AIRPROX REPORT No 2013004

Date/Time: 16 Jan 2013 1311Z

Position: 5322N 00426W (8·5nm NNE Valley)

Airspace: LFIR/Valley AIAA (*Class: G*)

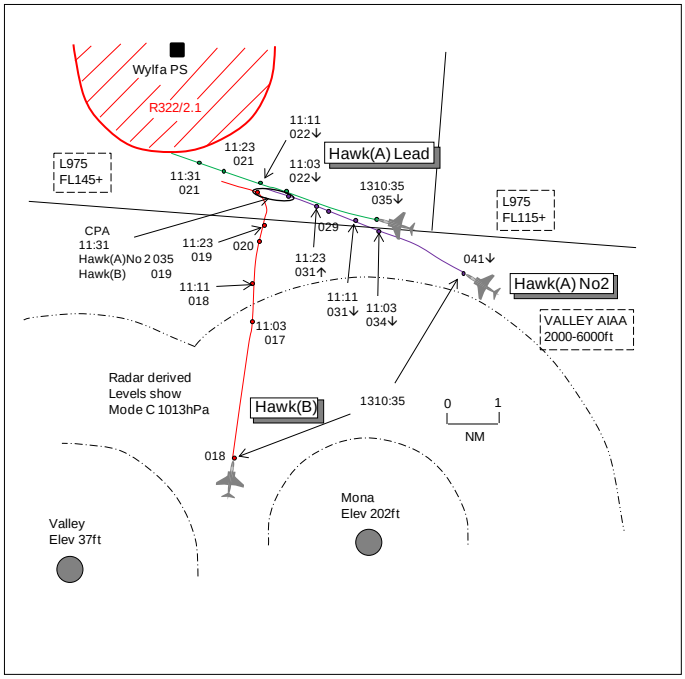
	Reporting Ac	*Reported Ac*
Type:	2xHawk T Mk2(A)	Hawk T Mk 2(B)
Operator:	HQ Air (Trg)	HQ Air (Trg)
Alt/FL:	↓2000ft QFE (1010hPa)	1500ft QFE (1010hPa)
Weather:	VMC CLBC	VMC CLBC
Visibility:	10km	20km

Reported Separation:

1000ft V/0·7nm H Not seen

Recorded Separation:

1600ft V/0·6nm H



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HAWK T MK2(A) NO2 PILOT reports flying solo recovering to Valley and in communication with Valley Director on 363·65MHz, squawking 3730 with Modes S and C; TCAS was fitted. The visibility was 10km flying clear below cloud in VMC and the ac was coloured black with strobe and nav lights switched on. During a pairs recovery to Valley as No2, Leader was level at 2000ft and his ac was 2nm in visual trail at 230kt descending through 2900ft, which was a non-standard recovery for Valley-based ac. The formation was receiving a TS, but only the Lead ac was allocated a squawk (of note, No2 was also squawking Lead's code to enable TCAS functionality, but ATC were not aware of this). The Lead pilot had briefed ATC on the non-standard formation recovery by phone before flight and by radio during recovery (a pair would normally recover in arrow or close formation). Lead was flying with TCAS in TA/RA mode and, following a TA indication on his TCAS, gained tally of a single Hawk [Hawk (B)]. Assessing a possible confliction with his (No 2)'s ac, the Lead pilot made an immediate call on the formation chat frequency. At that instant No2 pilot, who was flying in TCAS TA/RA Mode, received a TCAS RA to "Climb-Climb" so he climbed to resolve the conflict. He got tally at an estimated 1nm range as Hawk(B) turned to match the Hawk Lead's heading, directly between the formation and now slightly low (assessed at 1500ft), about 0·7nm away and 1000ft below. After 20sec Hawk(B) was seen to manoeuvre L towards Valley, shortly followed by an information call by Valley Director stating traffic was passing O/H the formation at 3000ft inbound to Valley. Now clear of the conflict, the formation recovered with no further incident. He assessed the risk of collision as 'Medium'.

