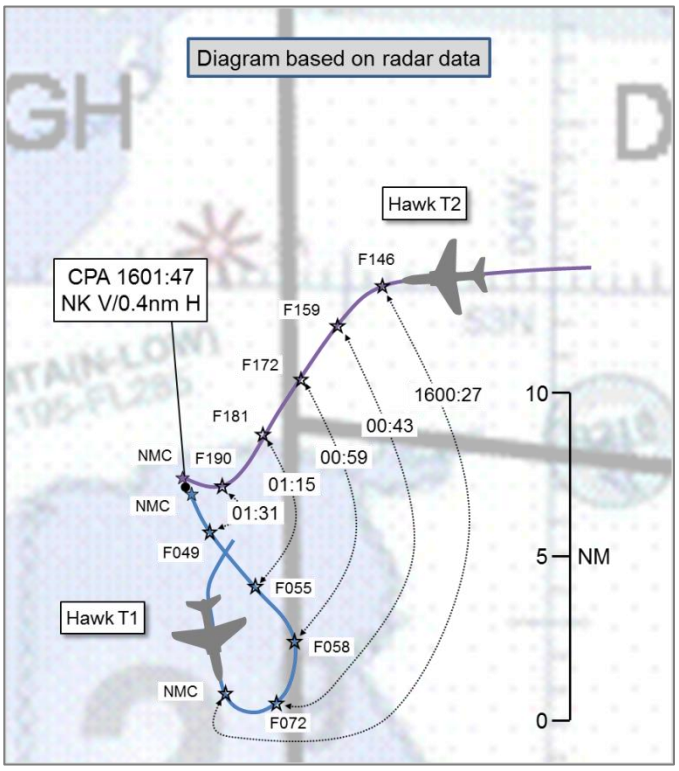
AIRPROX REPORT No 2014020

Date/Time: 5 Mar 2014 1602Z

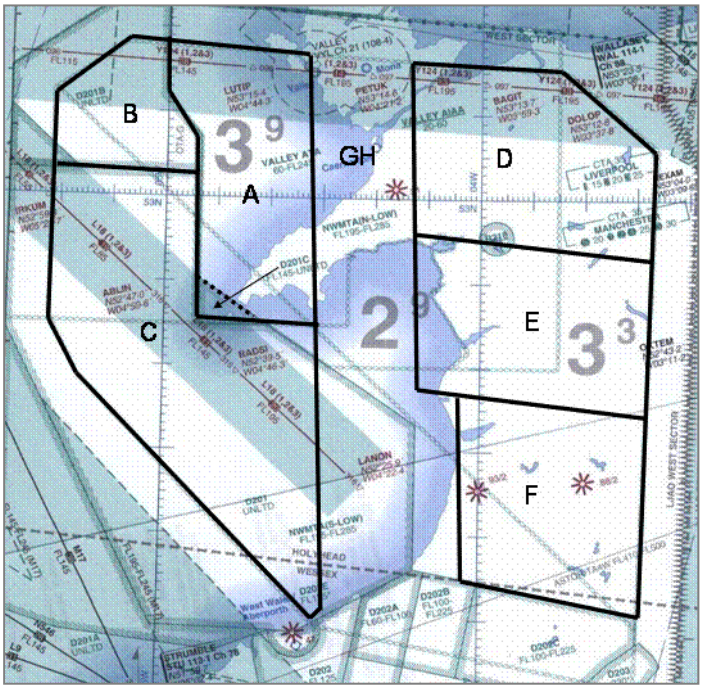
Position: 5256N 00421W (Lleyn Peninsular)

Airspace:	Valley ATA	(*Class*: G)
	Aircraft 1	*Aircraft 2*
Type:	Hawk T1	Hawk T2
Operator:	HQ Air (Trg)	HQ Air (Trg)
Alt/FL:	13,000ft RPS (1012hPa)	10,000ft RPS (1013hPa)
Conditions:	VMC	VMC
Visibility:	50km	25km
Reported Separation:	'300ft'	1200ft V/0.25nm H
Recorded Separation:	NK V/0.4nm H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HAWK T1 PILOT reports 'good VMC' in the RAF Valley 'GH Corridor'. The black aircraft had navigation lights and HISLs selected on, as was the SSR transponder with Modes A and C; Mode S was not fitted. The aircraft was not fitted with a TAS or ACAS. The pilot was operating under VFR, in VMC, in receipt of a Traffic Service from Valley RAD. There was 'a high level of stratus' with a base of about 18,000ft and broken stratocumulus cloud tops at 4,000ft in the southern end of the '4 FTS GH Corridor'. The aircraft was maintained within the constraints of the Corridor. The pilot believed he had good SA from Valley RAD and sound deconfliction from all other traffic, including with other Hawk aircraft using the Valley Deconfliction frequency. He was unaware that Sunburst formation was in his vicinity or operating in the GH corridor. ATC passed Traffic Information of traffic 'at 1nm' when, climbing on a heading of 270° at 300kt and passing 13000ft, he just caught sight of another Hawk in his left 10 o'clock at about 4-600yd in a slow descent. The other aircraft was on an apparent collision course, increasing in size but with no sight-line rate, so he broke upwards and over-banked to maintain visual contact. He reported the Airprox over RT and subsequently to ATC on the ground. The pilot commented that 'it all happened exceptionally quickly'.



