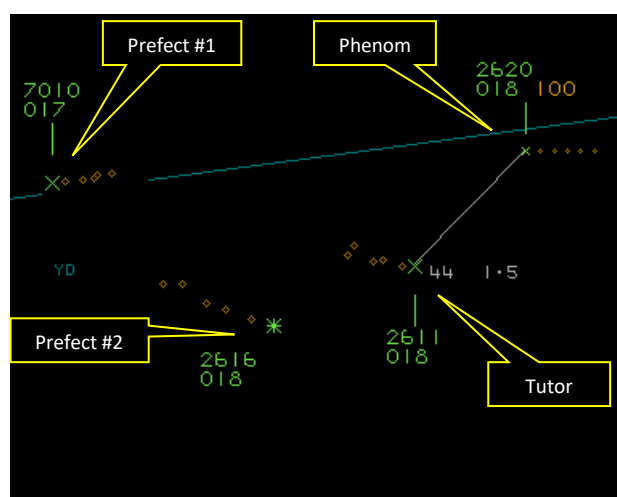


Figure 3 (1312:08): 3.5NM gear check call conducted for the Phenom. Separation 1.5NM

The Cranwell Surveillance Radar Approach controller observed the Tutor turning towards the centreline as the Phenom was approaching 4NM to run on the approach. At 1312:08, whilst preparing to confirm with the Cranwell Approach controller the intentions of the Tutor, the Cranwell Surveillance Radar Approach controller elected to prioritise the 3.5NM gear check to facilitate the

approach, their intention being to delay the Traffic Information regarding the Tutor until after the gear check.

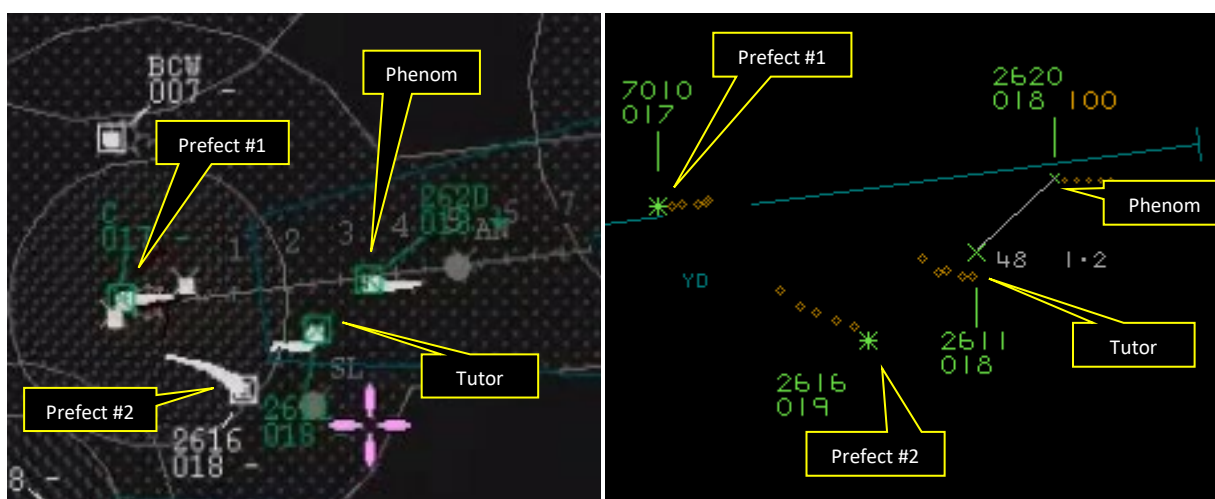


Figure 4 (13:12:11): Phenom reported visual with the Tutor. Separation 1.2NM

At 1312:11 the Phenom pilot reported visual with the Tutor to the Cranwell SRA controller, “we’re visual with joining traffic level with us, ermm 1 mile left”. The Cranwell Approach controller informed the Cranwell Surveillance Radar Approach of the Tutor pilot’s intentions. The Phenom pilot was not passed Traffic Information on the position of the Tutor, though, as the Cranwell Surveillance Radar Approach controller prioritised the 3.5NM gear check to facilitate the approach.