THE HAWK T MK2(B) PILOT reports flying a dual training sortie inbound to Valley and in receipt of an implied BS from Valley Approach on Stud 5 squawking 3737 with Modes S and C; TCAS was fitted. The visibility was 20km clear below cloud in VMC and the ac was coloured black with HISLs and nav lights switched on. As part of a transit from Mona RLG (RW22) to Valley (RW13), the student pilot (front cockpit) initiated a RH turn off RW22 and rolled out heading approximately N. He switched to Valley Approach (Stud5) and informed them that they were in the transit from Mona at 1500ft QFE. The APP informed them that there was "no traffic to affect". After a brief period on this heading at 345kt the student spotted a single Hawk T2 [(A) Lead] crossing R to L in our 1 o'clock. He, the instructor in the rear seat, became tally shortly afterwards and estimated it at approximately 3nm and closing. The student initially decided to turn in front of the traffic, but changed his mind and lagged the Hawk's position and aimed behind him. A decision he considered sensible. The TCAS

triggered a "TCAS, TCAS" alert and ATC reported that "traffic believed to be us" had traffic 12 o'clock, 2nm, crossing, a pair, downwind for the ILS. This was in-keeping with the Hawk we had seen - although a second jet was not sighted in the vicinity of the first Hawk. He instructed the student to turn L to (a) avoid the Wylfa nuclear power station restricted area and (b) to turn back towards Valley as we were now following the previously sighted traffic. He took control to expedite the recovery and came further L onto a SW'ly heading. They informed APP that they would be joining for a straight in approach. After landing he was informed that the Hawk they had seen had been the lead element of a 2-ship flying in 2nm trail and that the wingman had taken avoiding action as they (Hawk(B)) had turned to go behind his leader. The rear ac [Hawk(A) No2], unsighted by him, filed an Airprox. He assessed the risk of collision as 'Medium'.

[UKAB Note (1): The Valley METAR shows:- EGOV 161250Z 12005KT 9999 FEW020 BKN080 03/M01 Q1011 BLU NOSIG=

THE VALLEY DIRECTOR reports controlling a busy radar pattern vectoring ac to both Valley and Mona with all flights being vectored on the same frequency. The Approach Radar controller (RAD) informed him about a Mona to Valley transit ac [Hawk(B)] which was a VFR transit taking generally the shortest ground track between Mona and the IP to the RW in use at Valley. At the time the transit was not perceived to be a factor to the Hawk(A) formation which was being vectored for a 'trails' ILS. RAD then informed him that Hawk(B) was positioning for a straight-in approach so, after passing instructions to other flights in the pattern, he checked on Hawk(A)'s position in relation to Hawk(B). Hawk(A) formation was informed of Hawk(B)'s position which appeared 1nm behind Hawk Lead ac and 1nm ahead of Hawk(A) No2. Hawk(B) was indicating 1000ft above both Hawk(A) formation ac, he thought, the No2 being 2nm in trail of the Lead. Hawk(B) then positioned for a straight-in approach via Holyhead mountain whilst Hawk(A) formation was vectored for a slightly wider pattern for separation on the approach from Hawk(B)'s visual straight-in approach.

THE VALLEY APPROACH RADAR CONTROLLER reports Hawk(B) pilot called on frequency for a Mona to Valley transit. Looking at the 'air picture' at the time of the request, there was no instrument traffic to affect this particular profile. On DIR's frequency was a Hawk T2 formation which was downwind in the RTC. The Mona to Valley transit should, according to the FOB, turn and be well ahead of the Hawk(A) formation and therefore not be a factor. RAD advised Hawk(B) flight that there was no instrument traffic to affect, to which he replied that he wanted to position for an 8nm straight-in approach to RW13. This then obviously changed the dynamic of the air picture and deviated from the standard Mona to Valley transit profile. Hawk(B) was never formally identified but a radar return with Mode 3A/C appeared to be tracking on a N'ly heading towards Hawk(A) formation in the RTC. RAD stated to Hawk(B) pilot that, "traffic believed to be you has traffic 12 o'clock 2nm crossing R to L indicating similar height". Hawk(B) pilot replied he was visual with this traffic. RAD then went on to explain that the formation was positioning for the ILS. Hawk(B) pilot reported he was heading towards Holyhead mountain for his straight-in approach and then changed to Tower frequency. In the meantime RAD liaised with DIR confirming that there was going to be a visual straight-in ac positioning ahead of his instrument traffic. Hawk(B) pilot did not advise of any TCAS RA on his frequency.

