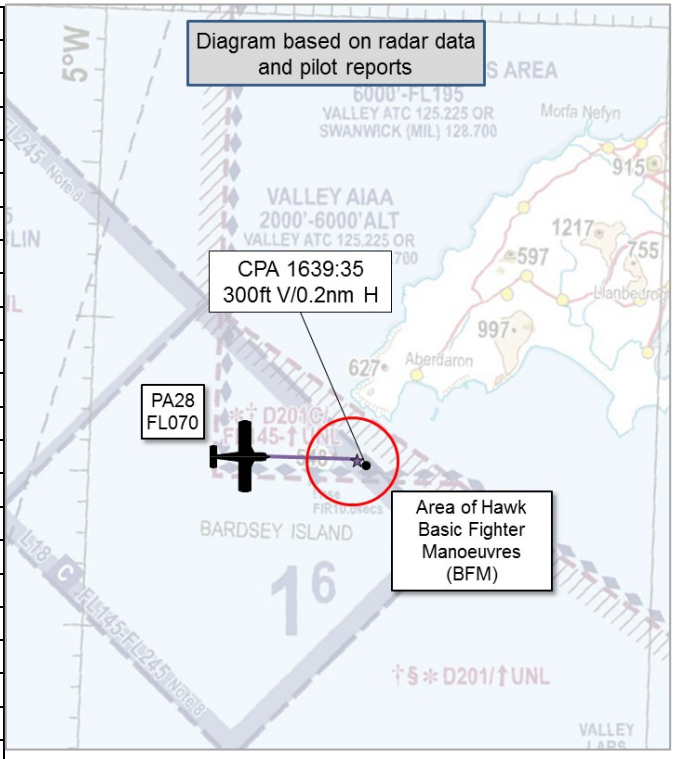
AIRPROX REPORT No 2017182

Date: 31 Jul 2017 Time: 1639Z Position: 5245N 00445W Location: 3nm south Aberdaron

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Hawk	PA28
Operator	HQ Air (Trg)	Civ Pte
Airspace	Valley ATA	Valley ATA
Class	G	G
Rules	VFR	VFR
Service	Traffic	Basic
Provider	Valley	London Info
Altitude/FL	FL072	FL071
Transponder	A, S, C	A, C
Reported		
Colours	Black	White, Blue
Lighting	HISL, Nav	Strobe, Tail
Conditions	VMC	VMC
Visibility	10km	>10km
Altitude/FL	6500ft	FL070
Altimeter	NK	QNH (1013hPa)
Heading	160°	089°
Speed	300kt	140kt
ACAS/TAS	TCAS II	Not fitted
Alert	TA	N/A
Separation		
Reported	NK V/0.5nm H	500ft V/1000m H
Recorded	300ft V/0.2nm H	



THE HAWK PILOT reports that he was the rear-seat instructor during a Basic Fighter Manoeuvre (BFM) sortie for a trainee instructor (albeit one with a significant amount of aviation experience). The formation were in a maximum-rate descending turn to 'base height' in the Aerial Tactics Area (ATA). At the beginning of the fight, ATC advised them of traffic in the vicinity, transiting the ATA, which he acknowledged but did not gain visual contact; they elected to continue the fight. However, as they descended, the handling pilot spotted the aircraft approximately 0.5nm from the nose and called "Knock it off" due to the close proximity. The other Hawk's pilot had not sighted the aircraft, the fight was terminated, and positive deconfliction from the traffic was maintained. Due to the excellent spot from the handling pilot, safe separation was maintained throughout; however, it serves as a reminder of the often congested nature of the Class G airspace around RAF Valley. The sortie was terminated at this point, ATC were advised of the Airprox, and the aircraft recovered safely to RAF Valley. He opined that BFM sorties for trainee instructors are a high-workload situation where lookout for stranger traffic can become compromised, and TCAS alerts from the other aircraft in the formation can dull the senses to warning tones. Fortunately, in this case, see and avoid had prevailed.

He assessed the risk of collision as 'Medium'.

THE PA28 PILOT reports that he had asked London Information if D201 was active and was advised it was not. He maintained FL070 and continued en-route. At approximately 10 to 15nm west of Bardsey Island, his passenger noticed aircraft through the door window. The PA28 pilot immediately identified them as Hawk aircraft, he opined that it was apparent the Hawk's were dispersing about his aircraft position, in front and beneath; he did not notice any passing overhead. Initially he believed the Hawks were carrying out a handling demonstration about his aircraft position. He was later advised by Western Radar of an Airprox report from RAF Valley when he changed frequency.