VATAs and GH Corridor

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

THE HAWK T2 PILOT reports leading Sunburst formation for close and tactical formation manoeuvering. The black aircraft had navigation lights, conspicuity light and HISLs selected on, as

was the leader's SSR transponder with Modes A, C and S. The aircraft were fitted with TCAS. The pilots were operating under VFR, in VMC, in receipt of a Traffic Service from Valley RAD. The formation members had manoeuvred in the vicinity of Valley Aerial Training Areas (VATAs) D and E before splitting for individual general handling. Another Hawk singleton [not the subject Hawk T1] had deconflicted with Sunburst formation to operate in the vicinity of VATA E; VATAs A and B were active with traffic. Following the formation split, Sunburst 2 remained in VATA D and Sunburst 1 climbed to attempt a spin. The weather in VATA D was unsuitable for spinning but looked better near the GH Corridor. At about 1558:30, Sunburst 1 headed towards the GH corridor and climbed to approximately 20000ft to find suitable weather. At about 1601:30 the aircraft captain decided to descend out of a thin layer of cloud and not attempt a spin due to the weather being unsuitable. The student pilot (handling pilot) began a >6000fpm RoD at 420kt IAS/M0.77 and right hand turn onto a heading of 350°. During this time there were no contacts on TCAS and no Traffic Information was given by ATC on the position of [subject Hawk T1 C/S]. At about 1602:04 the student pilot and Rear Seat Captain gained visual with a Hawk aircraft in the right 2 o'clock high, about 0.5nm away. The student pilot initiated a left turn onto 330° and continued the descent to about 10000ft. About 3sec after sighting the other Hawk, the Rear Seat Captain confirmed with the student pilot that he was visual and a clipped Traffic Information call to [Hawk T1 C/S] from ATC was heard. Almost at the same time, a TCAS TA appeared starting at +200ft and quickly showing +500ft. At about 1602:12, [Hawk T1 C/S] called that they were visual with Sunburst 1 and shortly after, at about 1602:14, the student pilot initiated a right hand turn to maintain visual contact as the other aircraft passed behind. At the time of crossing, the captain assessed the lateral range to be inside 0.25nm and outside 1000ft vertically. This was confirmed by the TCAS showing +1200ft and increasing. [Hawk T1 C/S] initiated an Airprox over the radio. The Hawk T2 pilot commented that he had briefed that Sunburst formation would remain on the formation chat frequency (to allow deconfliction between elements) and Valley RAD frequency[1].

He assessed the risk of collision as 'Low'.

THE VALLEY CONTROLLER reports that he took over the Valley TC(RA) (RAD) position following a full handover from the off-going controller, some 3min before the reported Airprox. He was informed that Sunburst formation were general handling in VATA D in the block 5-25000ft and that [Hawk T1 C/S] was conducting general handling in the GH Corridor in the block 3-15000ft. To make his task easier, the controller began to enter code callsign information about 2 of his 4 Traffic Service aircraft into the system. He scanned all 4 aircraft tracks on the radar screen and 'no input was required'. [Hawk T1 C/S] was indicating 5000ft and Sunburst 1 was indicating 19000ft with 4-5nm lateral separation. The other 2 aircraft were separated by at least 10-15 nm. SSR Mode C dropped off the [Hawk T1 C/S] and Sunburst radar returns. Mode C reappeared 1-2sec later and indicated 1000ft of separation between the subject aircraft. Traffic Information was called to [Hawk T1 C/S] as Sunburst 1 was equipped with TCAS. The Hawk T1 pilot reported visual with Sunburst 1 and then requested whether Traffic Information had been passed to the other aircraft. The Valley RAD was unable to pass Traffic Information to Sunburst 1 as the frequency was occupied by the Hawk T1 pilot's request.

