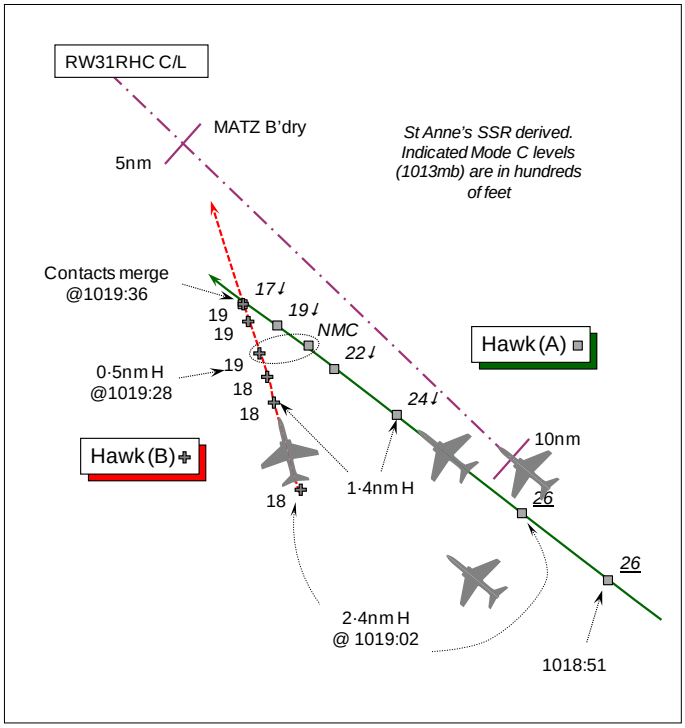
AIRPROX REPORT No 2011009

Date/Time:	1 Feb 2011 1019Z	
Position:	5310N 00424W (6½nm SE of Valley - elev 36ft)	
Airspace:	London FIR	(*Class: G*)
	Reporting Ac	*Reporting Ac*
Type:	Hawk T Mk1 x3	Hawk T Mk1
Operator:	HQ Air (Trg)	HQ Air (Trg)
Alt/FL:	2000ft↓ QFE (1021mb)	2000ft QFE (1020mb)
Weather:	VMC CLBC	VMC CLBC
Visibility:	20km	>10km
Reported Separation:	Nil V/<100ftH	200ft V/nil H
Recorded Separation:	200ft V/SSR contacts merged	



BOTH PILOTS FILED

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HAWK T MK1 FORMATION LEAD PILOT [HAWK (A)], a qualified QFI but here a student on the TAC Weapons course, reports that he was leading a formation of 3 Hawk ac in 'arrow' formation, inbound from the Valley Aerial Tactics Area (VATA) E, VFR, for a visual recovery to RW31RHC at Valley. APP was providing a TS on Stud 5 as they descended to 3500ft QFE (1020mb) and a squawk of A3730 was selected with Mode C; neither Mode S nor TCAS are fitted.

APP informed them of traffic Downwind for a short pattern PAR – the subject singleton Hawk (B) - which he acquired visually while he was more than 10nm from the airfield positioning for Initials. The formation was descended to 2000ft QFE reducing vertical separation to 500ft, but because of a thin layer of Stratus at 1700ft [see UKAB Note 1: later reported to be at 2500ft], he lost visual contact with this ac. APP continued to pass TI on the singleton Hawk (B): traffic at 11 o'clock - 5nm 2000ft below, followed by traffic at 11 o'clock – 3nm 500ft below. On discovering a 'VMC gap', he descended the formation through it and switched to TOWER on Stud 2. About 6nm SE of Valley heading 320° at 350kt, passing, he thought, 1500ft in the descent, he saw the singleton Hawk (B) [that was flying level at 2000ft QFE (1020mb) – broadly 1800ft (1013mb)] pass to port of his ac through the LH side of the formation at a range of less than 100ft between the No 2 and No 3 with a 'high' Risk of collision. No avoiding action was taken as by the time he, as the formation leader, was 'tally' with Hawk (B) it had passed up and through the formation and was no longer a factor. The formation continued through Initials [at 3nm] for an uneventful Break to land.

The ac are coloured Black and the upper and lower red strobes and nav lights were on.