He assessed the risk of collision as 'Medium'.

THE VALLEY CONTROLLER reports that he was the TC(RA) controller providing a Traffic Service to the Hawk formation in Valley ATA; areas A, B and C. They were operating in the block 6,000ft to 26,000ft. He saw an aircraft transiting from west to east in the southern part of the Valley Western ATA. The aircraft was squawking 1177 (London Information) and was indicating FL70. As the unknown aircraft approached the eastern edge of Valley ATA C, he considered that it had become relevant to the Hawk formation and passed Traffic Information to them as 'west 3nm indicating 7000ft'. At the time the Hawk formation were manoeuvring, indicating approximately 4,000ft to 5000ft above the other aircraft. The Hawk formation pilot called 'not sighted'. He continued to monitor the aircraft but didn't consider a second TI call necessary. The lead Hawk formation pilot then called complete, recovering to Valley, and informed him that they were going to file an Airprox.

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

THE VALLEY SUPERVISOR reports that he heard the Approach controller call the unknown traffic to the Hawk formation. The unknown was called when it was indicating FL70 on Mode C and the Hawk formation were showing 11,300ft on Mode C. The Approach controller called it at this point as the unknown traffic was flying within the Hawk formation's general handling level block. Following a period monitoring the traffic, the Hawk formation was observed to descend within the vicinity of the unknown aircraft and, when on recovery, informed Approach that they would be filing an Airprox against the unknown aircraft.

Factual Background

The weather at Valley was recorded as follows:

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METAR EGOV 311550Z 19021KT 9999 FEW018 SCT080 17/13 Q1008 BLU NOSIG
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Analysis and Investigation

CAA ATSI

The Hawk aircraft were conducting Basic Fighter Manoeuvres VFR in Valley Aerial Tactics Area C and were receiving a Traffic Service from the Valley Radar Approach controller. At the time of the Airprox, the PA28 (code 1177 (FIS)) was on a VFR Flight and receiving a Basic Service from London Flight Information Service and was maintaining FL70. The London FISO did not have access to surveillance equipment and therefore could not monitor the flight profile of the PA28.

At 1627:00 the PA28 checked in with London Flight Information Service, advised that he was routing via Llanbedr at FL70 and requested the status of D201. The FISO responded with a request for the PA28 pilot to transpond code 1177 with Mode C, report coasting in at Llanbedr, and that D201 was not notified as active.

There was no further communication between the PA28 pilot and the FISO until 1643.00, (after the Airprox), when the FISO instructed the pilot to change SSR code and contact Western Radar.

The PA28 pilot was subsequently advised by Western Radar that RAF Valley would be filing an Airprox.

At 1633:00, the two Hawk aircraft and the PA28 were first observed on the radar replay. The PA28 was 12nm southwest of the two Hawks at the time. (Figure 1).

At 1638.00 the PA28 is 3.5nm west-northwest of the two Hawks (Figure 2).