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

THE VALLEY SUPERVISOR reports that he was in the VCR, liaising with the Duty Aircrew Officer, whilst this incident occurred. The RAD involved advised him of the situation and the RT tapes were impounded.

Factual Background

The weather at RAF Valley was recorded as follows:

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METAR EGOV 051550Z 20020KT 9999 FEW008 SCT100 BKN200 09/07 Q1018 BLU TEMPO SCT008 GRN
METAR EGOV 051620Z 20022KT 9999 BKN020 BKN110 09/07 Q1018 WHT TEMPO SCT010 GRN
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[1] The Hawk T1 and T2 are equipped with 2 radios.

Analysis and Investigation

Military ATM

This incident occurred on 5 Mar 14 at 1602 between a Hawk T1 and a Hawk T2. Both aircraft were under a Traffic Service from the RAF Valley Approach controller. The incident occurred in the Valley General Handling corridor, 5 nm north-northwest of Llanbedr.

All heights/altitudes quoted are based upon SSR Mode C from the radar replay unless otherwise stated. The radar replays are based upon the Clee Hill Radar and do not represent the images available to the controller.

The Valley Approach controller had just taken over the control position and had four aircraft on frequency. The workload was described as 'medium to low'; the Supervisor assessed the controller's workload as 'medium'. Approach was in the process of inputting callsign conversion to enable all other controllers to recognize the aircraft by callsign on radar. Upon handover of the Approach position, the controller was informed that the Hawk T1 was General Handling in the specified corridor between 3,000ft and 15,000ft and that the Hawk T2 formation were in VATA D between 5,000ft and 25,000ft. The controller recalled the Hawks being separated by 4-5nm and having 14,000ft vertical separation. The SSR Mode C data disappeared from radar on both aircraft and when it returned, 1-2sec later, 1000ft of separation was indicated and Traffic Information was called. Traffic Information was prioritised to the Hawk T1 as the controller knew that this model lacked TCAS. The Hawk T1 pilot reported visual and then asked if Traffic Information had been passed to the other aircraft; the brief exchange did not allow the controller to then pass information to the Hawk T2 pilot.

At 1601:30, as per Figure 1, the Mode C's indicate 048 (Hawk T1) and 188 (Hawk T2).

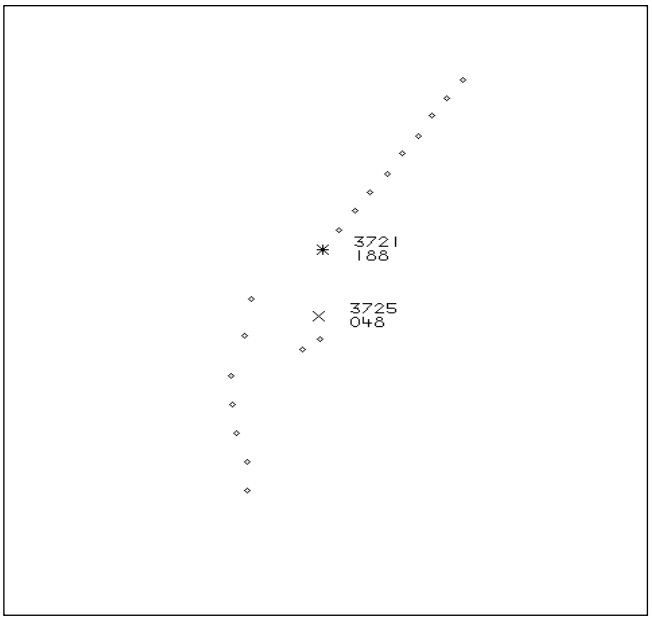

Figure 1: Aircraft geometry at 1601:30 (Hawk T1 squawking 3725; Hawk T2 3721)

As the pilots started to operate in the same geographical area, as shown in Figure 2, the trails became tangled but the Mode C readouts still displayed, as 066 and 184.

