

## **AIRPROX REPORT No 2013179**

Date/Time: 20 Dec 2013 0929Z

Position: 5301N 00412W  
(Lleyn Peninsular)

Airspace: Valley AIAA (Class: G)

Aircraft 1                      Aircraft 2

Type: Hawk T1(A)              Hawk T1(B)

Operator: HQ Air (Trg)        HQ Air (Trg)

Alt/FL: 6000ft                      6000ft  
            QNH (1007hPa)              QNH (1007hPa)

Conditions: VMC                      VMC

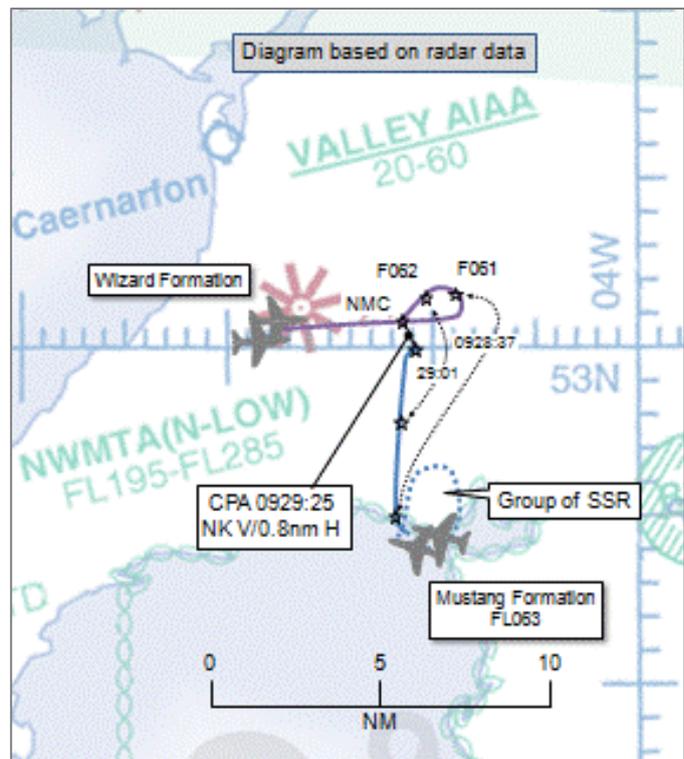
Visibility: 25km                      40km

Reported Separation:

700ft V/500ft H      300ft V/100ft H

Recorded Separation:

NK V/0.8nm H<sup>1</sup>



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

**THE HAWK(A) PILOT** reports conducting a student instructional sortie as lead of a pair of aircraft, Mustang formation. The black aircraft had navigation lights, nose light and white HISLs selected on, as was the SSR transponder with Modes A, C and S. The aircraft was not fitted with a TAS or ACAS. The pilot was operating under VFR in VMC; Mustang formation were in receipt of a Traffic Service from RAF Valley. Due to local training airspace being active through the period (Valley Aerial Tactical Areas (VATAs) A, B, D, E, F and D201), the formation leader elected to conduct the flying exercise south of the Lleyn peninsula, operating under a Traffic Service with Valley radar on VHF and with a UHF intra-formation 'chat' frequency on the other radio. During the sortie, ATC informed all formations that VATAs A and B were now available; Obi formation (a pair) elected to operate in the vicinity of VATA A due to poorer weather in VATA B. Later, Wizard formation (a pair) were noted to be operating to the north of the Lleyn peninsular as was a singleton. Throughout the sortie, 'traffic calls' were at a high density, with multiple calls for formations Obi and Wizard. Mustang formation did not receive any traffic calls until the incident. Shortly before the incident, Mustang formation was repositioning to track north, at 380kt, and an internal call was made to ascertain whether the formation leader (at that stage the tactical wingman) was content and ready for recovery or required another exercise. Another exercise was requested. At this point, having recently coasted-in over the southern coast of the Lleyn peninsula, ATC passed Traffic Information stating that there was another formation at the 2 o'clock position, range 3nm and at 6100ft. The Mustang formation lead rear-cockpit pilot sighted Wizard formation in a perceived climbing left hand turn in the right 1 o'clock at about 2nm and made a call of "Mustang, descend now". The Mustang formation number 2 pilot rolled inverted and pulled whilst the Mustang formation lead pilot bunted to remain visual with all formation elements. The lead element of Wizard formation was noted to be about 700ft vertically and 500ft horizontally displaced to the east from the Mustang formation number 2. Mustang formation lead was estimated to be 1000ft vertically below the same aircraft. The trail element of Wizard formation appeared to be about 2-3000ft displaced to the east with 500ft of vertical separation. Due to the proximity of Wizard formation, there was no time to change to VHF and respond to the ATC call before positively manoeuvring. Once Mustang formation had descended and turned onto west (away from the last known position of Wizard formation), a confirmatory call of having received the ATC call

<sup>1</sup> CPA is derived from surveillance tracks but some aircraft in the formations were not transponding. Actual CPA could therefore have been less than that recorded.

and having been visual with the [other] formation was made, and an update on their position requested. The exercise was curtailed and Mustang formation recovered to base.