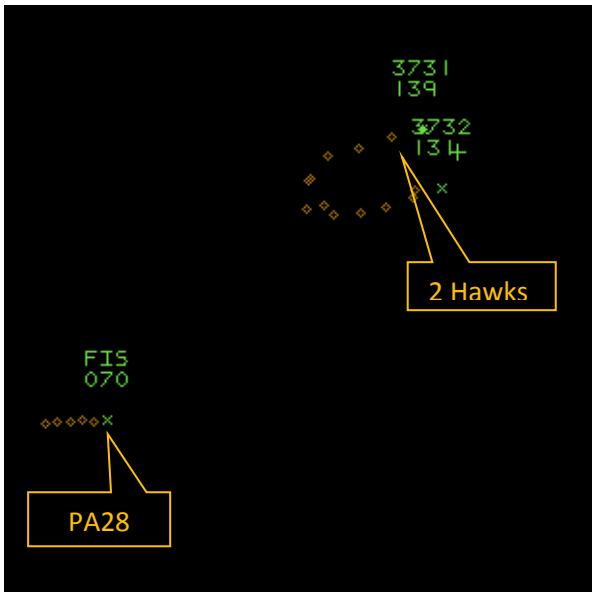

Figure 1 – 1633:00

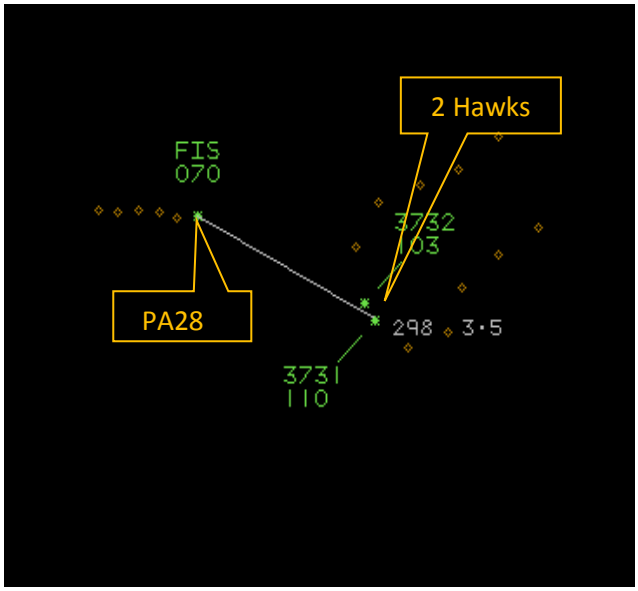

Figure 2 – 1638.00

CPA took place at 1639:47. The PA28 was separated from Hawk 1 by 0.2nm laterally and 300ft vertically (Figure 3), and from Hawk 2 by 1.2nm laterally and 400ft vertically (Figure 4). The PA28 pilot reported sighting the two Hawks dispersing in front of and beneath his aircraft. The radar replay displayed the Hawks as passing behind and below the PA28 at CPA.

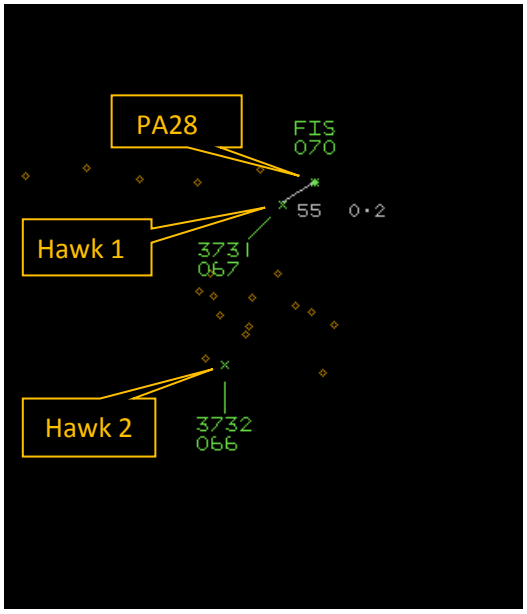

Figure 3 – 1639:47 (Hawk 1)

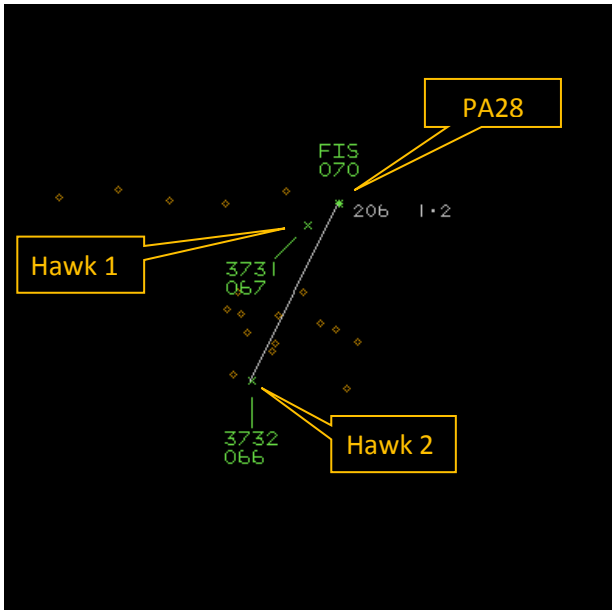

Figure 4 – 1639:47 (Hawk 2)

