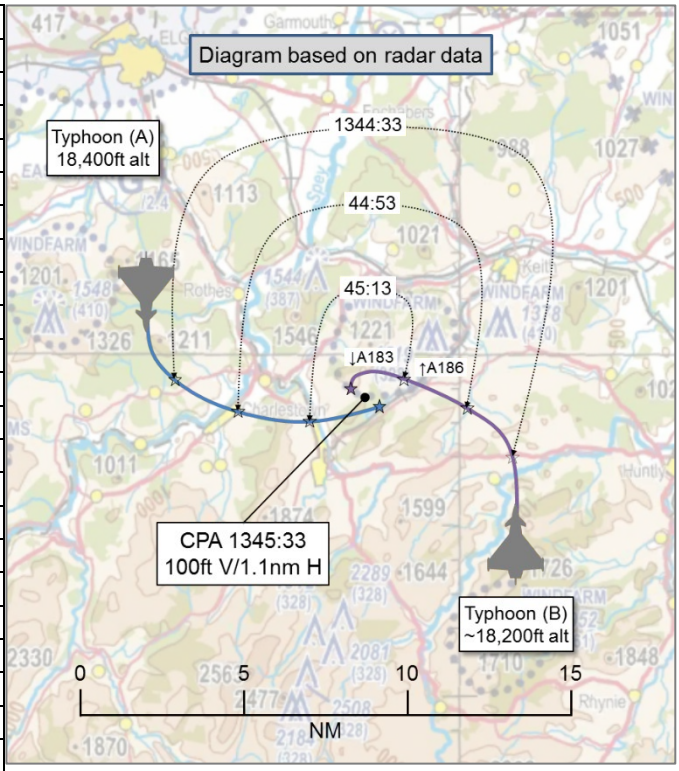
AIRPROX REPORT No 2019238

Date: 12 Aug 2019 Time: 1345Z Position: 5728N 00304W Location: 12nm SE of Elgin

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Typhoon (A)	Typhoon (B)
Operator	HQ Air (Ops)	HQ Air (Ops)
Airspace	Scottish FIR	Scottish FIR
Class	G	G
Rules	VFR	VFR
Service	Traffic (Reduced)	Traffic (Reduced)
Provider	RAF Lossiemouth	RAF Lossiemouth
Altitude/FL	18,400ft	18,300ft
Transponder	A, C, S	A, C, S
Reported		
Colours	Grey	Grey
Lighting	Strobes, nav lights	
Conditions	VMC	VMC
Visibility	10km	
Altitude/FL	18,000ft	18,000ft
Altimeter	RPS (1006hPa)	RPS (1006hPa)
Heading	090°	
Speed	300kt	300kt
ACAS/TAS	Not fitted	Not fitted
Alert	N/A	N/A
Separation		
Reported	0 V/~1nm H	NR
Recorded	100ft V/1.1nm H	



THE TYPHOON (A) PILOT reports that he and 2 other pilots were tasked to fly Close Air Support (CAS) training missions in the local area with JTAC[1] support. The sortie was to include air-to-air refuelling (AAR) in Towline 4 before tactical training. Due to deconfliction concerns, the pilot of [Typhoon (B)] initially planned to work on the west coast of Scotland while he and the third, non-Airprox, aircraft [Typhoon (C)] were to work in the vicinity of RAF Lossiemouth. Although he and [Typhoon (C)] pilot were not operating in the same formation, a deconfliction plan was formulated and the sortie was briefed together and coordinated with the JTACs: the pilot of [Typhoon (C)] was to operate at a hard height of 16,000ft and the pilot of [Typhoon (A)] was to operate at 18,000ft, with any required height changes to be coordinated airborne. On start, the pilot had aircraft issues and eventually launched on a no-AAR timeline, becoming established in the tactical area at around 1308Z. [Typhoon (B)] and [Typhoon (C)] had completed AAR and [Typhoon (C)] arrived in the tactical area at 1310z with [Typhoon (B)] already working towards the west coast of Scotland. With the weather unsuitable, [Typhoon (B)] transited back from the west coast with Swanwick(Mil) and was passed to the Lossiemouth Approach frequency and subsequently assigned to [Typhoon (A)] pilot's working frequency. Whilst the pilot of [Typhoon (A)] was made aware of [Typhoon (C)], he was not informed of the presence of [Typhoon (B)] despite a confliction with [Typhoon (B)] pilot's requested level and his own allocated block and current altitude. He was working a block SFC-20,000ft with a hard-height of 18,000ft, MARSA[2] with [Typhoon (C)]. Having worked with the JTACs for approximately 35 minutes, the pilot received a traffic call from Lossiemouth Approach at 1345Z "(C/S), traffic, [unreadable], 7nm, manoeuvring west, indicates similar level"; this transmission was coincident with a transmission from the JTAC on Radio 2. The pilot called 'looking' for the reported traffic and continued with JTAC communications. At approximately 1345Z he became visual with the other aircraft, a Typhoon, visually assessed to be between 6000ft–4000ft lateral separation, with approximately 90° heading crossing angle, co-altitude and at the 4 o'clock position. Initially he believed the aircraft to be [Typhoon (C)], however, on querying with Lossiemouth Approach,