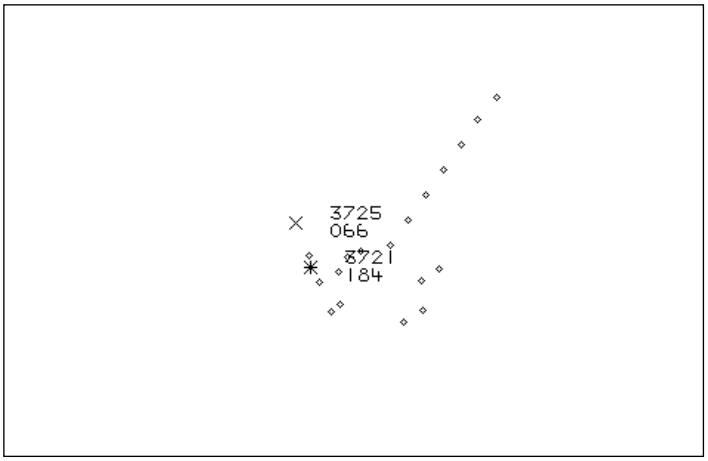

Figure 2: Aircraft geometry at 1601:49

Figure 3 shows the aircraft geometry at 1601:55; the Hawk T1 is in the climb and the Mode C has disappeared from the Hawk T2.

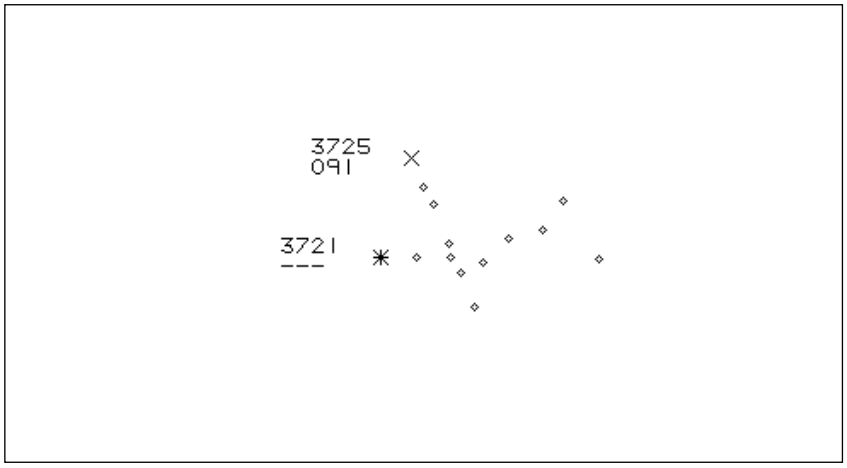

Figure 3: Aircraft geometry at 1601:55

At 1602:03, the Approach controller began a transmission to Hawk T1 and at 1602:05 continues with, "[Hawk T1 C/S] *traffic south…west, 1 mile, tracking north, FL125*."

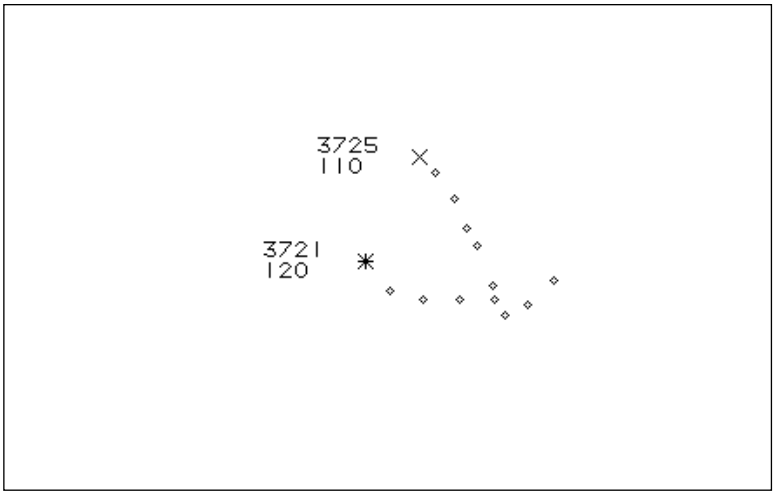

Figure 4: Aircraft geometry at 1602:03 Traffic Information

Hawk T1 pilot replied with "*Visual now*" at 1602:10, as at Figure 5. The CPA on radar analysis is at 1602:11 with 0.3nm separation but indeterminate vertical separation due to Mode C dropout.