THE VALLEY SUPERVISOR reports he was in the VCR advising the ADC that the ILS approach was a pairs approach which were 2nm apart, which is not a commonly practised recovery to Valley. His aim was to fully brief the ADC, ensuring that the clearances that could be issued were understood. Additionally the cct was busy with other traffic and he wanted to ensure that the ADC had informed the cct traffic of this particular ILS approach. Post incident and after discussion with the Approach Radar controller, RAD informed him that TI was passed to Hawk(B) pilot against Hawk(A) formation after initially stating that there was no instrument traffic to affect. RAD's reason was that Hawk(B) had not taken the normal transit route iaw the FOB (B05-1 Para 9) and the instrument traffic, which would not normally be a factor, became an issue because Hawk(B) pilot later informed RAD that he was positioning for a visual straight-in approach. DIR also had an understanding that Hawk(B) was a standard Mona to Valley transit which joins through initials and would not be a factor. DIR stated that this was the reason the traffic was not called earlier to Hawk(A) formation. He believed 2 factors contributed to the incident. First, the ILS approach in trail

is not a commonly practised procedure at Valley and more clarity on carrying out the procedure needs to be understood by both ATC and aircrew. Second, a Mona to Valley transit is through initial; if a straight-in approach is required it should be requested on initial contact with Approach so that the pertinent information can be passed regarding the approach and measures can be taken to facilitate the request and sequence the ac if required.

BM SAFETY POLICY AND ASSURANCE reports that this Airprox occurred in VMC, 8·3nm NNE of Valley between a flight of 2 Hawk T2s (Hawk A flight) and a singleton Hawk T2 (Hawk B). Hawk(A) No 2 was operating in 2nm trail to Hawk(A) Lead and being vectored for a pairs trail ILS approach to RW13 at Valley, in receipt of a TS from DIR. Hawk(B) was conducting a VFR Mona to Valley transit, not in receipt of an ATS but in 2-way comms with Valley RAD.

All heights/altitudes quoted are based upon SSR Mode C from the radar replay unless otherwise stated. Valley QFE at the time of the incident was 1010hPa, equating to approximately 90ft difference between the reported heights and the radar replay derived altitude which is based on 1013hPa.

DIR was a highly experienced controller and reported that, at the time of the incident, he had been working for 2hr since his last break and described his workload as 'high to medium' with 'medium' task complexity. 4 speaking units were on frequency conducting IFR approaches to both Valley and Mona. RAD described his workload as low with only 1 ac on frequency and minimal task complexity.

The RAF Valley FOB states that 'Before transiting between RAF Valley and Mona airfields, aircrew are to pre-note Tower with this intention before departing the visual circuit. A call is then to be made to Valley Approach in order to determine the position of any other joining or departing traffic. If a conflict appears likely, the transit traffic is to defer to other traffic and sequence accordingly'.

Figure 1 below depicts the ground track to be followed by ac conducting Mona/Valley transits, with the Mona RW22/Valley RW13 transit ground track highlighted in red. The apogee of the Mona RW22/Valley RW13 transit ground track is approximately 5·8nm NNE of Valley. Of note, the Valley FOB does not stipulate a height for the transit procedure but does stipulate that 'ac are normally to join through Initial at 1000ft QFE'.