He assessed the risk of collision as 'Medium'.

**THE HAWK(B) PILOT** reports conducting a staff training sortie as number 2 of a formation pair, Wizard formation, in the North Wales MTA<sup>2</sup>. His black aircraft had navigation lights, nose light and red HISLs selected on as per close-formation SOPs. The SSR transponder was selected to standby; the aircraft was not fitted with a TAS or ACAS. The pilot was operating under VFR in VMC. Wizard formation was in receipt of a Traffic Service from RAF Valley on VHF and were using a UHF intra-formation 'chat' frequency on the other radio. On formation check in, Wizard formation lead could not hear the number 2 on VHF, but ATC could. This intermittent communication between the formation on VHF continued throughout the sortie; however, both aircraft captains were able to receive calls from Valley RAD and other aircraft on frequency and had 'good 2 way comms' on their UHF intra-formation frequency. On initial check in, Valley RAD passed that a single Hawk aircraft was being operated south of the Lleyn (its captain had called on VHF to say they were remaining south of the Lleyn) and that all VATAs were hot<sup>3</sup>. A later traffic call stated that 'Obi formation' was operating on the VATA A/GH Corridor boundary. After conducting manoeuvring, Wizard formation was visual with Obi formation and de-conflicted from them by heading east, with Obi formation going to operate in VATA A which had just become cold. (VATA B was also now available although unfit due to weather). Once eastbound, the Wizard formation number 2 rear-cockpit passenger visually picked up 2 aircraft, "Right, 2 o'clock, 5nm" with ATC approximately 10sec later calling "Pop-up Traffic, South East, 5 nm, no height". Wizard formation lead, seeing the pop-up traffic in a left hand turn through west, turned Wizard formation north to de-conflict. During the next exercise, heading 260° at 320kt, the Wizard formation number 2 rear-cockpit passenger visually identified 2 aircraft at close range on the nose. He called "break away" to the handling pilot. The handling pilot asked for a direction to break to (having not seen the conflict). The passenger then shouted "Break up" at the same time as the handling pilot gained visual with 2 Hawks, less than 1nm on the nose. The pilot pulled up using maximum performance to get away from the 2 opposite direction Hawks. At the same time, Valley RAD called "Wizard, traffic, 12 o'clock, 1nm". The separation was judged to be approximately 100ft to the left and 300ft below Wizard formation number 2. Wizard formation terminated the sortie and returned to RAF Valley without further incident.

He assessed the risk of collision as 'High'.

**THE VALLEY RAD CONTROLLER** reports controlling 4 speaking units, including 3 formation pairs. Mustang and Wizard formations were general handling approximately 10-20nm south of Valley, in the GH corridor and in the vicinity of VATA D, between 5-25000ft amsl. Traffic Information had been passed to both formations on various occasions before the occurrence; no acknowledgement of the traffic calls had been received. At approximately 0930, RAD passed Traffic Information to Mustang formation relating to Wizard formation, who at that point were approximately 4nm to the north east with no height information displayed. Height information then appeared on Mode C and indicated both formations were at a similar level, which was immediately passed to Mustang formation. RAD waited approximately five seconds for an acknowledgement from Mustang formation, to avoid dual transmission, before calling the traffic to Wizard formation, at which point the traffic was approximately one mile apart and indicating similar height. Mustang formation reported visual with Wizard formation and had been 'working an internal frequency'. RAD asked for clarification as to whether the two formations were deconflicted using an intra-formation frequency. Mustang formation then asked for an updated location of Wizard formation, who in turn requested an update of traffic within five miles. When the incident occurred, Wizard formation reported that Mustang formation was "uncomfortably close".

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

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<sup>2</sup> Military Training Area.

<sup>3</sup> Were occupied.

