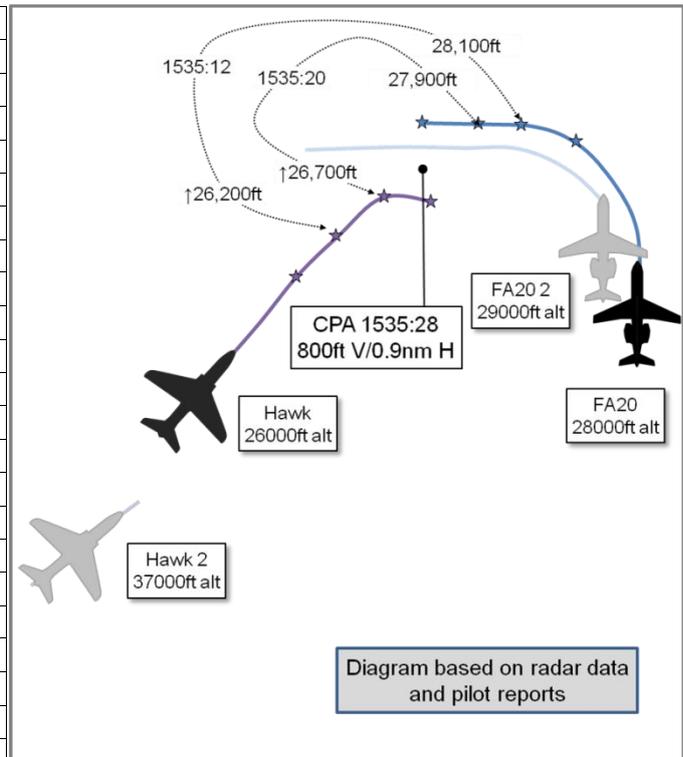


**AIRPROX REPORT No 2015023**

Date: 11 Mar 2015 Time: 1535Z Position: 5433N 00035E Location: D323B

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

Recorded	Aircraft 1	Aircraft 2
Aircraft	FA20	Hawk
Operator	Civ Comm	HQ Air (Ops)
Airspace	Lon FIR	Lon FIR
Class	C	C
Rules	VFR	VFR
Service	Traffic	Traffic
Provider	Hotspur	Hotspur
Altitude/FL	28000ft	27200ft
Transponder	A,C,S	A,C,S
<b>Reported</b>		
Colours	Blue/white strip	Black
Lighting	HISLs and Nav	Strobes, Nav
Conditions	IMC	IMC
Visibility	In Cloud	1km
Altitude/FL	28000ft	27000ft
Altimeter	QNH	QNH
Heading	300°	090°
Speed	360kt	Mach 0.65
ACAS/TAS	TCAS II	Not fitted
Alert	TA only selected	N/A
<b>Separation</b>		
Reported	100ft V 1-2nm H	Not seen
Recorded	800ft V/0.9nm H	



**THE FA20 PILOT** reports undertaking a Typhoon affiliation<sup>1</sup> sortie in the D323B airspace. They were receiving a Traffic Service from Hotspur. The sortie involved 2 FA20s, and 2 Hawks on the ‘Red’ side pitted against 4 Typhoons on the ‘Blue’ side. The FA20s and Hawks were IMC and so each had been allocated a sanctuary level to maintain throughout the sortie. The FA20s were at 29,000ft and 28,000ft, and were leading the Hawks, in ‘ladder’ formation<sup>2</sup> trailing 10nm behind, and at lower sanctuary levels of 27000ft and 26000ft. At a pre-assigned range from the Typhoons, the FA20s turned left through north, maintaining their levels. During this turn the No2 FA20 saw a TCAS contact at 26,000ft on his TCAS, this contact was believed to be the Hawk which, he reported, and then climbed up to a level of 28,100ft before descending; he estimated that the two aircraft were between 1-2nm of each other, IMC. At no time did Hotspur give any Traffic Information. As is their standard practise for this type of sortie, the FA20’s TCAS RA function had been inhibited because it would otherwise have constantly alerted due to the manoeuvring of the aircraft; therefore, only a TCAS TA was received. The event happened very rapidly, and so the pilot had no time to respond or take avoiding action.

He assessed the risk of collision as ‘Medium’.

**THE HAWK PILOT** reports that during the early stages of the first planned presentation the 4 ‘Red’ aircraft were heading 050° in 20nm ladder formation with the FA20 at 29,000ft and 28,000ft. The number 1 Hawk was at 26,000ft and the number 2 Hawk 10nm behind but at 37,000ft. The FA20 turned as planned, and the Hawk notched<sup>3</sup> to the right. During the turn, in IMC, the height was allowed to climb from the Hawk 1 sanctuary height of 26,000ft to that of Hawk 2’s height of 27,000ft; however, because Hawk 2 was 10nm in trail and well above at 37,000ft this wasn’t called on the RT.