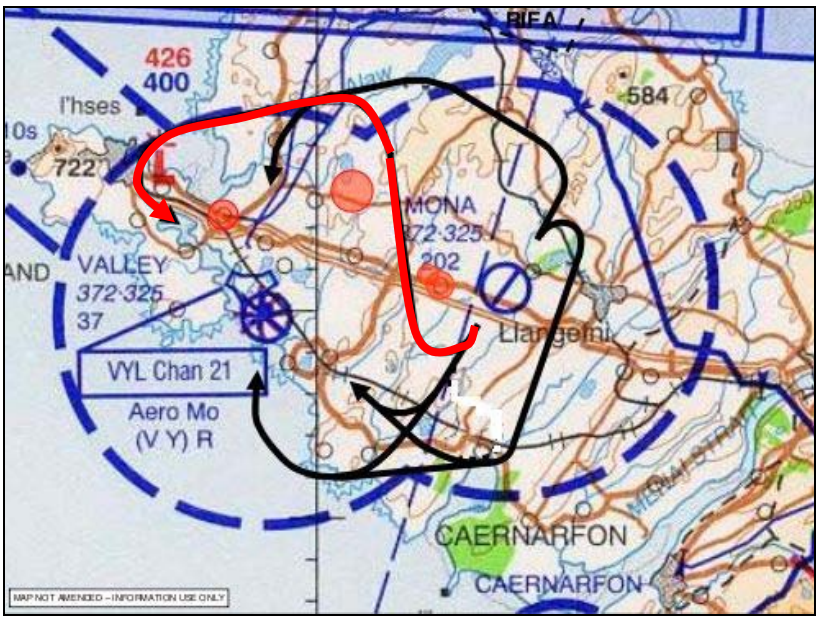


Figure 1: Depiction of Ground Track for Mona to Valley Transit.

Although the pilot of Hawk(B) stated that they were in receipt of an 'implied BS' during the Mona/Valley transit, no agreement was reached between Hawk(B) and RAD to provide a BS and the

Valley FOB does not state that a BS will be provided during the transit. That said, it is reasonable to argue that Valley ATC personnel would treat ac flying this profile as if they were in receipt of a BS.

Trails procedures are non-standard for the Hawk and are not incorporated within the Valley FOB. Although they will be included within the T2 simulator syllabus for students, it will not form part of the live flying syllabus. The unit investigation determined that the crews of Hawk(A) formation were all instructors and were flying the formation by way of a familiarisation and validation exercise. The pilot of Hawk Lead reported that they had 'briefed ATC on the non-standard formation recovery by phone before flight and by radio during the recovery'. Although it has not been possible to determine the content of the phone briefing, the pilot of Hawk(A) Lead briefed DIR on the RT at 1304:25 stating that, "*as pre-briefed, once Victor-Mike, err [Hawk (A) formation c/s] for Radar to ILS with (Hawk(A) No2 c/s)] in trail 2 miles*." Although it was not instructed by DIR, at 1306:59 Hawk(A) No2 began to squawk the SSR3A code assigned to Hawk(A) Lead. This was not challenged by DIR, nor was Hawk(A) No2's SSR 3A validated nor the SSR Mode C information verified.

The incident sequence can be deemed to have commenced at 1310:30 as Hawk(B) free-called RAD departing Mona, transiting to Valley. RAD replied that there was, "*no instrument traffic to affect*", which was acknowledged. Although Hawk(B) would have already been displayed on the Valley surveillance display, this point also reflects the moment at which Hawk(B) entered NATS surveillance coverage and was thus visible on the radar replay. Hawk(B) was 3·1nm WNW of Mona and 3·9nm ENE of Valley, tracking N'ly, indicating 1800ft. Hawk Lead was 5·4nm NE of Hawk(B), heading 290°, indicating descent through 3500ft to 2000ft QFE; Hawk(A) No2 was in 2nm trail to Hawk(A) Lead and 5·7nm NE of Hawk(B), commencing a L turn onto 290°, indicating 4100ft having not yet commenced descent. Figure 2 depicts the incident geometry at this point.