**THE VALLEY SUPERVISOR** reports the occurrence happened during a wave of 14 aircraft operating from Valley. He, along with the Approach Controller and another Radar qualified controller, was monitoring the Radar Controller's task as it was becoming apparent that 3 formations from the same Sqn were intending to operate within an approximate 10nm radius of one another. All aircraft involved were operating on the same ATC frequency. Prior to the incident, the Radar Controller broadcast that VATA A was also available for use. As the formations turned towards one another, the Radar Controller passed traffic information to Mustang formation and then to Wizard formation, although no acknowledgement was received. Due to the manoeuvring of the formations, Mode C information was not always displayed, however the Radar Controller updated height information as soon as available. At their closest, the formations appeared to be within approximately 1nm with Mode C indicating similar levels. Wizard formation reported seeing the other aircraft, and that they had been working on an internal frequency. As stated in the Radar Controller's narrative, Wizard formation also reported that the other aircraft had been 'uncomfortably close'. The Duty Pilot was advised of the occurrence and after landing, the Sqn involved advised ATC that they were planning to submit an Airprox regarding the incident. The SUP de-briefed the Radar Controller involved and he also believed that a hazardous incident had occurred.

## Factual Background

The weather at RAF Valley was recorded as follows:

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EGOV 200850Z 23022KT 9999 FEW020 BKN140 09/04 Q1013 BLU BECMG 20030G40KT SCT020 WHT
EGOV 200950Z 23023KT 9999 FEW027 BKN250 09/04 Q1013 BLU BECMG 20030G45KT SCT020 WHT
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## Analysis and Investigation

### Military ATM

The incident occurred at 0929 on 20 Dec 13, to the south of RAF Valley, involving two pairs of Hawk T1 aircraft (Hawk Mustang & Wizard formations) under a Traffic Service from RAF Valley Radar. Hawk Mustang formation were conducting a formation sortie in the North Wales Military Training Area and Hawk Wizard formation were on a tracking exercise in the same area; both formations were general handling between 5000ft and 25000ft amsl.

All heights/altitudes quoted are based upon SSR Mode C from the radar replay unless otherwise stated. The radar replay used for investigation was not the display available to the controllers.

Both crews report handling in VMC, above cloud height of 4000ft, with visibility estimated between 15km and 40km. The Valley Flying Order Book has procedures to avoid airspace congestion but on the day, poor weather limited airspace and five of the six VATAs, plus D201 Aberporth Range, were active. Following a prolonged period of poor weather, a busy and productive flying day had been planned. Both formations were on the same VHF frequency used by Valley Radar to provide an ATS.

The Valley RAD was providing a service to four speaking units, including three pairs formations; the task difficulty was described as 'medium' and the workload was described as 'high'. The SUP had agreed with the traffic assessment and when it was clear that three formations were operating within proximity of one another, additional controller support was provided to the RAD and the SUP monitored and witnessed the incident.

At 0927:41, the RAD called Traffic Information to Hawk Mustang formation, "*Mustang, traffic southeast five miles tracking er north, indicating no height information*". Figure 1 depicts the geometry of the traffic; the radar replay displays Mode C height information but the SUP confirmed that due to the high energy manoeuvres, the Mode C was not always painting on the Valley radar and height information was passed when showing on screen. The RAD updated the information to confirm that the traffic was no longer a factor.