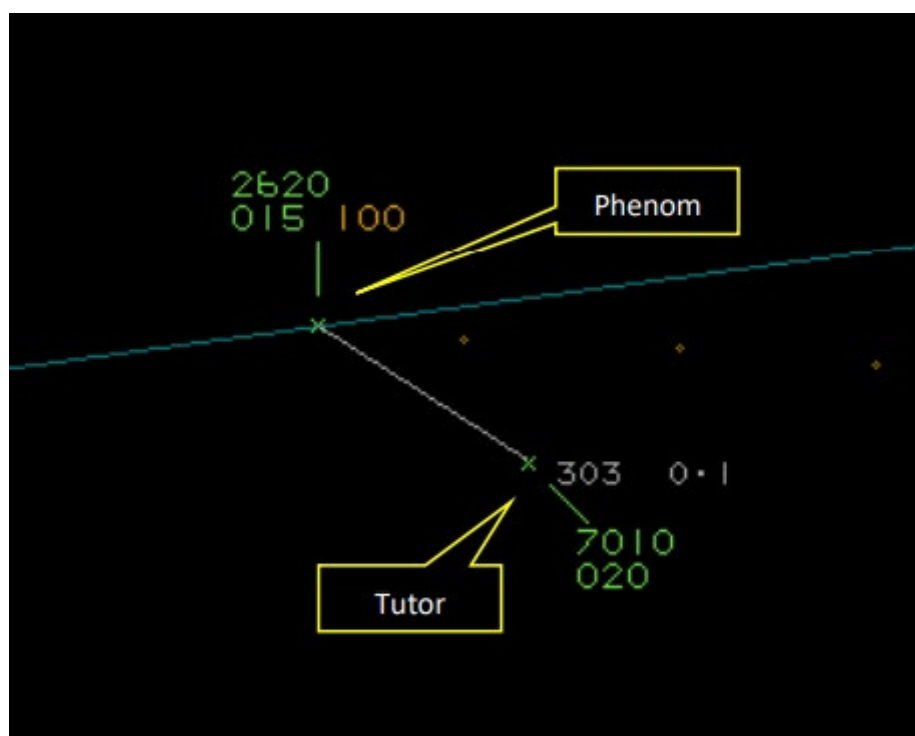


Figure 5 (13:12:42): CPA. CPA was measured at 0.1NM and 500ft separation.

At 1312:58 the Phenom pilot elected to break off the approach in response to the TCAS RA triggered by the Tutor’s positioning “change of intentions ermm were maintaining level accelerating away from contact he’s right on top of us”. The Phenom then proceeded to fly through deadside but the pilot elected to contact Cranwell Tower rather than Cranwell Approach to maintain situational awareness on the Tutor, now establishing on the Cranwell Tower frequency.

## Local BM Investigation(s)

The local investigation conducted by RAF Coningsby identified the cause of the Airprox as loss of situational awareness for the Phenom crew, however noted that the Tutor pilot was visual with the Phenom throughout the visual circuit join. Several BM related causal/aggravating factors were then identified that were believed to have contributed to the Airprox:

- a. An unawareness by the Tutor crew of how their proximity would affect the Phenom's TCAS.
- b. The Cranwell Surveillance Radar Approach controller elected to prioritise the gear check for the Phenom as opposed to pass Traffic Information to the Phenom pilot regarding the joining Tutor.

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

6FTS were to brief all aircrew regarding the operation and sensitivity of TCAS.

## 2 Gp BM Analysis

With the initial point for RW26 being situated 100ft displaced to the deadside (north of the centreline), it required the visual recovery profile of the Tutor to cross the centreline. The Cranwell Approach controller provided sufficient Traffic Information to the Tutor pilot to facilitate a visual join through both initial generic positioning information regarding the Phenom and then accurate Traffic Information. Due to the Tutor pilot not being visual with the Phenom and its proximity to both the Phenom and Prefect #1, the proactive control instruction of an orbit was a suitable method of resolution. This orbit and the subsequent westerly heading, required to maintain separation from the downwind departure by Prefect #2, enabled the Tutor pilot to visually acquire the Phenom.

As the Tutor pilot transmitted their intention "*visual with instrument traffic positioning for Initial behind*" there was no requirement for the Cranwell Approach controller to delay the visual join any further. The Cranwell Surveillance Radar Approach controller's decision to not immediately pass the Traffic Information to the Phenom regarding the Tutor and instead continue with the gear check is supported for two reasons. As the visual joining traffic, it was the responsibility of the Tutor pilot to maintain adequate separation from instrument traffic, in this case the Phenom. Additionally, a delayed gear check would have resulted in a delayed clearance for the approach and potentially resulted in an increased workload for the crew. With the Tutor pilot being visual with the Phenom and positioning behind, there was no imminent risk of collision and hence the prioritisation of control actions by the Cranwell Surveillance Radar Approach controller was justified. In addition to those identified by the local BM investigation(s) the following BM-related causal/aggravating factors have been identified by 2 Gp BM:

The integration of downwind departures with visual joiners from the south, particularly when an orbit for sequencing is required in such proximity to the visual circuit.