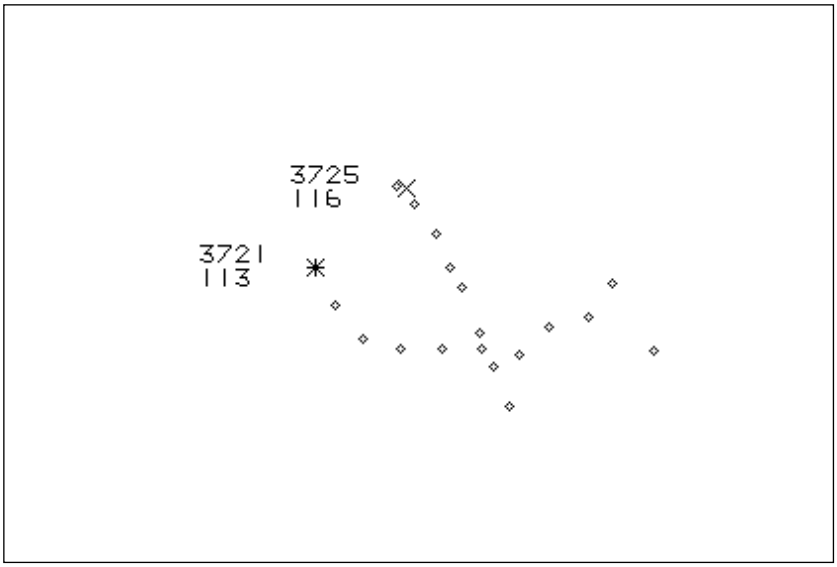

Figure 5: Aircraft geometry at 1602:10 when Hawk T1 calls visual

The Hawk T1 pilot did not have situational awareness of the other aircraft; his aircraft was not fitted with TCAS and he was using the Valley Deconfliction Frequency to listen out for other airspace users. The Hawk T2 pilot did not have the Deconfliction Frequency selected and ATC are not able to dial into, or monitor, the frequency. The Hawk T2 had TCAS fitted but this was of limited use during high-energy manoeuvering. The Hawk T2 formation were not using the Deconfliction Frequency because the internal formation frequency was used to monitor separation between formation elements. On a shared Valley Approach frequency, crews would only be aware of others operating in the area if the callsigns were used on the RT or Traffic Information was provided. Pre-flight airspace deconfliction plans are always susceptible to changes due to sortie requirements and weather; the Hawk T2 pilot's change of operating area was not known to the Hawk T1 pilot. Dynamic deconfliction of aircraft depends upon shared situational awareness, usually provided by radar-based Traffic Information.

The controller was scanning the radar and momentarily inputting code callsign information, but the high-energy manoeuvring, and particularly the high rate of decent of the Hawk T2, meant that Traffic Information was initiated with approximately 1.1nm horizontal separation between aircraft. Prior to the Mode C dropout there was approximately 12000ft of vertical separation. To add further context, the Mode C on the fully serviceable SSR could not provide an accurate update and even though the aircraft were provided with overlapping operating blocks, the controller was not aware of the rapid descent or the change of operating area for the Hawk T2. The controller was monitoring the radar screen and, prior to the rapid descent, the aircraft had been well-separated on Mode C and in separate operating areas. As per CAP 774, Chapter 3, the approach controller's role was to provide Traffic Information to assist the pilots in avoiding other traffic; early information may have alerted the Hawk T2 pilot of the traffic below and led to a delay in spin/descent or re-positioning to clearer airspace. Equally, had the Hawk T2 informed the approach controller of his intentions, the Hawk T1 and approach would have been alerted.

The barriers of Traffic Information, lookout and TCAS (Hawk T2 only) all played their parts in this incident but the nature of the manoeuvres demonstrate that they are liable to dilution given the busy and dynamic environment of fast jet operations at Valley. The barriers to an incident will be improved with robust airspace booking procedures, more inclusive use of Deconfliction Frequencies and pro-active use of Traffic Information for airspace planning and deconfliction.

In order to address airspace booking and deconfliction, RAF Valley have an ongoing review of airspace procedures and are conducting a re-write of the Flying Order Book, due for publication in June 2014.

UKAB Secretariat

Both pilots shared an equal responsibility for collision avoidance and not to fly in such proximity to another aircraft as to create a danger of collision[2].

Comments

HQ Air Command

A number of barriers that mitigate the risk of mid air collision were available in this incident; however, the airborne deconfliction frequency barrier was not available and the controller was not briefed on the change of intentions of the Hawk T2 pilot (which may have prompted a TI call to the Hawk T1 pilot given the likely rapid erosion of vertical separation). Encouragingly, TI was passed to the Hawk T1 (non-TCAS equipped) first but the Hawk T1 pilot then delayed the passage of TI to the Hawk T2 with a superfluous message to ATC. Ultimately, the detection of the conflict was down to lookout, once again proving the indispensability of this core skill.