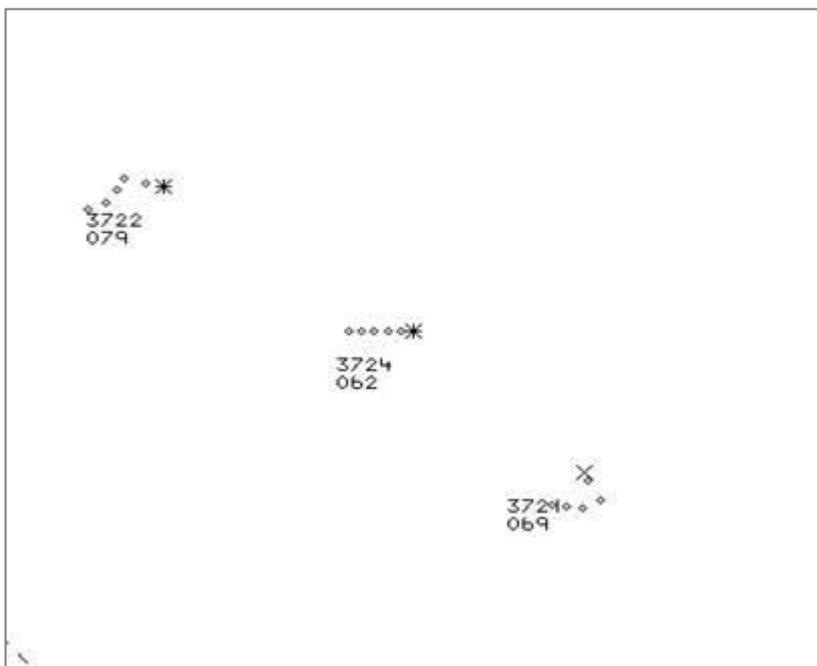


Figure 1: Aircraft geometry at 0927:41 (Mustang formation 3724; Obi formation 3722; Wizard formation 3721)

At 0928:54, Traffic Information was passed to Wizard formation, “*Wizard, traffic northeast three miles, pair manoeuvring, tracking west, no height information*”. Figure 2 depicts the geometry and confirms that the traffic was in fact heading east and not west.

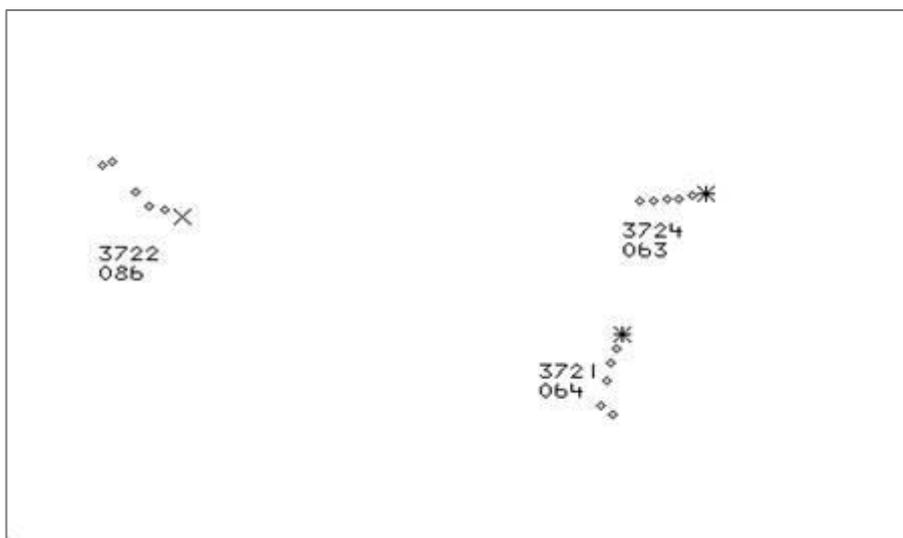


Figure 2: Aircraft geometry at 0928:54

An update was provided at 0929:03 to provide height information; at this point the formations indicated the same height on radar replay with 3.7nm horizontal separation, see Figure 3. Neither Traffic Information calls were acknowledged by Wizard formation. The controller delayed his transmission to Mustang formation because he waited for an answer to avoid dual transmissions.

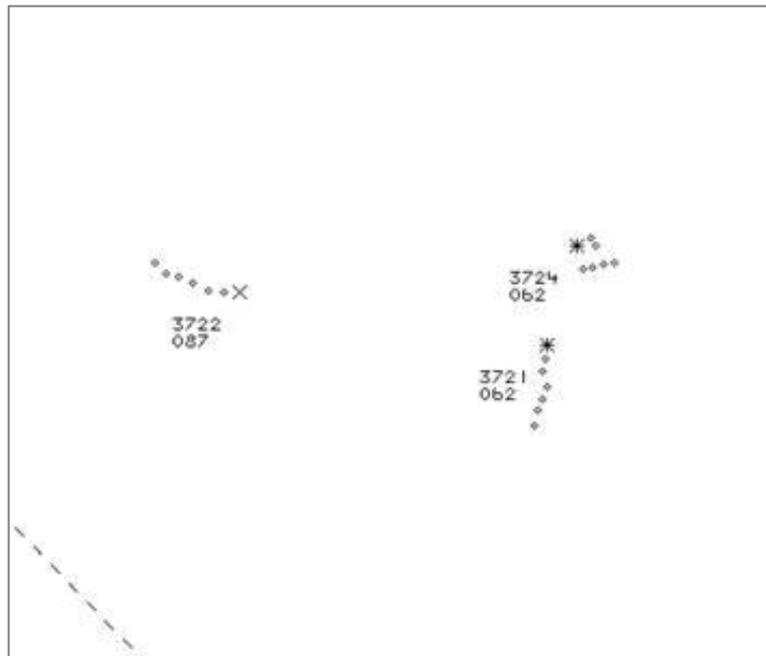


Figure 3: Aircraft geometry at 0929:03

At 0929:13, Mustang formation turned to the south, taking their track towards the other formation (see Figure 4), prompting Traffic Information, “*Mustang, traffic south west, 1 mile tracking er north indicating er altitude 6300 feet*”. Mustang formation did not respond to the RAD.