<sup>1</sup> A flying exercise where dissimilar aircraft engage in mock air-combat engagements.

<sup>2</sup> Where aircraft follow each other in trail but stepped down in altitude.

<sup>3</sup> A manoeuvre where an aircraft turns through 90° to compromise radar detection.

On roll-out, the aircraft was recovered to 26,000ft and the presentation continued. After the mission, discussions with the FA20 pilot revealed that the top height of this manoeuvre had indicated to them as around 28,000ft, the sanctuary level for the FA20s, and that the two aircraft closed to within 2nm. No indication of this conflict was given by Hotspur. He noted that it was a high-work-load sortie, and that earlier radio problems with the Typhoons had led to a rushed set-up, with hindsight he felt that he should have delayed the start of the presentation.

He assessed the risk of collision as 'Medium'.

**THE HOTSPUR CONTROLLER** reports that he has very little recollection of the event. He has since been able to review the transcript of the sortie and could see nothing on the radar to indicate that an Airprox had occurred. He noted that the Mode C of the Hawk indicated FL271 at its maximum and that there was 1nm lateral separation between the two aircraft prior to the Hawk turning on to south and descending down to FL205. During this phase of the sortie he would have been providing the 'Red' aircraft with a tactical picture and, as such, his attention would have been on the 'Blue' aircraft; therefore, it would be unlikely that he noticed the event, which took place within 1 sweep of the radar picture.

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

**THE HOTSPUR SUPERVISOR** reports that he did not recall witnessing a loss of separation during the sortie. On reviewing the radar replay he noted that the pressure on the day was 1009 HPa, so the Mode C readout would normally be 100-200 ft high; therefore, with a Mode C readout of FL271 he would not deem the Hawk to have left his sanctuary height.

## Factual Background

The weather at Durham Tees Valley was reported as:

METAR EGNV 111520Z 18017KT 8000 -RA FEW029 BKN036 08/05 Q1021

## Analysis and Investigation

### Military ATM

At 1535:09 (Figure 1), the FA20 (5134) was showing 28,100ft on the standard pressure setting of 1013hPa (actual 28,000ft on 1009hPa) and the Hawk (5131) was showing 26,100ft (actual 26,000ft on 1009hPa).

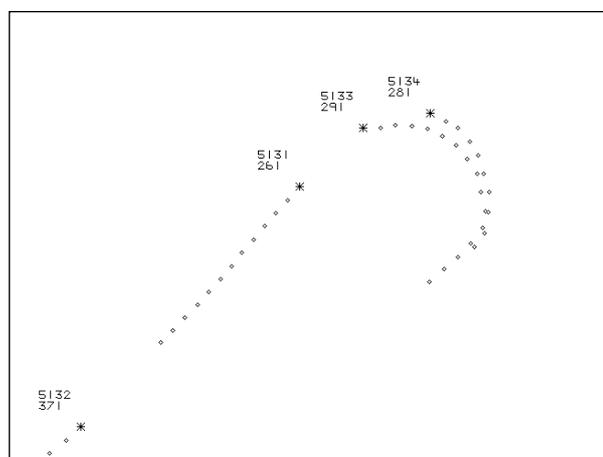


Figure 1: Geometry at 1535:09.

At 1535:21 (Figure 2), the Hawk showed 26,800ft in the climb (actual 26,700ft on 1009hPa).

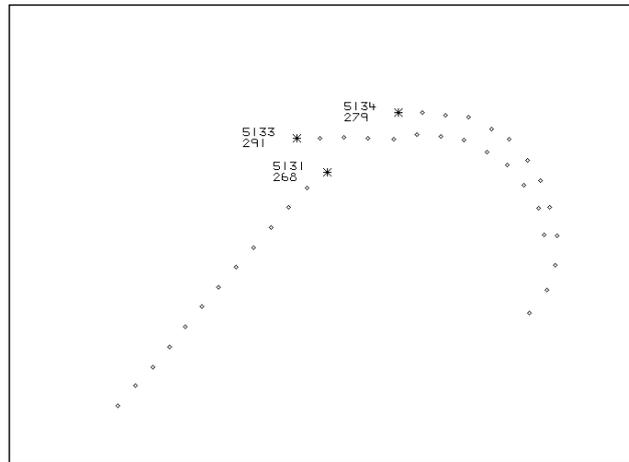


Figure 2: Geometry at 1535:21.

The CPA was estimated at 1535:26 (Figure 3) with 0.9nm and 800ft separation on Mode C.