The Airprox occurred on Monday 31st July when the Valley ATA is promulgated as active with a lower limit of altitude 6000ft. Whilst the PA28 pilot requested the status of D201 and was advised that this was not notified as active, the pilot did not request the status of the Valley ATAs and did not adopt the advisory measures in the UK AIP (see below) or on the Aeronautical Chart i.e. to avoid the area or avail himself of a Radar Service from RAF Valley or Swanwick Mil, via London Flight Information if necessary. The following information on the Valley Aerial Tactics Area is promulgated via the UK AIP and the 1-500,000 Southern England and Wales Aeronautical Chart:

UK AIP ENR 6-5-1-2 Aerial Tactics Areas

ATAs are defined as: An airspace of defined dimensions designated for air combat training, within which high energy manoeuvres are regularly practised by aircraft formations'. Pilots of non-participating aircraft who are unable to avoid these areas are strongly advised to make use of a radar service.

Autonomous operations are only permitted within ATAs above FL195 when the overlying TRA is active.

1. WASH 0700-2300 Mon-Thu and 0700-1700 Fri. London Radar, via London Flight Information.
2. LAKENHEATH 0700-2300 Mon-Thu and 0700-1700 Fri. London Radar, via London Flight Information.
3. VALLEY 0800-1800 Mon-Thu and 0800-1700 Fri. RAF Valley ATC or Swanwick Mil, via London Flight Information.

- These times are one hour earlier during summer period. See UK AIP GEN 2.1.1 for start and finish of summer period.

UK AIP ENR 5.2.

ATA VALLEY 531810N 0050753W - 531505N 0034316W - 530603N 0032604W - 520153N 0033037W - 520911N 0043030W - 523827N 0051555W - 524529N 0052146W - 531234N 0052117W - 531810N 0050753W	Upper limit: FL660 Lower limit: 6000 ft ALT	Military aircraft are to book in between FL 100 and FL 660. Autonomous operations requiring access to NWMTA airspace above FL 195 are to ensure that the NWMTA is active before entry. **Hours:** Military flying is at its peak between Mon-Thu 0800-1800 (0700-1700); Fri 0800-1700 (0700-1600). **Remarks:** All CAS is to be avoided. Users are to note that when the NWMTA North Low is not active, airway Y124 may be activated. Intense military air activity, including air combat training manoeuvres and live air-to-air firing at towed targets over the sea. **Advisory Measures:** Pilots are strongly recommended to avoid the area; if this is not possible they should request a service from RAF Valley ATC or Swanwick Mil, via London Flight Information if necessary, at least 15 nm range from the edge of the area. *Note: Live air-to-air firing at towed targets regularly takes place over the sea within the northern stub of EG D201. Live firing under 'Clear Range' procedures but at least 20 nm out from the coastline, may take place both within and below portions of the Aerial Tactics Area. The activity will not be subject to NOTAM action but times can be obtained from RAF Valley Operations, Tel: 01407-762241 Ext 7540.*

At the time of the Airprox the aircraft were operating in Class G Airspace where pilots are responsible for their own collision avoidance.

Military ATM

Figures 5-10 show the positions of the PA28 and Hawks at relevant times in the lead up to and during the Airprox. The screen shots are taken from a replay using the Clee Hill radar, which is not the radar used by Valley ATC, therefore is not representative of the picture available to the controllers. There may also be disparity between the timings of the radar picture and communications recordings due to equipment limitations.

At 16:37:52 (Figure 5), the Valley Approach Controller passed Traffic Information (TI) to the pair of Hawks as "west, 2nm, eastbound, slow moving, indicating 7000ft". Hawk 1 was 5.4nm and Hawk 2 was 3.8nm from the PA28.