[1] Joint Terminal Attack Controller.
[2] Military Accepts Responsibility for Separation of Aircraft.

the identity of the other aircraft was confirmed as [Typhoon (B)]. The pilot reports confirming the height of [Typhoon (C)] and, on identifying a confliction, immediately requested the pilot of [Typhoon (B)] to change altitude. The pilot of [Typhoon (B)] established at 19,000ft and the sortie continued. An Airprox was not declared airborne. Up to this point, [Typhoon (B)] and [Typhoon (A)] had come within 8nm, co-altitude, on 4 previous occasions with lateral separation of 6, 7.4, 4 and 4nm respectively over a period of 16 minutes (data from post-mission analysis). He and the pilot of [Typhoon (B)] received a total of 2 traffic calls on each other; the first was on the initial pass of 6nm and the second 16 mins later at 1345:36z immediately before the closest point of approach. At no point had the pilot of [Typhoon (B)] declared MARSA with his aircraft. On completion of the sortie, the pilots of both Airprox aircraft immediately debriefed with the Duty Authoriser as to the safety implications of the event. Post-sortie discussions indicate that the pilot of [Typhoon (B)] had no SA as to the presence of [Typhoon (A)] and believed that the pilot of [Typhoon (A)] had ground aborted due to his late take-off combined with lack of indications of the presence of [Typhoon (A)] on MIDS.[3] At no point did the pilot of [Typhoon (B)] become visual with [Typhoon (A)]. The pilot of [Typhoon (A)] was previously aware of the presence of [Typhoon (B)] through radio traffic on the working frequency as well as intermittent radar SA, which indicated him working approximately 20nm to the south of RAF Lossiemouth. There were several additional contributing factors that could be identified that led to this loss of safe separation: [Typhoon (A)]'s MIDS was inoperative, which reduced SA, prevented co-ordination via Link 16 Voice and also complemented [Typhoon (B)] pilot's impression that [Typhoon (A)] was a ground abort; the pilot of [Typhoon (A)], despite having awareness of the presence of [Typhoon (B)], had reduced SA due to only having 2 x MHDDs[4] available (with one unserviceable) which resulted in radar SA being overlaid on an attack format rather than having its own, independent, display. The pilot of [Typhoon (A)] was also unable to alter the volume of the second radio, which led to safety critical information being 'stepped on' by communications with the JTAC.

The pilot assessed the risk of collision as 'Medium'.

THE TYPHOON (B) PILOT reports that he had departed RAF Lossiemouth to conduct Laser Designator Pod (LDP) work and simulated air-to-surface (A/S) attacks. The plan was for his aircraft to conduct A/S training on the west coast of Scotland, with [Typhoon (A)] and [Typhoon (C)] conducting training just east of RAF Lossiemouth. Prior to tactical training, he and the pilot of [Typhoon (C)] conducted air-to-air refuelling in Towline 4 while [Typhoon (A)] was delayed resolving some aircraft issues on the ground. On completion of air-to-air refuelling, the pilot departed the tanker and headed for the west coast as planned. Upon reaching the west coast, the cloud-base was observed to be more significant than forecast and was deemed unworkable for A/S attacks. The pilot then elected to return to the area surrounding RAF Lossiemouth because, and with no indication that [Typhoon (A)] had taken off, this was the only area where the weather was observed to be adequate for simulated A/S attacks. En-route to RAF Lossiemouth, the pilot contacted the pilot of [Typhoon (C)] on MIDS in order to deconflict altitudes. It was decided that [Typhoon (C)] would remain at 16,000ft and [Typhoon (B)] would operate at 18,000ft. At this point, the pilot of [Typhoon (B)] was not aware that the pilot of [Typhoon (A)] had resolved the issues with his aircraft and had taken off because [Typhoon (A)] was not observed on the link. The pilot coordinated with Swanwick(Mil) as well as Lossiemouth Approach and began conducting A/S attacks and LDP training south of RAF Lossiemouth by approximately 20nm. However, no information was provided on other callsigns that were also working in the immediate area. The Lossiemouth Approach controller coordinated the Traffic Service on the Approach frequency and then instructed him to recontact her on a different frequency. The pilot observed that there was a lot of dialogue between himself and the controller on the App frequency but, on the new frequency, there was very little communication except for the odd traffic call. At this time he was aware of [Typhoon (C)] because he had coordinated with him via MIDS, but he had no awareness of [Typhoon (A)]. Approximately 15 mins into the A/S training, the pilot was given a traffic call of a contact off his nose at a range of 7nm. Assuming that this to be [Typhoon (C)], which he could see on the link, he did not pay much attention to it. The next indication that he was not aware of all the airborne aircraft in the vicinity was a call from [Typhoon (A)] over the Approach frequency, querying the controller about traffic in the area and in his immediate vicinity. At this point he and the pilot of [Typhoon (A)] realised that they were