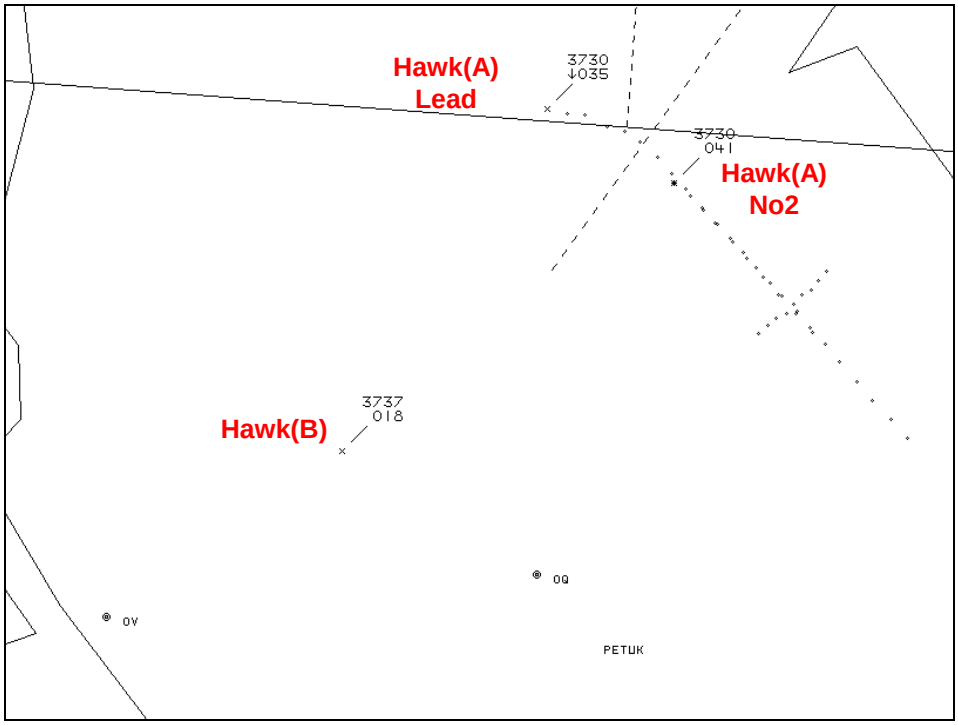


Figure 2: Incident Geometry at 1310:35.

By 1311:03, Hawk(B) had extended 6nm NE of Valley, tracking N'ly, indicating 1700ft; Hawk(A) Lead and Hawk(A) No2 were 2·6nm NNE and 3nm NE of Hawk(B) respectively, heading 290°, indicating descent through 2200ft and 3400ft respectively. At this point, it is evident that Hawk(B) had turned L approximately 15°, which may accord with the pilot's report that his student had 'initially decided to turn in front of the traffic' having visually acquired a single Hawk 'crossing right to left in our 1 o'clock' with the instructor estimating the lateral separation at 3nm. It later transpired that the crew of Hawk(B) had sighted Hawk(A) Lead but not Hawk(A) No2. The unit's investigation stated that the

instructor in Hawk(B) was 'somewhat confused' by only sighting 1 Hawk, given that the 'standard pairs recovery for Valley Hawks is echelon or arrow; in short, a 2nm trail was not expected'. The unit's investigation also determined that the crew of Hawk(B) received a TCAS TA at this point and while the crew were conscious of the warning, they 'did not check the TCAS display which might have provided SA on the trail [ac]', Hawk(A) No2; it has not been possible to determine whether the TA was activated against Hawk(A) Lead or Hawk(A) No2. The instructor added that the student then changed his mind 'and lagged the Hawk's [Lead] position and aimed behind it'. The unit's investigation determined that it was during this period that the crew of Hawk(B) 'took the decision to position at 8nm for a flapless approach'; however, this decision was not relayed to RAD until 1311:36, after the CPA.