## Cranwell Occurrence Investigation

The Phenom was under control of the TATCC on an SRA. The Tutor pilot was attempting to sequence behind but failed to appreciate that they were close enough to the Phenom to trigger a TCAS RA and cause a high level of concern in the Phenom cockpit, particularly given that the crew were not visual with the Tutor, or updated on its location by ATC. Of note, although the Phenom pilot was visual initially with the Tutor, the Phenom pilot quickly lost sight of the Tutor as they turned and descended behind the Phenom. The Tutor pilot was visual with the Phenom throughout.

The investigation found that:

The Tutor pilot was requested to orbit to help with the sequencing of aircraft, but executed a very tight 360° turn which failed to increase significantly the spacing between the Phenom and Tutor. Thereafter they appeared to execute an expedited recovery.

The Tutor pilot was conscious of their position close to the airfield and the requirement to remain to the south of the centreline. In addition, a Prefect was departing downwind meaning that the Tutor pilot needed to take expeditious action to remain clear of both the Prefect and the Phenom.

Although the Phenom pilot was initially visual with the conflicting traffic, as the Tutor moved towards the 6 o'clock position they were obscured due to the window layout in the cockpit. This is a known issue with Phenom aircraft (amongst many others) and is usually overcome by the maintenance of situational awareness via other means.

The SRA controller prioritised the mandatory gear down check over providing situational awareness on the Tutor to the Phenom crew. This was likely further exacerbated by the TCAS RA call which was called by the QFI but did not appear to be received by ATC (nothing heard on the SRA audio recording but believed to be a simultaneous transmission with ATC passing a height call; aircraft audio not available) and thus ATC not being fully aware of the Phenom pilot's intentions. In addition, the lack of information on the Tutor eroded the Phenom crew's confidence in ATC information. Of note, had the Phenom crew been informed that the Tutor pilot was indeed visual with the Phenom, the crew would not have been overly concerned with the situation.

The Tutor pilot failed to appreciate the sensitivity of the TCAS II system fitted to Phenom and deemed visual separation sufficient. More widely, it is not known if the Tutor pilot (and indeed the wider Tutor community) are aware of the operating characteristics of the Phenom aircraft, particularly with respect to go-around SOPs, circuit patterns, operating speeds etc.

TCAS information is crudely displayed, particularly when in close proximity to other traffic, and the system cannot be relied upon for accurate data on contacts within 900ft. However, there is currently no SOP on how the TCAS should be employed to provide greatest SA, including which range scale setting is most appropriate. On this occasion, the range scale in use, coupled with the coarse depiction of own aircraft and conflicting traffic, reinforced the mental model of the Phenom QFI that the Tutor was extremely close.

## **UKAB Secretariat**

The Phenom 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.<sup>2</sup> 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.<sup>3</sup>

## **Comments**

### **HQ Air Command**

Whilst there was no risk of collision in this incident, with the Tutor pilot visual with the Phenom, it made for an uncomfortable period for the Phenom crew post TCAS RA, with incomplete SA on the other aircraft during a high workload phase of flight. This incident highlights the complexities of a Phase 2 flying training station; in this instance there were 3 aircraft of 3 different types converging on the same piece of airspace at approximately the same time. Sequencing aircraft of different types, flying different profiles, is always a challenge; with multiple radio frequencies in use in this case, the aircrew could not get a full picture from the other pilots' RT calls. ATC, however, gave, and indeed updated, joining instructions to the Tutor pilot to ensure safe sequencing; it is unfortunate that the Tutor flew close enough to the Phenom to trigger the TCAS RA and that the Phenom crew were unaware that the Tutor pilot was visual with them. The Local Investigation identified 2

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<sup>2</sup> MAA RA 2307 paragraphs 1 and 2.

<sup>3</sup> MAA RA 2307 paragraph 17.



recommendations aimed at increasing awareness of Cranwell aircrew users of TCAS II sensitivities and to encourage sympathetic consideration for others in the circuit.