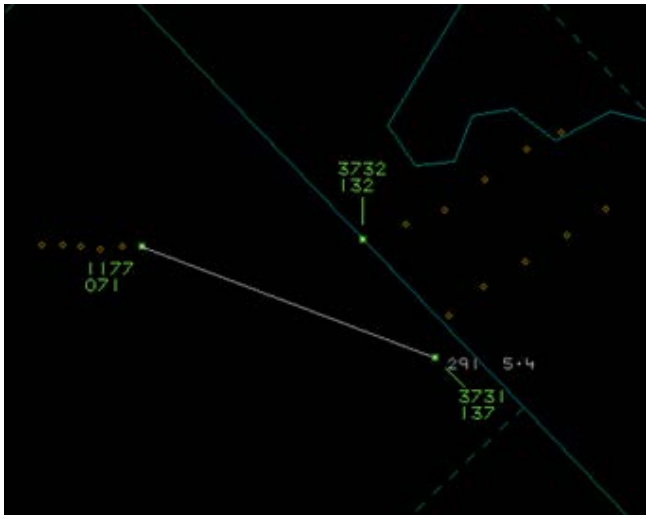

Figure 5: Geometry at 16:37:52

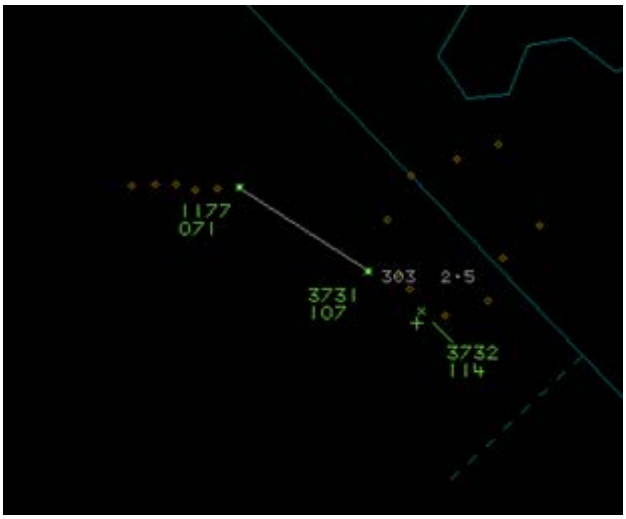

Figure 6: Geometry at 16:38:12

(PA28 1177; Hawks 3731/2)

At 16:38:12 (Figure 6), the Hawks were both still operating above 10,000ft, with the PA28 maintaining course and altitude.

Figure 7: Geometry at 16:38:56

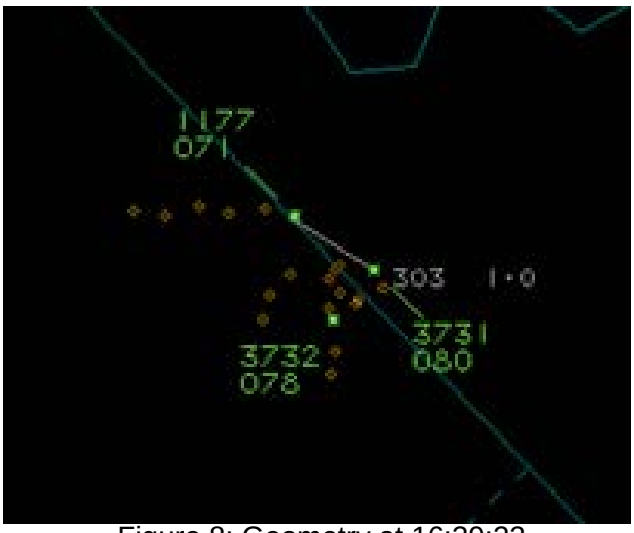

Figure 8: Geometry at 16:39:23

(PA28 1177; Hawks 3731/2)

At 16:38:56 (Figure 7), the Hawks were both still operating above 11,000ft, with the PA28 maintaining course and altitude.

At 16:39:23 (Figure 8), after their mode C readout had dropped out for several seconds, the Hawks reappeared having made a rapid descent.

At 16:39:33 (Figure 9), the Hawks and PA28 were co-altitude with 0.7nm lateral separation.

Figure 9: Geometry at 16:39:33

Figure 10: Geometry at 16:39:47

(PA28 1177; Hawks 3731/2)

At 16:39:47 (Figure 10), the PA28 and Hawks were at their closest proximity, approximately 0.2nm lateral separation and 300ft vertical separation.

The Valley Approach Controller reported having low workload and task difficulty as he was only providing an Air Traffic Service to the pair of Hawks. He passed TI to the Hawks when the PA28 was 5.4nm west of Hawk 1 (3.8nm west of Hawk 2) and 6000ft below because the aircraft was in transit through their operating block, the lower level of which was 6000ft, and the Hawks could be

expected to make a rapid descent at any time. The TI was inaccurate, underestimating the range of the PA28 (described as 2nm), though this could be attributed to the range scale of the radar screen at the time of the incident. The lead Hawk pilot responded that the traffic was not in sight.