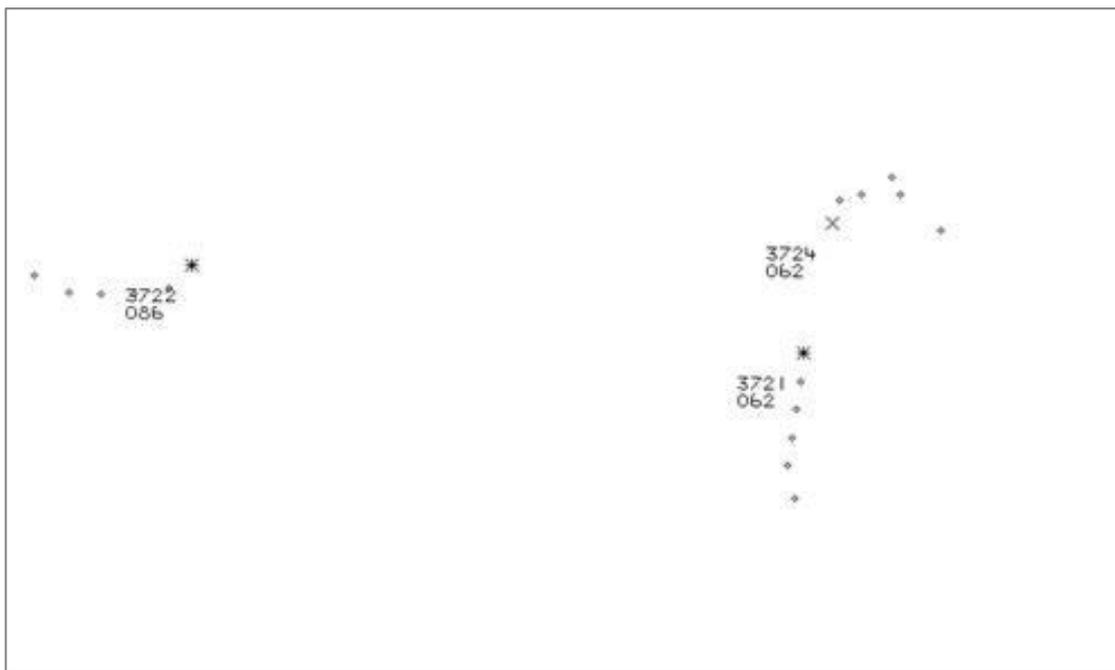


Figure 4: Aircraft geometry at 0929:13

The CPA from radar replay occurred at 0929:25 with 0.8nm horizontal separation, which did not capture the exact Mode C of Wizard formation; the crews of Mustang formation put the separation at 100ft horizontal and 300ft vertical. At 0929:31, Wizard formation responded to earlier Traffic Information with, “*Wizard, copied. We er saw that traffic, we were talking on internal frequency*”. A further update was requested by the Wizard formation and after confirmation that the other formation had got ‘uncomfortably close’ the Wizard formation requested information on all aircraft within a 5nm radius.

BM SPA recognises that this was a busy controlling period for the RAD and commends his Traffic Information calls, and the SUP for providing support. The Traffic Information was mostly accurate considering that height information was not always displayed, although increased accuracy would have helped the crews acquire conflicting aircraft and/or assist in their navigation.

The crews were also in a high workload situation and despite late sightings, avoiding action was implemented to provide separation. One crew had radio issues (intermittent communications and change of frequencies between UHF and VHF) and placed internal communication and coordinated avoiding action above immediate ATC acknowledgement. Due to the high density of traffic there were multiple traffic information calls to deal with as well as the internal chat frequency. The multiple calls, high workload, traffic density and radio issues all add context to the lack of situational awareness that allowed the aircrew to manoeuvre towards each other.