[UKAB Note (1): During the investigation it became apparent that there were 2 versions of the report from the lead pilot of Hawk (A), which differed in two areas of detail. The second report specified, correctly, that the Airprox occurred as the formation descended through 2000ft QFE, not the 1500ft QFE reported originally. Moreover the phrase the formation was 'descended to 2000ft QFE reducing vertical separation to 500ft' was excised from the report. A subsequent conversation with the pilot of Hawk (B) has confirmed that his original report was amended by the SFSO to account for Hawk (A) pilot's factual error of the height at which the Airprox occurred. However, this amended report did not accurately reflect the lead pilot's SA, as he believed at the time that Hawk (B) was still level at 1500ft

QFE for a short pattern PAR cct as he had been told in the first transmission of TI from APP. This was the basis of the lead pilot of Hawk (A)'s perception of the other ac's height throughout the encounter as being 1500ft QFE, despite the three further transmissions of TI which referred to the vertical separation of Hawk (B) beneath Hawk (A). Furthermore, he had levelled his formation with the intention of affording some vertical separation above Hawk (B). The pilot also added that none of the other formation pilots were visual with Hawk (B) before the Airprox occurred.]

THE HAWK T MK1 PILOT [HAWK (B)], a QFI, reports that he was conducting an instructional sortie whilst in receipt of a TS from Valley DIR and then TALKDOWN on Stud 7. The assigned squawk of A3740 was selected with Mode C.

Whilst flying level at 2000ft QFE (1020mb) at 200kt on feed-in to RW31 for a PAR, a traffic call was given by TALKDOWN alerting him to joining traffic in his 4 o'clock crossing from his R to L. He informed his student that he would conduct the lookout and briefly scanned the area for the traffic. No traffic was seen and he then prioritised the capture of the glideslope, which was imminent. A few moments later, before the glideslope was reached, he spotted 2 Hawks in arrow formation in his 4 o'clock – 400ft away just before they passed 200ft directly underneath his ac from his 4 o'clock to 10 o'clock position, at relatively high-speed. As the ac extended into the 10 o'clock he saw a 3rd Hawk swept L on the arrow pair, which had probably passed behind his ac. No avoiding action was taken as the other ac were seen too late.

He added frankly that he had assumed a degree of safety by virtue of being on an instrument approach, hence only a cursory lookout scan was made when the traffic was called. Workload was also a factor as his student was flying with a simulated emergency which gave rise to an increased workload as they approached the glideslope.

The ac is coloured Black and the white strobes were on.

THE VALLEY APPROACH (APP) CONTROLLER reports that the formation leader of Hawk (A) called for a visual recovery, was identified, passed the aerodrome details and given own navigation to the aerodrome. Upon identification of Hawk (A) an ac in the Valley radar training cct – Hawk (B) - was called to the lead pilot of Hawk (A) as it was deemed to be relevant traffic for his recovery. TI was passed on Hawk (B) again and updated for a third time as it was deemed relevant. The formation leader of Hawk (A) called visual at a range of 3nm and 500ft above Hawk (B) and changed to the TOWER frequency. Information was passed to TALKDOWN that Hawk (A) was visual with Hawk (B).

This type of recovery is a very common occurrence at Valley and it was performed in a standard manner. He did not see anything untoward at the time, but it later transpired that Hawk (A) had lost contact with Hawk (B) and flown exceptionally close to it.

THE VALLEY TALKDOWN CONTROLLER reports that he received control of Hawk (B) approaching 7nm from touchdown, well L of centreline correcting nicely on a heading of 340° at 2000ft QFE, the pilot having elected to delay checks. The ac was originally vectored by DIRECTOR for a short pattern cct but had been climbed to 2000ft due to a wide feed for RW31RHC. Hawk (B) was identified and the QFE read-back checked, he then called traffic as 'right 4 o'clock 2 miles crossing R to L'. This traffic had been indicated to him by the APP controller as Hawk (A), a formation joining the visual cct that was visual with his Hawk (B). He continued with a normal PAR until approx 4nm when he questioned whether the crew had completed their checks, but no reply was received. At 3½nm he carried out a gear check, but again received no reply so he elected to break off the approach for safety reasons as no gear indication had been given. He asked the pilot of Hawk (B) if he was visual with the aerodrome, to which he indicated he was, so he then instructed the pilot to join the visual cct Deadside and to continue with TOWER.