The Valley Approach Controller stated that TI was not updated because, while monitoring the situation, he did not deem it to be necessary. Figure 4 shows that the pair of Hawks descended towards the transiting PA28 and operated at a similar altitude for approximately 24 seconds before the CPA was recorded; therefore, it would have been reasonable to expect the changing situation to be recognised, assimilated and TI to be updated unless the controller was distracted.

UKAB Secretariat

The Hawk and PA28 pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard[1].

Occurrence Investigation

The Hawk operating authority Occurrence Safety Investigation (OSI) identified that the TCAS had repeatedly failed during the high-energy manoeuvres, with each failure lasting between 4 and 5 seconds; there were also nuisance warnings due to the proximity of the second cooperating aircraft (the second Hawk). This resulted in the TCAS not alerting the presence of the PA28 until the pilot had called 'Knock it off'. A recommendation was proposed as a result:

> *Due to TCAS nuisance warnings during BFM and the possible desensitisation of aircrew to these warnings it may be advisable to revisit the use of TCAS by only one formation member during BFM sorties.*

Comments

HQ Air Command

This occurrence took place in the busy Class G airspace of North Wales, within the Valley Aerial Tactics Area (ATA) and just above the Valley Area of Intense Air Activity (AIAA) (see UK AIP ENR Section 6.5.1.2). The available barriers to MAC in this type of airspace are most usually electronic conspicuity, a surveillance-based Air Traffic Service and lookout. On this occasion the electronic conspicuity barrier appears to have failed because the PA28 was not equipped with an ACAS and the TCAS II fitted to the Hawk T2 aircraft continually failed during the high energy manoeuvres that the Hawks were conducting. However, the Hawk pilot did receive TI. Further investigation has revealed that the time stamps from the radar and radio recordings and may not be synchronised (a possible error of up to 15-30 seconds), thus it is difficult to establish whether or not the initial TI was accurate. Notwithstanding, the Hawk pilot elected to continue the descending fight towards the vicinity of the PA28 as he had not assimilated the proximity of the stranger traffic to his projected flight-path, possibly expecting the TI to be updated if the PA28 was to remain a factor. Further communication with the controller involved has revealed that the Mode C readout on the Hawks was not as stable as might be assumed from reference to the Clee Hill radar recordings (the controller was not using a NATS radar feed) and that, in fact, there was no indication to the controller that the Hawks were descending. Once his Mode C information stabilised, the controller assimilated the proximity of the aircraft and was about to issue further TI when the Hawk pilot declared the Airprox.

The final barrier available to the crews in this encounter was lookout. This is naturally compromised during BFM because the pilot will be concentrating more on the 'adversary' and therefore less on the wider environment. That said, the Hawk pilot did see the PA28 in time to warn his wingman of the presence of the other aircraft and ensure safe separation was achieved between all 3 aircraft.

[1] SERA.3205 Proximity.

The safety investigation conducted by the unit recommended that the use of TCAS by both aircraft during BFM be revisited as the constant alerts generated by the wingman may lead to the crews becoming desensitised to the warnings. After reviewing the issue of crew desensitisation to TCAS warnings during BFM it has been decided that the benefits of both aircraft being in a position to receive warnings of other traffic outweigh the possible disadvantages of crew desensitisation.

Summary

An Airprox was reported when a Hawk and a PA28 flew into proximity at 1639 on Monday 31st July 2017. Both pilots were operating under VFR in VMC, the Hawk pilot in receipt of a Traffic Service from Valley and the PA28 pilot in receipt of a Basic Service from London Information.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of 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 began their discussions by hearing from the military aircrew Board member. He commented that, although the Hawk pilots had received Traffic Information at 2nm, the lead pilot had said that they had not fully assimilated the information and had not realised that their manoeuvres would take them close to the PA28 who was transiting through the ATA. He explained that the high-energy manoeuvres and rapid climb/descent profiles coupled with the equipment update rate of the Valley radar resulted in the Valley controller only seeing the Hawk's rapid altitude changes on his radar screen once the Hawks had either levelled-off or slowed their climb/descent; this meant that the controller had not realised the Hawks had descended towards the PA28's level. Nevertheless, the controller had previously passed Traffic Information to the Hawks based on their operating block. Regarding the use of both aircraft having their TCAS II equipment turned on and crews becoming 'desensitised' to the multiple alerts, he amplified the HQ Air Command comment and confirmed that it had been decided that the value of both aircraft having their electronic warning systems on outweighed the relatively few times that the systems issued a false alert from another aircraft in the formation.