## Summary

An Airprox was reported when a Phenom and a Tutor flew into proximity 3NM east of Cranwell at 1312Z on Wednesday 18<sup>th</sup> January 2023. The Phenom pilot was operating under IFR in VMC and in receipt of a Traffic Service from Cranwell SRA, the Tutor pilot was operating under VFR in VMC and in receipt of an ACS from Cranwell Tower.

## **PART B: SUMMARY OF THE BOARD'S DISCUSSIONS**

Information available consisted of reports from both pilots, radar photographs/video recordings, 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 first considered the actions of the Phenom pilot. They had been undertaking an SRA and had been visual with the Tutor earlier in the procedure. However, once the Tutor had positioned for its visual approach, the Phenom crew had lost sight of it. Using their TCAS for situational awareness, the Phenom pilot had grown more concerned as they had seen the Tutor closing on their TCAS and believed it to have been directly overhead and descending (**CF5**). The pilot's incorrect mental model of the position of the Tutor had been further reinforced by the TCAS RA, triggered by the Tutor (**CF6**). Some members commented that TCAS in azimuth should not be relied upon, and noted that the scale that the pilot had had the TCAS set to may have further exacerbated this incorrect mental model (**CF4**). That being said, the members with airline experience commented that the situation would have been very concerning for the Phenom pilot, TCAS resolutions are inhibited below 1000ft and they thought that the pilot would have felt that they had been squeezed between the Tutor and the ground, which would have introduced the added danger of the ground proximity. Members agreed that this would have been an uncomfortable situation for the Phenom pilot.

Members noted that the Tutor pilot had been visual with the Phenom as they had recovered to the visual circuit. They were informed by an RAF advisor that the Tutor pilot had needed to position to the north side of the runway centreline in order to join the visual circuit, which meant that, because they had been approaching from the south, at some point in the recovery they had needed to cross the centreline. Noting that the controller had asked the Tutor pilot to conduct an orbit to deconflict from previous traffic, some members expressed surprise that the Tutor pilot had remained in the same position once told about the Phenom conducting an instrument recovery, because they thought it had been obvious that the Tutor pilot would have needed to either conduct a number of orbits, or move further east. However, having been told to orbit by ATC, once visual with the Phenom, the pilot had been given permission to continue with their visual recovery. This positioning by the Tutor pilot, who had been visual with the Phenom and converging at a similar level, had caused the TCAS RA in the Phenom. Members thought that the Tutor pilot should have been more aware of the possibility of their actions triggering the TCAS and therefore given the Phenom a wider berth (**CF3, CF7**). However, the Board was heartened to hear the recommendations that had been made with regard to increasing awareness amongst Cranwell personnel on the TCAS parameters and sensitivities.

Turning to the actions of ATC, the Approach controller had requested that the Tutor pilot orbit in order to deconflict with a Prefect, and then also needed to deconflict with traffic departing from downwind. Again, members reiterated that the position in which the Tutor had been orbiting had not been ideal, being as it had been close to both the visual circuit and the radar pattern, and members thought that, although the controller had not been vectoring the Tutor, they could have suggested a better place to orbit. The Approach controller had been aware that the Tutor pilot had been visual with the Phenom, but it appeared that this information had not been passed on to the SRA controller. It had been unfortunate that the timing of the event had occurred at the same point at which the SRA controller had been required to request a gear check because, had the controller provided Traffic Information and told the Phenom pilot that the other pilot had been visual with them, it is likely that they would have been

content with the situation (**CF1**). Finally, the Board also noted that, although Cranwell controllers have STCA at their disposal, the Cranwell controller would not have had an STCA alert in this situation because the Tutor's squawk would have been outside the select frame of the STCA (**CF2**).

When assessing the risk, members considered the reports from the pilots and controllers, together with the radar screenshots. Members were satisfied that, because the Tutor pilot had been visual with the Phenom, there had been no risk of collision. However, whilst some members opined that normal parameters had pertained and safety had not been degraded, others thought that the lack of Traffic Information to the Phenom pilot, together with the TCAS RA at a low altitude meant that safety had been degraded. After a vote, the latter view prevailed, Risk Category C.