HQ 1GP BM SM reports that this Airprox occurred between a 3-ship formation of Hawks – Hawk (A) - conducting a visual recovery at Valley in receipt of a TS from Valley APP, and a singleton Hawk – Hawk (B) - on a PAR also in receipt of a TS from Valley TALKDOWN.

Given the range of the Hawks from the St Anne's Radar used for the LATCC (Mil) radar recording, Hawk (B) does not appear on the recording until 1019:02, which has complicated the task of correlating the radar replay and tape transcript. Moreover, comparison of the radar recording and RT tape transcript has identified a difference of 25sec between them. An initial engineering analysis at Valley could find no fault in their system, yet the events portrayed within the evidence available could only be explained through the presence of a 25-sec time-lag. The investigation was therefore pursued on the basis of the presence of a 25-sec time difference and all times were amended by adding 25sec to the original transcript timing.

[UKAB Note (2): Both ac are displayed during the encounter as SSR contacts with no supporting primary.]

At 1015:48 Hawk (A) flight free-called APP for a visual recovery. The formation leader was issued a squawk of A3730 at 1015:54; the formation was identified, placed under a TS that was reduced as Valley ATC was operating SSR-only and instructed to continue, "…*own navigation taking your own terrain clearance descent approved*."

Following a previous Airprox some years ago between IFR traffic and an ac on a visual recovery in receipt of a FIS, the Unit mandated that visual recoveries receive a RIS and with the introduction of CAP774 – UK FISs - a TS. The procedure outlined in the Flying Order Book is that aircrew will be given TI to assist them in becoming visual with all relevant IFR traffic and differs from a radar to visual approach.

[UKAB Note (3): Sequencing is not affected by ATC between instrument and visual recoveries.]

At 1017:15, over 2min before the CPA, APP passed TI to the lead pilot of Hawk (A) about Hawk (B) downwind stating, "…*traffic left 11 o'clock 8 miles correction 13 miles, opposite direction, indicating 1500 feet, Hawk in short pattern circuit*."

In his original report, the lead pilot of Hawk (A) states that following receipt of the initial TI and having lost sight of Hawk (B) due to a thin stratus layer, they "*descended to 2000ft reducing separation to 500ft*." This sentence does not feature in the second version of the report but provides evidence for the pilot's perceived mental 'air picture' at the time of the Airprox.

TI was given on 3 further occasions; first at 1018:14, *".. previously called traffic left 11 o'clock 5 miles opposite direction 3 tho-correction 4 thousand feet below*", just as DIR instructed Hawk (B) at 1018:15 to, *"…climb to height 2 thousand feet"* from 1500ft to avoid Caernarfon ATZ [elev-14ft]. Second, in response to a query of *"request range"* from Hawk (A), at 1018:22 APP advised, *"left 11 o'clock 5 miles crossing left to right 2 thousand feet below".* The third and final update was given at 1018:47, *"..previously called traffic left 10 o'cl. correction 11 o'clock 3 miles crossing right-left* [sic] *500 feet below*." Hawk (A) was not told specifically that Hawk (B) has been climbed to 2000ft QFE by DIR.

At the time the final update was given, Hawk (B) is not visible on the LATCC (Mil) radar recording, but at 1018:51 Hawk (A) is about 11·5nm SE of Valley indicating level at 2600ft Mode C [about 2810ft QFE (1020mb) just L of the centre-line to RW31]. The lead pilot of Hawk (A) replied at 1018:54, *"visual"* – the response perceived to be that he was visual with Hawk (B). Some 22sec later at 1019:16, Hawk (A) declared, "[C/S] *visual to TOWER"* and switched to TOWER. However, the lead Hawk pilot also states in his written report that at some point in the incident sequence he lost sight of Hawk (B) due to a 'thin stratus layer at 1700ft, subsequently amended to 2500ft.'

TALKDOWN passed TI to Hawk (B) about the 3-ship formation at 1019:19 as, "..*traffic right 4 o'clock 2 miles crossing right left instrument traffic visual with the visual joiners above*", which was

acknowledged with Hawk (B)'s C/S. Although the latter part of the TI is not clear, it has been confirmed that TALKDOWN was passing TI on Hawk (A). At 1019:02, when Hawk (B) first appears on the radar replay, 2·4nm horizontal separation exists.

[UKAB Note (4): Following the read-back check of the QFE by TALKDOWN, the new QFE value of 1021mb (issued to Hawk (A) by APP at 1016:16) was not issued to the crew of Hawk (B).]