At 1311:04 and 1311:06, Valley Talkdown advised DIR, "*Talkdown free*" on the channel intercom. At 1311:08, an unrelated Hawk pilot advised DIR that he was, "*checks complete*", which was acknowledged. At 1311:13, RAD advised Hawk(B) pilot, "*traffic believed to be you has traffic 12 o'clock, 2 miles, crossing right to left, believed to be similar type pair, similar level*." At this point, Hawk(A) Lead and Hawk(A) No2 were 2nm N and 2·3nm ENE of Hawk(B) respectively, heading 290°, indicating 2200ft and descent through 3100ft respectively. Hawk(B) pilot advised RAD that they were, "*visual*" which RAD acknowledged, adding, "*that is a pair about to..on the…for the ILS, shouldn't affect your Mona transit*." Hawk(B) pilot acknowledged this at 1311:28.

CAP 774 Chapter 3 Para 5 states that:

> 'Traffic is normally considered to be relevant when, in the judgement of the controller, the conflicting aircraft's observed flight profile indicates that it will pass within 3 NM and, where level information is available, 3,000 ft of the aircraft in receipt of the Traffic Service. However, controllers may also use their judgement to decide on occasions when such traffic is not relevant, e.g. passing behind or within the parameters but diverging'.

At 1311:23, Hawk(A) No2 pilot's response to their reported TCAS RA climb begins to become evident on the radar replay; Hawk(B) was 1·1nm SW of Hawk(A) No2, tracking NNE'ly, indicating 1900ft. Hawk(A) No2 reached the top of their TCAS RA-instructed climb at 1311:27, indicating 3500ft. The pilot of Hawk(A) No2 did not advise DIR that they had received a TCAS RA. Between radar sweeps at 1311:27 and 1311:31, Hawk(B) pilot initiated a further L turn to track approximately 290°. This was, as reported by the instructor, to avoid the Wylfa power station restricted area and to turn back towards Valley as 'they were now following the previously sighted traffic'. The pilot of Hawk(A) No2 reported that they 'got tally at an estimated 1nm range as the single Hawk [Hawk(B)] turned to match (Hawk(A) Lead)'s heading, directly between the formation'.

The CPA occurred 8·3nm NNE of Valley at 1311:31 as Hawk(B) passed 0·6nm ahead of Hawk(A) No2; Figure 3 depicts the incident geometry at this point. No TI was passed by DIR to Hawk(A) Lead or Hawk(A) No2, about Hawk(B), prior to the CPA. Subsequent to completing their DASOR, DIR has related that RAD warned them 'off-landline' that Hawk(B) was extending to conduct a "flapless straight in approach"; however, this would have been shortly after 1311:36 and hence after the CPA. DIR added that, having believed that Hawk(B) was conducting a standard Mona/Valley transit and joining through Initials, they did not believe that Hawk(B) was a factor and had been focussed on monitoring the progress of the other ac on frequency, particularly those conducting IFR approaches to Mona.