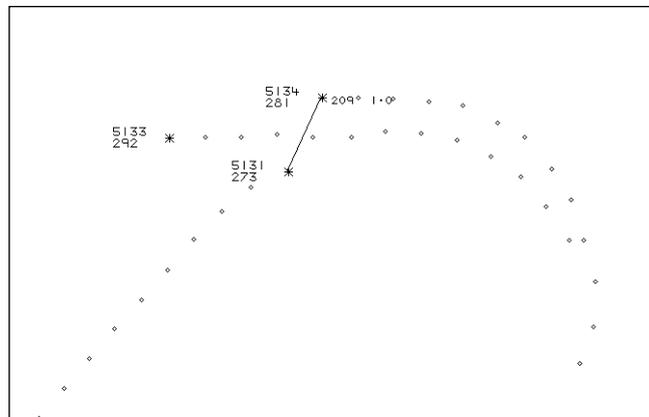


Figure 3: CPA at 1535:26.

Following CPA at 1535:34 (Figure 4), the Hawk was viewed descending back to 26,100ft (actual 26,000ft on 1009hPa).

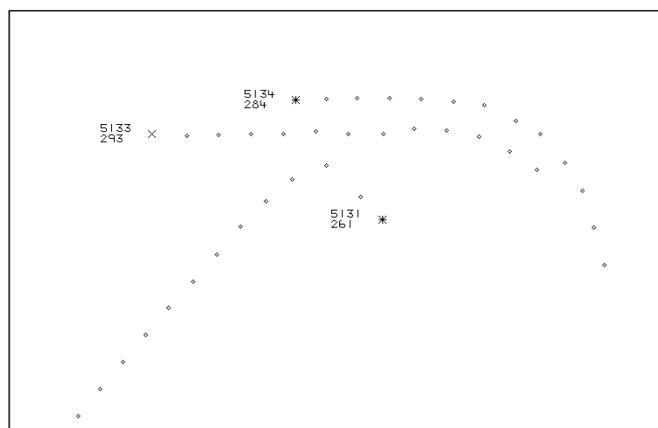


Figure 4: Post-CPA at 1535:34.

The radar replay showed the Hawk at the following altitudes:

- 1535:22 Hawk altitude 26,800ft (actual 26,700ft on 1009hPa).
- 1535:26 Hawk altitude 27,300ft (actual 27,200ft on 1009hPa).
- 1535:30 Hawk altitude 27,200ft (actual 27,100ft on 1009hPa).
- 1535:36 Hawk altitude 26,100ft (actual 26,000ft on 1009hPa).

The pilot of the Hawk lead element allowed his aircraft to climb from his own sanctuary height of 26,000ft to just above the sanctuary altitude of his wingman of 27,000ft because he had momentarily entered IMC and knew that the other Hawk was 10nm in trail at 37,000ft. The Hawk lead then descended back to sanctuary height following roll-out and, post-mission, the FA20 pilot had reported that the Hawk had climbed to 28,000ft. The FA20 pilot reported that the TCAS display on the Falcon had indicated that the Hawk had climbed through its level, reaching 28,100ft [the FA20's altitude], within 1-2nm horizontal separation. The aircraft were IMC throughout and not visual with each other.

The radar replay shows a CPA at 1535:26 of 0.9nm horizontal separation and 800ft vertical separation; the Falcon was indicated at 28,100ft and the Hawk was at 27,300ft. The TCAS on the FA20 would have detected the climbing Hawk, and the FA20 pilot observed a TCAS readout of 28,100ft, but there is no indication on the radar replay that the Hawk was above 27,300ft (with radar readouts of 4 second intervals). Traffic Information was not passed by Hotspur, although the controller would have observed approximately 1,000ft separation to aircraft operating within their sanctuary blocks. Neither of the pilots were visual, and the Hawk aircraft was not fitted with ACAS. The profile of the Hawk triggered a TCAS TA contact in the FA20, with a TCAS readout suggesting that the Hawk had broken the sanctuary level.

### **UKAB Secretariat**

Both pilots shared an equal responsibility for collision avoidance and for not flying into such proximity as to create a danger of collision<sup>4</sup>. If the incident geometry is considered to be converging and approximately co-altitude then the Hawk pilot was required to give-way.<sup>5</sup>

## **Comments**

### **HQ Air Command**

The procedural barrier of sanctuary altitudes was eroded in this case by the decision of the Hawk pilot to use his wingman's sanctuary, knowing that it was vacant, but not communicating this to the other ac to maintain their Situational Awareness. Had the FA20 pilot elected to do similar there could have been a much more serious outcome. That said, the available radar data indicates that separation at CPA was around 1nm and 800ft – even allowing for data latency it is extremely unlikely that the Hawk actually penetrated the Falcon's sanctuary, as reported by the Falcon pilot – there may be an underlying issue of how TCAS data is presented to the crew which could have led to misinterpretation of relative altitudes. This incident highlights the need to share situational awareness, particularly when executing an unbriefed and unexpected manoeuvre, to ensure that all players have an accurate mental picture of aircraft relative positions.

