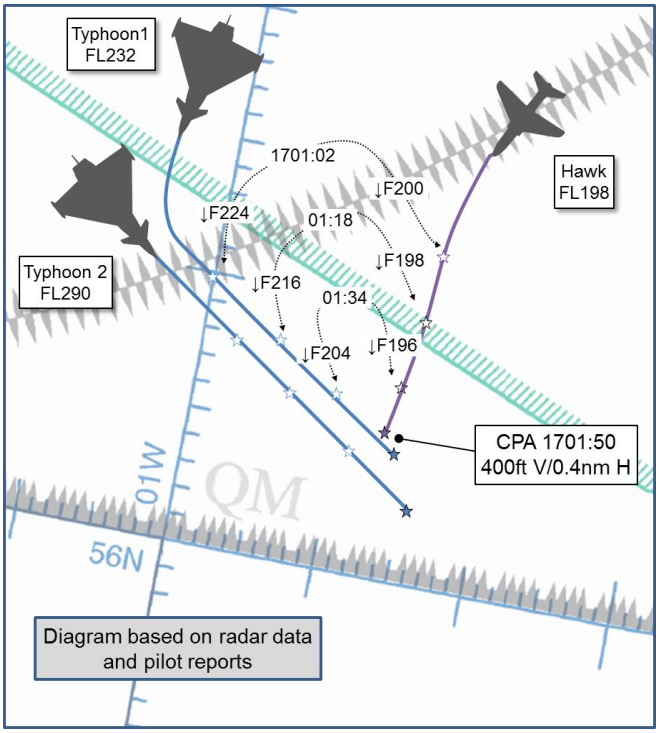
AIRPROX REPORT No 2015004

Date: 22 Jan 2015 Time: 1703Z Position: 5610N 00101W Location: D613C (Twilight)

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Hawk T1	Typhoon FGR4
Operator	HQ Air (Ops)	HQ Air (Ops)
Airspace	Scottish FIR	Scottish FIR
Class	G	C
Rules	IFR	IFR
Service	Traffic	Traffic
Altitude/FL	FL194	FL198
ACAS/TAS	Not fitted	Not fitted
Transponder	A, C, S	A, C, S
Reported		
Colour	Black	Grey
Lighting	Navigation, red HISL, Nose light	Navigation, red HISL
Conditions	VMC	VMC
Visibility	100km	30km
Altitude/FL	FL190	FL200
Speed	180kt	300kt
Separation		
Reported	300ftV 800ft H	'400ft'
Recorded	400ft V/0.4nm H	



THE HAWK PILOT reports returning to base in dusk conditions having acted as target for visual identification training for a Typhoon aircraft in the D613 complex. The last intercept was completed at FL170 and the Typhoon was seen to climb away to the west. After receiving a 'stop climb' during his recovery, the Hawk was then instructed by Hotspur (fighter control) to descend to FL190. The Hawk was now outside the D613 complex and, maintaining FL190 for several track miles, the Hawk pilot became visual with a Typhoon in the right 2 o'clock at less than three miles, tracking right to left, slightly high. He stated that he understood that the Typhoon was joining with another Typhoon and climbing to FL290 to refuel to the east. The Typhoon subsequently passed a few hundred feet in front and about 300ft above. He did not manoeuvre because visual contact was maintained throughout. He requested whether the Typhoon pilot was visual to which the reply was 'negative'. Hotspur immediately responded with 'both 10 thousand feet above'.

He assessed the risk of collision as 'Low'.

THE TYPHOON (1) PILOT was a singleton Typhoon working with a Hawk in the D613 complex being controlled by Hotspur. He planned to rendezvous with another Typhoon (2) in the southern portion of D613. Upon completion of the intercept of the Hawk at FL170, he headed west in D613C whilst the Hawk turned north. He then climbed to meet Typhoon (2) at FL290. During the climb Typhoon (2) was cleared descend to FL230 and cleared left turn 125° direct to the refuelling area. To maintain separation from Typhoon (2), Typhoon (1) then descended to FL200. At this point both Typhoons were in mirror (one above the other), displaced by approx 5000'. The Typhoon pilot was unaware of the conflict with the Hawk because he had been focussing on the descending flight lead.

He assessed the risk of collision as 'Medium'.