The lead pilot of Hawk (A) called TOWER to join and was instructed at 1019:28, "*Valley TOWER,* [Hawk (A) C/S] *join runway 3-1 right hand QFE 1-0-2-1 circuit clear instrument traffic 6 miles*." At 1019:33, Hawk (A) reported that they were *"visual",* which is believed to refer to the instrument traffic. After this point, all RT calls between TOWER and Hawk (A) are completely normal for a visual recovery and there is no indication that an AIRPROX has occurred.

At 1019:09, Hawk (A) commenced a further slow descent, with Hawk (B) about 1.8nm W, on a converging heading, indicating 700ft below. Up until 1019:28, the ROD of Hawk (A) appears steady, losing 100ft per sweep of the radar (15RPM); however, at this point the Mode C of Hawk (A) 'drops out' for one sweep and then re-appears at 1019:32, indicating the same level as Hawk (B) with 0·4nm horizontal separation. The CPA occurs on the radar replay at 1019:36 with no discernible horizontal separation and 200ft of vertical separation as Hawk (A) descends through 1700ft Mode C and below Hawk (B), indicating 1900ft Mode. The pilot of Hawk (B) had the best sight of the Airprox and reports acquiring Hawk (A) visually with 200ft separation as the formation passed directly underneath his ac from 'the 4 o'clock to the 10 o'clock position at relatively high speed.'

The basis of the Valley visual approach procedure is that it is incumbent upon the traffic joining visually to 'see and avoid' IFR traffic, facilitated by the provision of TI from ATC. Once the visual joining traffic has declared that they are visual with the IFR traffic, there is no further ATC involvement until the integration of visual cct traffic with the IFR traffic. TALKDOWN was informed that the visual joining traffic was visual with their IFR Hawk (B) and provided TI accordingly. Moreover, given the relative positions of the ac and the assumption inherent in the 'see and avoid' principle of the visual recovery, earlier provision of TI to Hawk (B) would have been nugatory.

From an ATM perspective, although the TI passed by APP to Hawk (A) at 1018:47 incorrectly described the direction of Hawk (B) as crossing *"..right to left..",* it seems that Hawk (A) pilot stated that he was visual with Hawk (B). In HQ 1Gp BM SM's view this error in the TI was neither a causal nor contributory factor. All of the controllers involved reasonably expected Hawk (A) flight to 'see and avoid' Hawk (B). However, it also appears reasonable that, based upon Hawk (A) pilot's original report and his stated intent to descend to 2000ft QFE, thereby reducing separation against Hawk (B) to 500ft, that Hawk (A) pilot's mental air picture was still based on Hawk (B)'s height of 1500ft and that he had been unable to assimilate the later TI from APP. Therefore, the lack of an explicit statement from APP to the lead pilot of Hawk (A) that Hawk (B) had been climbed to 2000ft, could be considered contributory. However, there is an element of 'hindsight bias' in this view and it would also have been reasonable for APP to expect that the lead pilot of Hawk (A) would assimilate the height separation information passed about Hawk (B).

Following discussion with SATCO Valley and examination of the evidence, it appears that Hawk (A) leader lost sight of Hawk (B) at some point between 1018:54 and 1019:36, due to a thin stratus layer in the area. In this instance, the lead pilot of Hawk (A) was cognisant of the presence of Hawk (B), yet had been unable to use the TI passed by APP to update his mental 'air picture' and, having lost sight of Hawk (B), descended through that ac's height into confliction.

HQ AIR (TRG) was unable to provide Command comment on this Airprox before Service staffing action had been completed.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

Members agreed that the pilot of Hawk (B) had little influence on the outcome of this Airprox, which had already occurred when he sighted elements of the formation passing 200ft beneath his ac. Pilot Members understood Hawk (B) QFI's view that he 'had assumed a degree of safety by virtue of being on an instrument approach', which was not unreasonable when the other ac were overtaking from astern. However, this relies on pilots executing a visual approach acquiring instrument traffic in good time and affording appropriate separation. Whilst the pilot of Hawk (B) reported that he briefly scanned in the direction of the reported traffic, pilot Members stressed the importance of maintaining a good lookout in Class G airspace and particularly in an instructional environment where pilots should always be prepared to react to the unexpected.