## **Summary**

An Airprox was reported on 11<sup>th</sup> March 2015 at 1535 between a FA20 and a Hawk aircraft, both aircraft were IMC, and both were receiving a Traffic Service from Hotspur. The aircraft were part of a training sortie for 4 Typhoon aircraft and were operating as an enemy formation, although IMC, each aircraft had their own sanctuary height to maintain separation, the FA20 was at 28,000ft and the Hawk 26,000ft, but as he manoeuvred he ballooned in height causing a TCAS TA for the FA20.

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

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

<sup>4</sup> Rules of the Air 2007 (as amended), Rule 8 (Avoiding aerial collisions).

<sup>5</sup> SERA.3210 Right-of-Way (c) (2) Converging.

The Board first looked at the actions of Hotspur. Both pilots had reported that they would have expected the controller to give them Traffic Information. The ASACS Board member outlined the role of Hotspur in this type of exercise; the whole exercise would have been pre-briefed and the controller would have been made aware of the sanctuary heights of each of the aircraft. Whilst the controller would be expected to give Traffic Information on external traffic or if he perceived that situational awareness had been lost within the formation, he would not expect to provide inter-formation Traffic Information if they were operating within pre-briefed parameters. In this case, the Hawk had remained within the briefed sanctuary levels, albeit he had climbed to the level of the No2 Hawk. Therefore, the ASACS member opined that the controller would not have perceived there to be a problem in this scenario. The Board noted with disappointment that, due to equipment malfunction, the ASACS RT recordings were not available, and the Chairman noted that this was not the first Airprox this year that had had to be assessed without the ASACS RT recordings. The Board were assured that the equipment was going through an upgrade which should resolve the issue.

In looking at the actions of the Hawk pilot, the Board thought that although he was clear in his own mind that his wingman's sanctuary level was available to him, he would have been wise to have made an RT call to the rest of the formation indicating that he intended to use the sanctuary height of the other Hawk. This would have helped improve the FA20 pilots' situational awareness, and perhaps highlighted to them that they might expect to observe TCAS indications as they turned.

The Board then discussed the TCAS indications in the FA20. A pre-Board telephone discussion with the FA20 pilot had established that he had selected absolute altitude on his TCAS display, as opposed to the common selection of relative altitude, and that this was based on the QNH selected on the altimeter. This was selected in order to improve situational awareness on other aircraft in the engagement by correlating displayed altitudes with sanctuary altitudes. The Board were informed that the read-out he received was therefore in actual altitude, not a height differential from his own aircraft. The Board were perplexed as to why this should display an altitude of 28,100ft on his TCAS as opposed to the reality from the NATS radars which showed the Hawk reaching only 27,300ft indicated. Irrespective of altitude or flight level, the NATS radar replay clearly showed that a height differential of 800ft was present at CPA, and the Board thought it unlikely that the Hawk had climbed to the same level as the FA20 and back down again in the 4 seconds between radar sweeps. The Board wondered whether the TCAS could have projected the Hawk's climb to show an anticipated climb; but to their knowledge this was not a function of TCAS, which was believed to show actual heights only, as derived from Mode C. Some members wondered whether the FA20 TCAS display font might make a 6 look like an 8 (there was anecdotal evidence that some displays used differing numerical fonts for this reason, in order to avoid such confusion). Other members wondered whether the QNH had been erroneously set during the set-up for the engagement, and whether this might have affected the displayed values; however, the FA20 crews had not reported any inconsistencies in the rest of the sortie apart from this incident. Finally, not being familiar with the FA20 display, some members wondered whether it might be possible to mistake the FA20's own altitude for that of the Hawk's when interpreting the display in a high-workload situation.

The Board found it difficult to reconcile the disparity between the FA20 pilot's perception of the altitude of the Hawk and the radar recordings that showed otherwise. Therefore, the Board could only reach the conclusion that, for some reason, the FA20 pilot had perceived that the Hawk had climbed to his sanctuary level.

Having agreed that the FA20 pilot had perceived that the Hawk had climbed to his sanctuary level, the Board also agreed that there was a contributory factor that the Hawk pilot had not communicated his intention to use the higher Hawk sanctuary level. Notwithstanding, the Board assessed that at 0.9nm and momentarily 800ft separation, the risk of collision was Category E; normal safety standards had pertained.

**PART C: ASSESSMENT OF CAUSE AND RISK**

Cause: The FA20 pilot perceived that the Hawk had climbed to his sanctuary level.

Contributory Factor(s): Lack of communication from the Hawk pilot that he would be using the higher Hawk sanctuary level.

Degree of Risk: E.