THE HOTSPUR CONTROLLER reports controlling the Typhoon and Hawk prior to the Hawk returning to base and the Typhoon joining a tanker in AARA5. Typhoon (1) turned away from the Hawk to join Typhoon (2) at FL290 and began a climb. He thought Typhoon (1) would climb to level with Typhoon (2) as they had previously confirmed that they would be joining the tanker together. At this point, the Hawk turned onto a southerly heading and was initially approved a climb to FL240, this was corrected to a descent to FL190 as the Typhoons were joining above his position. In order to expedite the join between the Typhoons and action their descent for the tanker, Typhoon (2) had been approved a descent to FL230. As the two Typhoon radar plots merged, a left turn was approved for them to route towards the tanker. At this point, Typhoon (1) had in fact descended to FL196. The controller assumed that because Typhoon (1) was 'self joining' he would respond to changes in Typhoon (2)'s height to facilitate his join. The Hawk then questioned the Typhoon to confirm that they were visual as he had passed overhead.

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

THE HOTSPUR FIGHTER ALLOCATOR reports the Typhoon terminated his intercept and requested a join with another Typhoon who was at FL290 en route to meet a tanker. He asked the controller to call the Typhoon in and vector the Hawk south to clear them joining. The Typhoon called contact on the other Typhoon and turned away from the Hawk. At this point the controller instructed the Hawk to climb to FL240; however, on realising the Typhoons would need to descend for the tanker, he stopped the climb at FL200. He then descended the Hawk to FL190 to give himself extra separation. Initially the Typhoon had started to climb to join the other Typhoon, but then turned towards the Hawk and started to descend. From the Allocator's point of view, he had lost situational awareness on the Typhoon's height as he believed he was still in the climb and he had diverted his attention to the handover to the tanker.

Factual Background

The Aberdeen weather was recorded at the time:

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EGPD 221650Z 17008KT 6000 NSC 01/01 Q1019 NOSIG
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Analysis and Investigation

Military ATM

The tape transcript between the Hawk (Capture 01), the Typhoons (Venom 81/82) and the Weapons Controller (WC) is below:

From	To	Transcription	Time
VM81	WC	Venom 1, confirm Madras 42 is bullseye 179/100.	16:58:01
WC	VM81	Negative, Madras 42 is bullseye 163/153.	16:58:06
VM82	All	Venom 82 terminate terminate, request pick up and join Venom 81.	16:58:12
CE01	All	Terminate Capture 1.	16:58:19
WC	VM82	Terminate Hotspur. Venom 81 bullseye 149/59, 29 thousand tracks south.	16:58:24
VM81	WC	Venom 81 contact.	16:58:30
VM82	VM81	Venom 2, clear join tanker.	16:58:35
VM81	VM82	Clear join, Venom 81.	16:58:37
VM81	CE01	Capture 1 many thanks.	16:58:51
CE01	VM81	No worries have a good one.	16:58:54
WC	CE01	Capture, Hotspur, vector south, confirm level of recovery and type.	16:59:00
CE01	WC	Capture's in the climb flight level 270 and radar to PAR.	16:59:07
WC	CE01	Hotspur.	16:59:15
WC	VM82	VM82 playmate west.	16:59:23
VM81	WC	(Steps on Hotspur) Madras 42 is now 165/146.	16:59:24
WC	VM82	Affirm	16:59:30
CE01	WC	Capture 1 request climb flight level 270.	16:59:34