A thorough and wide-reaching unit investigation examined the incident and produced a number of recommendations. Many equipment-related observations were made that covered areas such as the Hawk GPS, radios and the lack of TCAS/TAS. It was recommended that the Flying Order Book should contain guidance as to when a single frequency should be monitored for deconfliction purposes. The organisation of airspace management at Valley was reviewed resulting in improved utilisation, coordination and communication of airspace usage. Work is ongoing to make safer use of the VATAs.

The unit investigation also recommended that the RAD at Valley should be provided a Flight Operations Assistant during busy times and ATC have implemented this recommendation as far as operations and manning will allow. A further recommendation was that ATC should consider using callsign coding for aircraft operating in the General-Handling area to improve aircrew situational awareness. RAF Valley ATM use code callsign conversion whenever workload or the situation allows. The CAP413, Section 5.20, directs passing the type of aircraft, if relevant but does not mention the use of callsigns to aid situational awareness. Furthermore, Valley ATC are considering the re-configuration of the Approach Room to provide a dedicated control position to control General-Handling aircraft. The Safety Assessment is ongoing.

## **UKAB Secretariat**

All the pilots shared an equal responsibility for collision avoidance<sup>4</sup>, a responsibility which was met by a combination of Traffic Information and visual acquisition, albeit at a late stage. The pilots of aircraft approaching head-on are required to turn to the right<sup>5</sup>, although it is acknowledged that in a highly dynamic encounter such as this an equally appropriate course of action is to manoeuvre into 'clear airspace', including in the vertical. It should be noted that the CPA is derived from squawking aircraft, in this case the formation leaders, and that the formation number 2 aircraft were not squawking. Therefore, the formation aircraft may have had less separation than was apparent from radar, as was reported.

## **Comments**

### **HQ Air Command**

This incident prompted an investigation on the unit concerned, which has returned a number of recommendations. It is clear from the report that all of the pilots were forced into the same operating area by the weather and some were battling radio issues. The airspace around Valley has been divided to mitigate the problems of compressing multiple formations conducting dynamic manoeuvring into the same area, but on this occasion that barrier was ineffective. The controllers did their best to provide accurate TI and ultimately it was a combination of this and crew lookout that prevented a more serious outcome. It is pleasing to note that all formations were operating VFR in VMC and had selected a Traffic Service to aid their situational awareness.

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

<sup>5</sup> *ibid.*, Rule 10 (Approaching head-on).

## Summary

Two Hawk formation pairs flew into conflict at 0929 on 20<sup>th</sup> December 2013, whilst manoeuvring in the Class G airspace of the Valley AIAA. All pilots were operating under VFR in VMC and both formations were in receipt of a Traffic Service from Valley RAD and received Traffic Information.

### **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 quickly came to the conclusion that the genesis of the Airprox lay in the fact that poor weather had caused a number of training formations conducting high-energy manoeuvres to operate in a constrained area. The non-availability of formally separated airspace was bound to result in pilots being funnelled into areas of clear weather, which then required active management to avoid congestion and potential conflict. The Board opined that, other than the use of Traffic Information as an aid to lookout, there did not appear to have been active management of general operating airspace by the formations in the face of poor weather that precluded the use of booked airspace (in this case the VATAs).

Although it was clear that a rudimentary inter-formation deconfliction plan had been made, some members opined that the formations had flown into conflict because the contingency planning had not been sufficiently robust. Other members were of the opinion that RAF Valley instructors were well versed in the task of mutual deconfliction using Traffic Information and lookout, and that in this case the aircrew had simply been task focused to the detriment of deconfliction. It was acknowledged by all members that the degree of deconfliction required depended on the nature of the exercise, and that it was possible that the communication issues and/or level of instruction 'in-cockpit' may have lead to a lack of sufficient SA.

In the end the Board agreed that, whilst it could reasonably be expected that the aircrew would themselves be expected to provide a degree of inter-formation de-confliction in flight, the dynamic management of airspace deconfliction was an additional drain on aircrew capacity and the training task, and did not provide the level of assurance of pre-booked and separate training areas.

In the event, reported separation was considerably closer than that recorded using radar traces and the Board opined that CPA occurred with at least one of the non-transponding aircraft. It was agreed that there had been a late sighting and that although avoiding action had successfully been taken, safety margins were much reduced below normal.

The Board were heartened to note that RAF Valley had completed a widespread review of airspace usage and VATA procedures in light of this incident.

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

<u>Cause:</u>	A conflict in Class G resulting from an insufficiently robust inter-formation deconfliction plan.
<u>Degree of Risk:</u>	B.
<u>ERC Score</u> <sup>6</sup> :	20

<sup>6</sup> 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.