## **PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK**

### Contributory Factors:

| 2023005   |               |  |   |  |
|---|---------------|--|---|--|
| CF  | Factor        | Description                                | ECCAIRS Amplification   | UKAB Amplification   |
| <b>Ground Elements</b>  |               |  |   |  |
| <b>• Situational Awareness and Action</b>                             |               |  |   |  |
| 1   | Human Factors | • ANS Traffic Information Provision        | Provision of ANS traffic information  | TI not provided, inaccurate, inadequate, or late                                 |
| <b>• Electronic Warning System Operation and Compliance</b>           |               |  |   |  |
| 2   | Technical     | • Conflict Alert System Failure            | Conflict Alert System did not function as expected  | The Conflict Alert system did not function or was not utilised in this situation |
| <b>Flight Elements</b>  |               |  |   |  |
| <b>• Tactical Planning and Execution</b>                              |               |  |   |  |
| 3   | Human Factors | • Insufficient Decision/Plan               | Events involving flight crew not making a sufficiently detailed decision or plan to meet the needs of the situation                                 | Inadequate plan adaption   |
| <b>• Situational Awareness of the Conflicting Aircraft and Action</b> |               |  |   |  |
| 4   | 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            |
| 5   | Human Factors | • Unnecessary Action                       | <del>Events involving flight crew performing an action that was not required</del>  | Pilot was concerned by the proximity of the other aircraft                       |
| <b>• Electronic Warning System Operation and Compliance</b>           |               |  |   |  |
| 6   | Contextual    | • ACAS/TCAS RA                             | An event involving a genuine airborne collision avoidance system/traffic alert and collision avoidance system resolution advisory warning triggered |  |
| <b>• See and Avoid</b>  |               |  |   |  |
| 7   | Human Factors | • Lack of Individual Risk Perception       | Events involving flight crew not fully appreciating the risk of a particular course of action   | Pilot flew close enough to cause concern   |

Degree of Risk: C.

### Safety Barrier Assessment<sup>4</sup>

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

#### **Ground Elements:**

**Situational Awareness of the Confliction and Action** were assessed as **partially effective** because the SRA controller had not passed Traffic information to Phenom pilot.

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

**Electronic Warning System Operation and Compliance** were assessed as **not used** because the aircraft had been outside the select frame for the STCA to alert.

**Flight Elements:**

**Situational Awareness of the Conflicting Aircraft and Action** were assessed as **partially effective** because the Phenom pilot had inaccurate situational awareness and, due to the TCAS alerts, believed the Tutor had been directly above them.

| Airprox Barrier Assessment: 2023005 |  | Outside Controlled Airspace |                   |                     |      |                            |           |
|-------------------------------------|--|-----------------------------|-------------------|---------------------|------|----------------------------|-----------|
| Barrier                             | Provision  | Application                 | Effectiveness     |                     |      |                            |           |
|                                     |  |                             | Barrier Weighting |                     |      |                            |           |
|                                     |  |                             | 0%                | 5%                  | 10%  | 15%                        | 20%       |
| Ground Element                      | Regulations, Processes, Procedures and Compliance          | ✓                           | ✓                 | [Green bar to 5%]   |      |                            |           |
|                                     | Manning & Equipment  | ✓                           | ✓                 | [Green bar to 3%]   |      |                            |           |
|                                     | Situational Awareness of the Conflicting Aircraft & Action | ✓                           | !                 | [Yellow bar to 15%] |      |                            |           |
|                                     | Electronic Warning System Operation and Compliance         | ✓                           | ○                 | [Red box at 0%]     |      |                            |           |
| Flight Element                      | Regulations, Processes, Procedures and Compliance          | ✓                           | ✓                 | [Green bar to 10%]  |      |                            |           |
|                                     | Tactical Planning and Execution                            | ✓                           | !                 | [Yellow bar to 10%] |      |                            |           |
|                                     | Situational Awareness of the Conflicting Aircraft & Action | !                           | ✓                 | [Yellow bar to 20%] |      |                            |           |
|                                     | Electronic Warning System Operation and Compliance         | ✓                           | ✓                 | [Green bar to 15%]  |      |                            |           |
|                                     | See & Avoid  | ✓                           | ✓                 | [Green bar to 20%]  |      |                            |           |
| <b>Key:</b>                         |  |                             | Full              | Partial             | None | Not Present/Not Assessable | Not Used  |
| Provision                           | ✓  | !                           | ✗                 | ●                   |      |                            |           |
| Application                         | ✓  | !                           | ✗                 | ●                   |      |                            | ○         |
| Effectiveness                       | [Green]  | [Yellow]                    | [Red]             | [Grey]              |      |                            | [Red box] |