From	To	Transcription	Time
WC	CE01	Capture 1 approved climb flight level 240.	16:59:44
CE01	WC	Flight level 240 Capture 1.	16:59:48
VM82	WC	Hotspur, Venom 82 requesting left turn own navigation for intercept.	16:59:54
WC	VM82	Venom approved.	17:00:00
VM81	WC	Own navigation Venom 81.	17:00:04
WC	CE01	Capture 1 stop climb flight level 200, descending playmates to low level for handover to tanker.	17:00:06
CE01	WC	Stop climb flight level 200 Capture.	17:00:11
WC	CE01	Capture 1 descend flight level 190 for handover to London.	17:01:01
CE01	WC	Descend 190 Capture 1.	17:01:05
WC	VM82	Venom 82 Radar Control at and above flight level 195 TRAs inactive.	17:01:11
VM82	WC	Radar Control Venom 82.	17:01:16
WC	VM81/82	Venom, Hotspur, once you're clear of Capture I'm gonna descend you flight level 190 for the tanker	17:01:23
VM82	WC	Venom copies.	17:01:28
WC	VM81	Venom 81 start descent flight level 230.	17:02:03
VM81	WC	Start descent flight level 230 Venom 81.	17:02:06
CE01	VM82	Venom 82 Capture 1.	17:02:18
VM82	CE01	Go for Venom 82.	17:02:21
CE01	VM82	Can you just confirm you were visual with us 50 seconds ago.	17:02:23
VM82	CE01	Um, negative, visual with lead joining above.	17:02:26
CE01	VM82	Roger.	17:02:31
WC	CE01	Capture Venom were 10 thousand above.	17:02:35
CE01	WC	Say again for Capture.	17:02:39
WC	CE01	Capture 1 Venom were 10 thousand feet above.	17:02:43
CE01	WC	I estimate 300 feet.	17:02:46
WC	CE01	Copied 300 feet.	17:02:50

The Hawk pilot requested a climb to FL290 and was provided a climb to FL240 at 1659:44. At 1659:54 (Figure 1) Venom 82 requested left turn own navigation for intercept with Venom 81, which was approved by the WC.

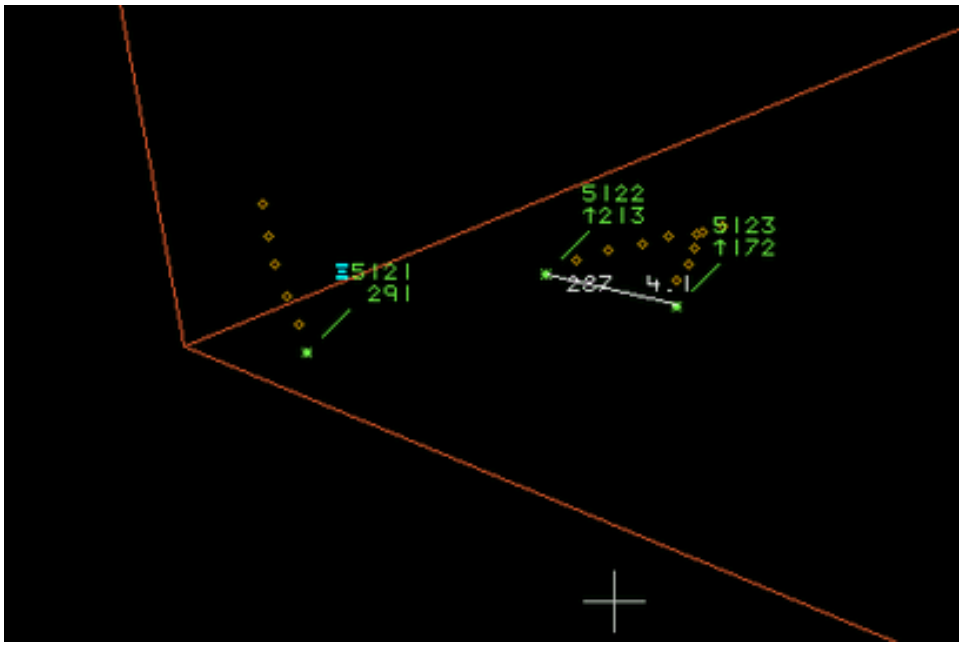

Figure 1: Geometry at 1659:55 (Hawk 5123, Venom 81 5121, Venom 82 5122).

At 1700:06, the WC issued a 'stop climb FL200' to the Hawk pilot because he was planning to descend the Typhoons to meet the tanker. At 1700:11 (Figure 2), the Hawk confirmed the stop climb at FL200.

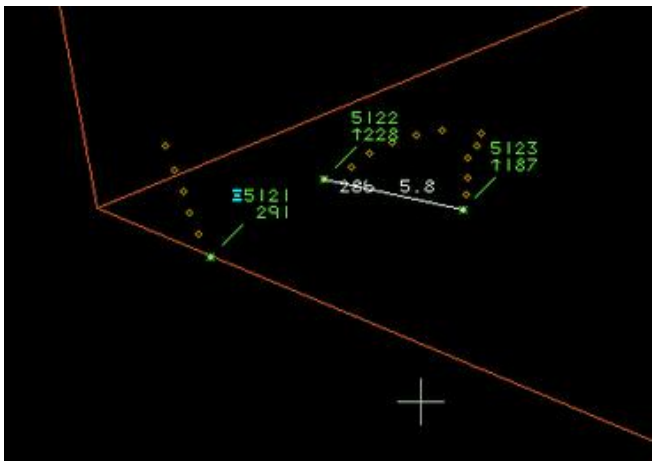

Figure 2: Hawk stopping climb at FL200 at 1700:11.