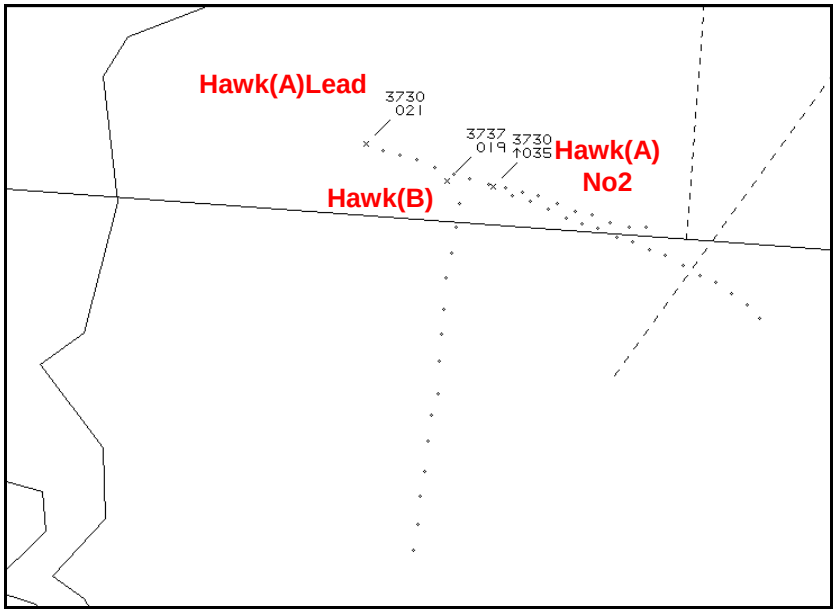


Figure 2: Incident Geometry at 1311:31.

At the time of the incident, the SUP was in the VCR briefing the ADC on the forthcoming trails approach and monitoring the busy visual cct. Consequently, the SUP was not in a position to affect the outcome of the incident.

Given the published Mona/Valley transit profile, at the point that RAD advised Hawk(B) flight that there was, "*no instrument traffic to affect*", he was correct in as far as Hawk(B) would have been expected to have been ahead of Hawk(A) Lead and Hawk(A) No2. Moreover, RAD's use of this expression was accepted standard Valley procedure and, based on the findings of the unit investigation, is understood by aircrews. However, notwithstanding that RAD's statement was accepted Valley procedure, BM SPA contends that, given that the Hawk formation would have been visible to Hawk(B) flight and of the proximity of the respective flight profiles, 'good practice' would have been for RAD to provide a warning to the transit traffic to develop aircrew situational awareness.

In terms of the Airprox itself, it occurred as Hawk(B) extended beyond the published ground track for the Mona/Valley transit procedure and thus introduced a confliction with Hawk(A) No2. Once Hawk(B) had extended beyond the route routinely followed by Mona/Valley transiting ac, only 10sec elapsed before RAD provided a warning of traffic to Hawk(B). Consequently, RAD reacted as quickly as could reasonably be expected, by providing a warning to Hawk(B) crew of the presence of Hawk(A) Lead and (A) No2; however, this warning did not explain that the pair of Hawks was in 2nm trail. Whilst 'good practice' would suggest that a more accurate warning detailing Hawk(A) Lead and Hawk(A) No2 individually was preferable, it is reasonable to argue that RAD would have been surprised by seeing Hawk(B) extend beyond the standard transit profile and was attempting to provide as timely a warning as possible. Moreover, given that RAD was providing an 'implied BS', a generic warning of the presence of Hawk(A) Lead and Hawk(A) No2 was arguably sufficient. The crew of Hawk(B) had already visually acquired Hawk(A) Lead and, based on RAD's warning, were cognisant that they had been notified of a "*similar type pair*" but were not aware that Hawk(A) No2 was flying in trail and did not see it. It is noteworthy that Hawk(B) did not seek confirmation of the location of Hawk(A) No2, having been unable to sight it. From RAD's perspective, Hawk(B) pilot's confirmation that they were "*visual*" will have reduced their concern over the developing situation and, believing that Hawk(B) would 'turn-in' to initials shortly, thus removed their ability to further directly affect the incident.

From DIR's perspective, it is reasonable to argue that Hawk(B) only became 'relevant traffic' from 1311:03 as it extended N of the typical Mona/Valley transit route. However, given the expected profile of Hawk(B), DIR had understandably prioritised his focus on the other ac on frequency and

was unaware of the proximity of Hawk(B) to Hawk(A) Lead and Hawk(A) No2 until the warning from RAD. Unfortunately, this meant that DIR did not detect the threat posed by Hawk(B) and, compounded by the short time available between 1311:03 and the CPA at 1311:31, was unable to provide TI to Hawk(A) Lead and Hawk(A) No2.