The Board then turned to the actions of the PA28 pilot. Although the pilot was flying within Class G airspace, the UK AIP strongly advises pilots transiting the area to contact either Valley or Swanwick ATC. The Board agreed that, had the pilot talked to Valley ATC and requested a service from them whilst transiting through the Valley ATA, this would have provided enhanced situational awareness to both the controlling agency and the Hawk pilots operating in the ATA, and would also have ensured that the PA28 pilot was kept appraised of any conflicting aircraft activity. Notwithstanding, members noted that although the Valley ATA and contact frequency is marked on the civil maps, the UK AIP entry was not as robust as it could be in that there was scope for pilots to misinterpret the correct agency to communicate with; the PA28 pilot may have believed he was conforming by receiving a Basic Service through London Information rather than Valley or Swanwick ATC in the belief that London Information would liaise with Valley ATC if the area was active. Members noted that the PA28 pilot did not see the Hawk aircraft until after the Hawk pilots had curtailed their manoeuvres and there was no risk of collision.

The Board then turned to the actions of the Hawk pilots. The Board agreed that the Hawk pilots had received adequate Traffic Information on the PA28 but they had not assimilated this information in relation to their high-energy manoeuvres early enough to prevent the aircraft coming into proximity. Board members with military fast-jet experience opined that, on receiving information that another aircraft was within 2nm of their BFM activity, the formation leader would have been better placed by terminating their manoeuvring at that point rather than carry on. Fortunately, as it happened, the Hawk pilot did see the PA28 with sufficient time to call 'knock it off' and cease manoeuvring, thereby ensuring the risk of collision was averted.

The Board then looked at the cause and risk of the Airprox. They agreed that the Hawk pilot had seen the PA28 sufficiently early to stop their manoeuvres and resolve the confliction, whilst the PA28 pilot had not seen the Hawks until they had already effectively avoided the PA28 so no action was required on his part. Given the circumstances of the incident, the Board considered that the Hawk pilot had seen the PA28 as early as could be expected, and so the cause was determined to be a conflict in Class G resolved by the Hawk pilot. Notwithstanding, the Board also agreed that there were two factors that had contributed to the Airprox: the first being that the PA28 pilot did not contact RAF Valley ATC or Swanwick as advised in the UK AIP; and the second that the Hawk crews did not assimilate the Traffic Information concerning the PA28's position. Turning to the risk, members were quick to agree that the Hawk pilot's actions had been sufficient to avert any risk of collision; accordingly, the Board assessed the risk as Category C.

The Board decided that the ambiguity in the UK AIP entry regarding the agency to contact when transiting through the Valley ATA should be reviewed to ensure it could not be misinterpreted or mislead pilots as to the correct actions they should adhere to. Therefore, the Board resolved to make a recommendation that DAATM review the AIP wording regarding transit of the Valley ATA.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A conflict in Class G resolved by the Hawk pilot.

Contributory Factor(s): 1. The PA28 pilot did not contact RAF Valley ATC or Swanwick as advised in the UK AIP.
2. The Hawk crews did not assimilate the Traffic Information concerning the PA28's position.

Degree of Risk: C.

Recommendation(s): DAATM review the AIP wording regarding transit of the Valley ATA.

Safety Barrier Assessment[2]

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

ANSP

Regulations, Processes, Procedures & Compliance was assessed as **partially effective** because the UK AIP entry for the Valley ATA was ambiguous and could result in some pilots misinterpreting the requirement to communicate with the relevant operating authority.

Flight Crew

Tactical Planning was assessed as **partially effective** because the PA28 pilot did not call Valley or Swanwick ATC in accordance with the UK AIP entry.

Situational Awareness & Action was assessed as **partially effective** because the Hawk pilots had sufficient Traffic Information but did not act upon it early enough.

Warning System Operation and Compliance was assessed as **ineffective** because the TCAS failures during the high-energy combat manoeuvres prevented the system functioning effectively.

[2] The UK Airprox Board scheme for assessing the Availability, Functionality and Effectiveness of safety barriers can be found on the UKAB Website.

See and Avoid was assessed as **partially effective** because the Hawk pilots saw the PA28 later than desirable, and the PA28 pilot did not see the Hawks until after CPA.