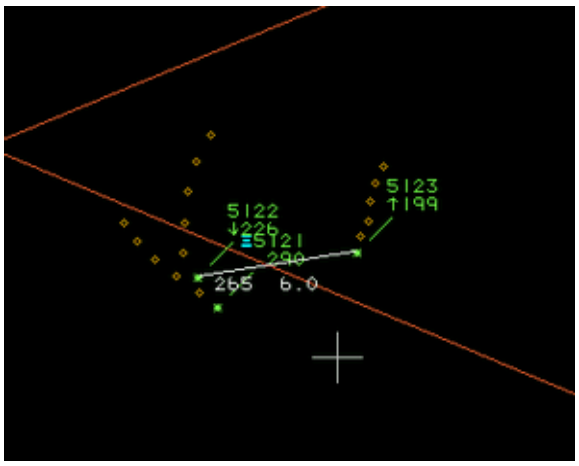

Figure 3: Hawk instructed to descend to FL190 at 1701:01.

At 1701:01 (Figure 3), the Hawk was descended to FL190 with Mode C showing FL199 climbing, and with Venom 82 descending through FL226. At 1701:23 (Figure 4), the WC confirmed that the Typhoons would be descended to FL190 for tanking, once clear of the Hawk.

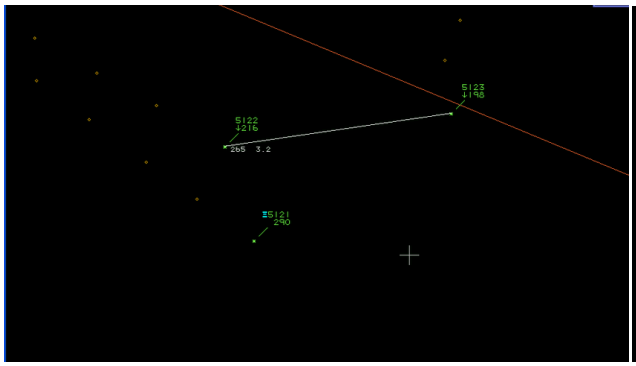

Figure 4: Geometry at 1701:23.

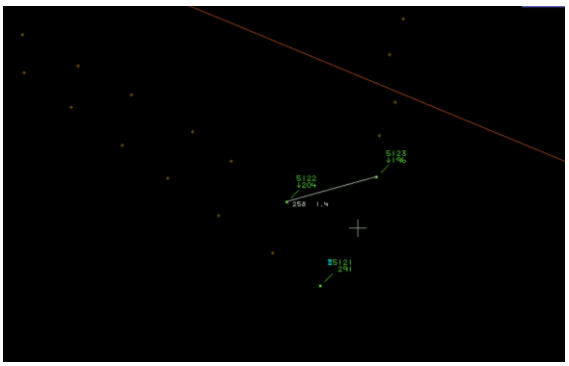

Figure 5: Geometry at 1701:34.

At 1701:34 (Figure 5), Venom 82 was descending through FL204, with the Hawk was in the descent passing FL196. The CPA was estimated at between 1701:42 (Figure 6) and 1701:50 with 0.4 nm and 400 feet separation.

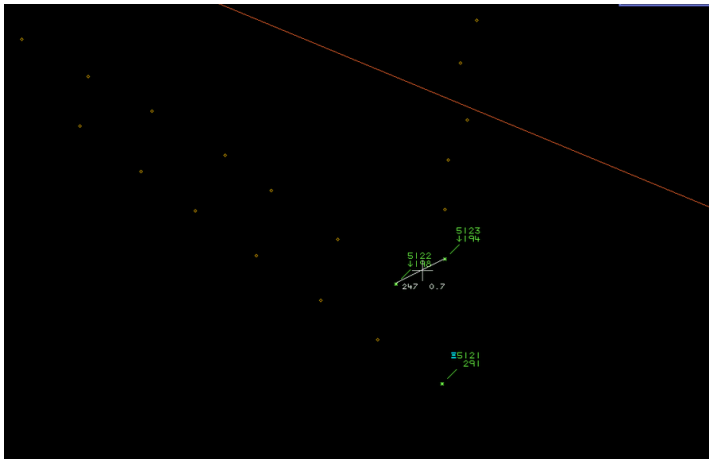

Figure 6: CPA at 1701:42.