This incident stands as an excellent example of disconnected, random acts and events highlighting weaknesses in an organisation's barriers against failure: the non-standard Hawk trail procedure and the flight by Hawk(B) outside the Mona/Valley transit profile which compressed the timelines available for ATC to react. In-turn, these shortened timelines caused the warning provided by RAD to Hawk(B) to lack explicit detail about the nature of the trail formation and, given DIR's workload, caused DIR to not pass TI to Hawk(A) Lead and Hawk(A) No2. In this instance, the TCAS onboard Hawk(A) No2 resolved the conflict enabling the crew to avoid Hawk(B).

RAF Valley conducted a thorough investigation into this Airprox and made a number of recommendations to reduce the likelihood of a reoccurrence. BM SPA has also recommended that RAF Valley review those elements of the FOB regarding the requirements for ATS provision to ac conducting Mona/Valley transit profiles.

HQ AIR (TRG) agree with BM SPA that the 'no traffic to affect' call was misleading but did not fundamentally cause this Airprox as TI was passed in time to be effective. However, the lack of a proper description of the disposition of the pair caused confusion and led the crew of Hawk(B) to believe they had acquired and safely deconflicted from the 'pair'. Mention of the fact that the pair were in fact in trail by 2nm, or giving the range and bearing to each of the pair separately would have provided the crew with better awareness. The key principle must always be to convey the displayed radar picture as effectively but succinctly as possible. It is disappointing to note the lack of use made by Hawk(B) of their TCAS capability, which was in stark contrast to the effective use of TCAS by Hawk(A) No2 pilot.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of Hawk(A) No2 and Hawk(B), 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.

The Airprox sequence of events began when the crew of Hawk(B) did not follow the Mona-Valley transit procedure and did not inform ATC. In extending N'ly beyond the published ground track, Hawk(B) flew towards the intended track of Hawk(A) and Hawk(A) No2. When Hawk(B) crew called RAD they were informed there was no instrument traffic to affect them, which was accurate as the ac would have been ahead of Hawk(A) Lead and No2 had the normal transit track been flown. As soon as RAD noticed Hawk(B) had crossed the MATZ boundary he passed a traffic warning to the crew but he was still under the impression that the procedure was being followed. It was unfortunate that RAD had not been informed by DIR that Hawk(A) No2 was in 2nm trail from his leader or that RAD did not notice Hawk(A) No2's squawk; the result was that in passing a warning to Hawk(B), RAD simply stated that the traffic was a pair of Hawks, thereby painting an incorrect 'air picture' to the crew of Hawk(B). Before receiving the ATC warning the crew had visually acquired Hawk(A) Lead and had elected to 'slot-in' behind it, which lead to Hawk(B) turning in front of Hawk(A) No2 which was not seen. Hawk(B) crew did not query with ATC that only a single Hawk could be seen, only reporting 'visual' with RAD and only informing RAD of their intention to position to 8nm final after the CPA. Hawk(B) crew would not have expected the Hawk 'pair' to be in 2nm trail as the procedure is not flown by Valley students and it was not an agreed procedure in the FOB. For his part, DIR was expecting Hawk(B) to remain clear of Hawk(A) Lead and No2's track and only noticed its proximity after the CPA. Following a TCAS TA alert, Hawk(A) Lead saw Hawk(B) and warned No2 of its presence simultaneously with No2 crew receiving and following the TCAS RA climb guidance before visually acquiring Hawk(B) well below. These actions allowed the Board to conclude that any risk of collision had been quickly and effectively removed. The Board noted that Hawk(A) No2 pilot did not alert ATC to the TCAS RA or 'clear of conflict' iaw CAP413.

The BM SPA Advisor informed Members that as a result of this Airprox the FOB Mona-Valley transit procedures were reviewed and amendments identified. These include specifying a transit height, reiterating the need to fly the published ground track or seeking ATC approval before deviating and stipulating that flights are in receipt of an ATS unless the Mona-Valley was for Valley RW31.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Hawk(B) crew deviated from the Mona-Valley transit procedure without informing ATC and turned in front of Hawk(A) No2, which they did not see.

Degree of Risk: C.