Summary

An Airprox was reported when a Hawk T1 and a Hawk T2 flew into proximity at 1602 on 5th March 2014. Both pilots were operating under VFR in VMC and both were in receipt of a Traffic Service from Valley RAD.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included 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 first considered the actions of the Hawk pilots. Both were conducting their sorties within Class G airspace and both were in receipt of a Traffic Service from Valley RAD. The pilots both had 2 radios, the other of which were selected to a different frequency in each aircraft, the Hawk T1 to the Valley GH Corridor Deconfliction Frequency and the Hawk T2 to an intra-formation frequency. The Hawk T2 pilot had been operating in a 2-aircraft formation, the elements of which had recently separated to complete individual tasks. The Hawk T2 pilot had elected to climb and find airspace with suitable weather to complete a spin. He was unable to do so and descended rapidly, passing close to the Hawk T1 in the process.

Some Board members felt that Valley ATC could usefully have given Traffic Information at a slightly earlier stage and questioned the controllers actions in inputting code call-sign conversion data just after starting on console rather than settling down to assimilate fully the tactical situation. Notwithstanding, the Board noted that the Hawk T1 and T2 pilots had planned to operate in altitude blocks that overlapped, 3-15000ft and 5-25000ft respectively, and ATC members felt that it would be impractical in any case for Valley RAD to have provided a meaningful Traffic Service to pilots with overlapping altitude blocks when their manoeuvering intentions were such that they could come into conflict in the vertical too quickly for Valley RAD to give effective Traffic Information. This would be compounded by the occulting of Mode C altitude indications should the aircraft manoeuvre at a rate of climb or descent greater than 10000fpm, a likely scenario with fast-jet traffic.

The Board opined that although the altitude blocks were a feasible traffic management tool whilst the aircraft were separated geographically, once the plan had changed and the Hawk T2 pilot moved out of his pre-booked area of VATAs D and E (as he was perfectly entitled to do), it became increasingly important for him to advise ATC of his intentions in order to mitigate unforeseen conflicts in the vertical before he commenced his high rate of descent (which Valley RAD was unable to detect). Members agreed that, in these circumstances, it rested with the aircraft captains to pass sufficient

[2] Rules of the Air 2007 (as amended), Rule 8 (Avoiding aerial collisions), as reflected in Military Flying Regulations.

information to allow Valley RAD to achieve a meaningful Traffic Service, and the Board felt that this was contributory to the Airprox.

The Board then considered the overall VATA system itself. Members were advised that the VATAs had been implemented to allow more aircraft to operate in a given area, that it had been in use for a number of years, and that the number of separate areas had increased over time from simply VATAs 'East' and 'West' to the current VATAs A to F and the GH Corridor. It was noted that the current system meant that pilots unable to remain in their booked VATA could effectively only use the GH Corridor to complete any contingency plan; this corridor was not subject to the same booking rigour and could end up funnelling Valley traffic into a relatively constrained area thus introducing an increased risk of confliction. The Board agreed that this 'funnelling' of Valley traffic was contributory to the Airprox, and noted that the increased complexity inherent in systems designed to increase flexibility could unfortunately introduce their own unforeseen hazards as shown in this event. Furthermore, the Hawk T2 pilot had not changed frequency to the GH Deconfliction Frequency on leaving the VATAs; the Board therefore felt that reliance on this frequency as a deconfliction measure was not sufficiently robust. The Board was heartened to learn from the HQ Air Cmd SME that a review of the VATA system was currently being undertaken.

Considering the cause and risk, the Board felt that the aircraft would not have passed in such proximity if either pilot had seen the other aircraft earlier and that the Airprox was therefore due to a late sighting by both pilots. The Hawk T2 pilot did see the other Hawk before CPA and manoeuvred, thereby honouring the VFR requirements of see-and-avoid; however, given the highly dynamic manoeuvering involved, the Board felt that safety margins had been much reduced below the normal.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A late sighting by both pilots.

Contributory Factor(s): 1. The Hawk T2 pilot did not inform ATC of his change in plan.

2. Establishment of the GH Corridor leads to funnelling of Valley traffic when using contingency plans.

Degree of Risk: B.

ERC Score[3]: 4

[3] Although the Event Risk Classification (ERC) trial had been formally terminated for future development at the time of the Board, for data continuity and consistency purposes, Director UKAB and the UKAB Secretariat provided a shadow assessment of ERC.