At 1702;26, the Hawk requested if Venom 82 was visual and Venom 82 replied with , "*negative, visual with lead joining above*." The WC informed that Venom were 10,000 feet above and the Hawk replied that the estimated separation was 300 feet.

The WC had initially approved a climb for the Hawk to FL240 but this was eventually amended to FL190 at 1701:01 with the Typhoons believed to be joining on a converging heading with the Hawk and Venom 82 actually in the descent passing FL226; no confirmation of the descent was passed over the RT. Venom 82 was put under Radar Control at 1701:11 (although the TRA was active and the Traffic Service was still relevant), and it is not known if the controller noticed the descending Venom 82 as the Typhoons conducted their own join that happened to take them past the flight path of the Hawk. The WC issued a descent to FL230 to Venom 81 post-CPA and commented to the Hawk that 10,000 feet separation existed. This may indicate that the WC had used the Mode C of Venom 81 and assumed that Venom 82 was well above the Hawk and not a factor for Traffic Information. No instruction was given to Venom 82 apart from approving the left turn to intercept Venom 81 at FL290; the WC may have assumed that the Venom 82 would be climbing for the join and the plan was to descend the Typhoon formation to the tanker level of FL190, when clear of the transiting Hawk.

Venom 82 had climbed to FL239 by 1700:26 before beginning a descent, passing FL196 at CPA. Venom 82 was not visual with the Hawk but was visual with the Typhoon playmate who had been maintaining FL290. The pilot of Venom 82 reported being cleared to descend to FL230 and continuing to FL200. The Hawk had gathered from the RT that Venom 82 was joining with Venom 81. Whilst at FL190, the Hawk pilot became visual with Venom 82 at less than 3 nms and subsequently passed behind and slightly below the Typhoon. The Hawk pilot did not take avoiding action but began to doubt whether the Typhoon pilot had been visual following separation that was closer than anticipated.

The normal barriers to an incident of this type would be Traffic Information, Airborne Collision Avoidance Systems (ACAS) and the 'see-and avoid' principle because crews were VMC in an active TRA. Traffic Information was not passed by Hotspur and there does not appear to be communication between controller and aircrew over the Typhoon plan to join. Neither aircraft were fitted with any form of ACAS, and onboard sensors were not used to detect conflictors at this stage. 'See-and-avoid' was the ultimate barrier to prevent collision, and the Hawk pilots were visual at approximately 3 nm; the Typhoon pilot was focussing on joining with the other Typhoon that was above, and was not aware of the Hawk passing 400ft below. CRC Boulmer investigated the incident and produced recommendations to prevent re-occurrence.

UKAB Secretariat

Both pilots had equal responsibility for avoiding collision and for ensuring that they did not fly in such proximity to other aircraft as to create a danger of collision[1]. The incident geometry is converging, and the Hawk pilot was therefore required to give way to the Typhoon[2].

HQ Air Command

This incident may be attributed to the miscommunication of intentions by the Typhoon (1) pilot when joining with his playmate, in conjunction with an assumption from the Hotspur Controller that Typhoon (1) would climb to the same level as his partner for transit to the tanker.

Due to the use of non-standard phraseology from the Typhoon(1) pilot when requesting 'pick up and join' with Typhoon(2), the Controller may have been under the impression that Typhoon(1) would climb to meet his playmate. As a result, he lowered the transit altitude of the Hawk, prior to handover, to facilitate the descent of the Typhoon formation above. Possibly as a result of the previous assumption, the Controller did not monitor the level of Typhoon (1) and he was not

[1] SERA 3205 (Proximity)
[2] SERA 3210 (Converging)

aware that his instruction for the formation to descend to FL230 resulted in Typhoon (1) manoeuvring to FL200 to maintain separation from the aircraft joining from above; this issue was compounded by the pilot of Typhoon (1) not complying with his clearance or informing the Controller of his intentions. Consequently, Traffic Information was not passed to either the Hawk or Typhoon (1) pilots as the Controller did not believe that their tracks would impinge on each other.