During the formation's visual recovery, APP initially provided TI at a range of 13nm advising the pilot of Hawk (A) that Hawk (B) was executing a Short Pattern Circuit at 1500ft QFE, the regular height for the procedure. This enabled the formation leader to sight Hawk (B) some distance away, but it was clear to the Board that he had subsequently lost sight of it and not assimilated the good flow of TI provided by APP. The way that the three subsequent transmissions of TI had been given had evidently not registered with the pilot of Hawk (A), who descended his formation through a small gap in the thin stratus layer and through Hawk (B)'s height not recognising that it was no longer level at 1500ft QFE. Pilot Members agreed that the omission of any specific mention that Hawk (B) had been climbed to 2000ft QFE was critical to the pilot of Hawk (B)'s appreciation of the air situation, albeit that he was aware that it was in the vicinity because he requested its range. The TI given was, however, all passed in a conventional manner by referring to the vertical separation remaining as the formation descended, controller Members pointed out. However, pilot Members were not content that it 'painted the picture' simply enough and perceived that the formation leader was somewhat 'maxed out' because he patently had not understood what he had been told; although there are good reasons for passing altitudes within TI as the number of feet above or below the TI recipient, there is potential for lag and inaccuracy if either or both of the aircraft have high rates of climb or descent. Moments before the formation leader called visual, the final TI update given, *"..left….11 o'clock 3 miles crossing right-left* [sic] *500 feet below*", should have been called as 'left-right'; a pilot Member suggested this might have misled the formation leader into thinking that Hawk (B) was now displaced L of the formation, moving L and thus no longer a confliction, whereas it was actually still a factor in confliction and still drawing R. This was an error, but the TI still told the formation leader that Hawk (B) was close below in the vertical plane, but it was unfortunate that it had not been made plain that Hawk (B) had been climbed up to 2000ft QFE from the outset. The Board did not suggest that APP was in any way culpable; the controller provided a good flow of TI until the pilot of Hawk (A) called *"visual",* when the controller quite reasonably expected the pilot of Hawk (A) to lead his formation clear of Hawk (B). An experienced controller Member thought it was unclear whether the pilot was actually visual with Hawk (B) or the A/D when he called, *"visual"*. It was plain that the lead pilot of Hawk (A) was visual with the A/D later when he switched to TOWER; however, a fast-jet pilot Member perceived that the formation leader's priorities were on descending his formation down towards 'Initials' at that point rather than remaining clear of Hawk (B). The subsequent call in reply to TOWER's joining clearance transmitted at 1019:28, reflected that he had reacquired Hawk (B) by 1019:33, just as the contacts are merging on the radar recording.

The formation leader has subsequently advised that none of the other pilots in the formation were visual with Hawk (B) when the Airprox occurred, which calls into question the lookout regime within the formation. Fast-jet pilot Members perceived a lookout responsibility on the part of the other formation pilots when flying in 'arrow'. Furthermore, since the formation leader was a student, albeit that he had served one tour as a fast-jet instructor, there are supervisory aspects to this Airprox. The Board agreed that the other two crews should have heard APP's TI and might have had the SA to question why the lead pilot was descending the formation through a gap in the cloud toward an ac they had been told about below them. If this was the case then there was an opportunity for the

instructors in the formation to step-in and avert this Airprox. As it was, despite seeing Hawk (B) at range, the pilot of Hawk (A) lost sight of it before he descended his three-ac formation through the level of the singleton, bracketing the other ac as they flew past at higher speed, the leader not actually reacquiring Hawk (B) until he saw it passing to port less than 100ft away between his number 2 and 3, he reports. Weighing all these various factors for relevance, the Members agreed that the Cause of this Airprox was that the pilot of Hawk (A) lost visual contact with Hawk (B) and descended his formation into conflict with it.

ATC were under no obligation to provide separation between this visual recovery and the PAR traffic. Having called visual with Hawk (B), the formation leader was entirely responsible for avoiding it with his formation. However, in the Board's view what separation that did exist was minimal and was purely fortuitous. The separation reported by both flights was closely aligned to that reflected by the radar recording which illustrates that the contacts merge with 200ft separation indicated on Mode C, after Hawk (A) had descended below Hawk (B). Given also that Hawk (B) had merged within the bounds of the formation, the Board could only conclude that an actual Risk of collision had existed in the circumstances conscientiously reported here.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The pilot of Hawk (A) lost visual contact with Hawk (B) and descended his formation into conflict with it.

Degree of Risk: A.