In this instance, see-and-avoid from the Hawk pilot ensured that safe separation was maintained and a more serious event did not occur. However, it is evident that both the Hotspur Controller and the Typhoon (1) pilot had lost situational awareness (SA) of the proximity of the Hawk. As neither aircraft was fitted with ACAS/TAS the barrier was not available. Nevertheless, this equipment may have assisted in improving SA for both crews, especially given the difficulty of judging closure distances during twilight conditions.

Summary

An Airprox was reported when a Hawk and a Typhoon flew into proximity on Thursday 22nd January 2015. Both pilots were operating under VFR in VMC and both were in a receipt of a Traffic Service from Boulmer Radar.

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 initially considered the actions of the Typhoon (1) pilot. They noted that he had disengaged from the Hawk after a target acquisition exercise and was displaced both laterally and vertically from his playmate, Typhoon (2). Implicit in his request to join with Typhoon (2) was the expectation by Hotspur that he would climb to do so. Unfortunately, his intentions were not explicitly communicated to Hotspur and, after visually acquiring Typhoon (2), he did not climb as expected but descended to facilitate Typhoon (2)'s own forthcoming descent for transit to join the tanker. Without any situational awareness of the Hawk, this unwittingly put him in potential confliction with it. Although the two Typhoon pilots discussed via internal communications the fact that Typhoon(1) was considerably lower than Typhoon(2), in mirror formation the two aircraft were some 9000ft apart but this information was not passed to Hotspur; the Board considered that this lack of information flow to Hotspur by the Typhoon(1) pilot was contributory to the incident. It was clear to the Board that the Typhoon(1) pilot's mental model had discounted the Hawk in the belief that it had departed the area, was not a factor, and that the priority was to facilitate the join with Typhoon(2) for their formation transit to the tanker. Not being privy to the actual geometry or capabilities of the Typhoon sensors, the Board wondered whether the pilot of Typhoon (1) might have been able to make more use of his aircraft's onboard sensors to improve his situational awareness given that he was effectively an individual manoeuvring element responsible for his own collision avoidance prior to his join with Typhoon (2).

Turning to the Hawk pilot, the Board noted that he was originally cleared to climb to FL240, but that this was subsequently amended to a descent to FL190 as Hotspur planned to descend the Typhoon pair in order to rendezvous them with a tanker. Alerted to a potential conflict, the Board commended the Hawk pilot for maintaining comprehensive situational awareness without the aid of any available sensors other than see-and-avoid and RT. They considered that it had been the Hawk pilot's effective and timely actions which had avoided any risk of collision.

In considering the controller's actions, it was clear to the Board that the Hotspur controller expected that Typhoon (1) pilot would climb and formate with his playmate Typhoon (2), at FL290, before subsequent manoeuvring for rendezvous with the tanker. However, he had not positively confirmed that this was the course of action that the Typhoon (1) pilot had intended, and neither did he monitor the altitude of Typhoon (1). As a result, he did not notice the confliction with the Hawk due to his

flawed mental model of what was occurring and, when questioned by the Hawk about the altitude of Typhoon (1), it became obvious to the Hawk pilot that Hotspur had lost situational awareness. The Board considered that Hotspur's lack of monitoring of Typhoon (1)'s altitude was contributory to the incident.

In assessing the cause and risk of the event, the Board was of the opinion that the root of the incident lay in the fact that a robust plan was neither formulated nor communicated either by Hotspur or the pilot of Typhoon(1) once disengagement from the Hawk had occurred. In essence, due to ineffective communication and monitoring, the Hotspur controller thought that one thing was happening, whilst the Typhoon (1) pilot was doing something else. However, given that the Hawk pilot was visual with Typhoon (1) well before CPA, the Board considered that there had been no risk of collision.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A lack of effective communication between Hotspur and Typhoon (1) pilot.

Contributory Factors: 1. Hotspur did not monitor Typhoon (1) pilot's altitude.

2. Typhoon (1) pilot did not communicate his intentions to Hotspur.

Degree of Risk: C.