[3] Multifunctional Information Distribution System.
[4] Multifunction Head Down Displays.

working co-altitude with no previous deconfliction. Although he was not aware of an Airprox at the time, mission recording media show a co-altitude pass at 1.2nm. It should also be noted that his aircraft came within 3-4nm of [Typhoon (A)] on several occasions with no associated traffic calls being given.

The pilot perceived the severity of the incident as 'Medium'.

THE RAF LOSSIEMOUTH CONTROLLER reports that she was the RA controller under a high-medium workload, working 3 frequencies and operating SSR-only with Kinloss active. [Typhoon (A)] and [Typhoon (C)] were working to the S/SE of Lossiemouth, SFC-22,000/18,000ft, and had confirmed MARSA while conducting CAS training. Shortly after [Typhoon (A)] had launched, Swanwick(Mil) called to say they had another aircraft [Typhoon (B)] who was working with [Typhoon (A)] and [Typhoon (C)] in the same vicinity, and they thought it would be better if she worked that aircraft. The controller asked the pilots of [Typhoon (A)] and [Typhoon (C)] if they were expecting another callsign, and was told that they anticipated him to be on the west coast. The controller then passed Traffic Information, informing them that [Typhoon (B)] was now to the south of them to conduct general handling. The controller was then contacted by the pilot of [Typhoon (B)] on one of the frequencies that she was working, whereupon she transferred the aircraft onto the same frequency as [Typhoon (A)] and [Typhoon (C)], and approved the pilot's requested altitude block on the same pressure setting in use by the other 2 aircraft. The first time she saw [Typhoon (A)] and [Typhoon (B)] getting close she issued Traffic Information to both pilots, informing them that the respective traffic was a similar type at a similar level; both aircraft acknowledged and continued with their missions. When she saw them getting close a second time, she issued further Traffic Information to both pilots with a separation of 7nm. Both aircraft acknowledged her calls and so she continued to work another aircraft which was climbing out of RAF Lossiemouth into the radar pattern on a different frequency. A short while later, the pilot of [Typhoon (A)] asked what the contact was a mile to the south and he was informed that it was the previously called traffic. He asked if the aircraft was on the same frequency, which was confirmed, and the pilots had a short conversation about working levels. Having worked aircraft conducting CAS training before, the controller was conscious of not over-controlling the aircraft in order to minimise distraction and that this consideration was reinforced by the fact that she had been informed that they were working together, she had told them each about each other, and they were on the same frequency. [UKAB note: the Unit's Occurrence Safety Investigation found that, in all likelihood, the controller had themselves formed the impression that the Typhoons were working together rather than being informed *per se*].

The controller perceived the severity of the incident as 'Medium'.

THE RAF LOSSIEMOUTH SUPERVISOR reports that she had nothing to add to the controller's account.

Factual Background

The weather at RAF Lossiemouth was recorded as follows:

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METAR EGQS 121350Z 28002KT 9999 FEW030 BKN250 17/06 Q1011 NOSIG RMK BLU BLU=
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Analysis and Investigation

Military ATM

The Typhoons involved in this incident were two of three aircraft due to conduct air to ground training sorties. As part of a pre-flight deconfliction plan between all three aircraft, Typhoon (B) planned to conduct simulated air to ground attacks on the west coast of Scotland under the control of Swanwick(Mil). Typhoon (A) and Typhoon (C) planned to work with JTACs south of Lossiemouth and agreed a vertical deconfliction plan between them.

During aircraft start, Typhoon (A) suffered a technical problem and was delayed. On reaching his operating area, the pilot of Typhoon (B) discovered that the weather was not fit and recovered towards Lossiemouth with the intent of operating in similar airspace as the other aircraft. The pilot of Typhoon (B) was under the impression that Typhoon (A) had ground-aborted their sortie and

therefore was not airborne. As a result, the pilot of Typhoon (B) agreed a vertical deconfliction plan, on an internal chat frequency, with the pilot of Typhoon (C) which actually placed him at a similar altitude to Typhoon (A).

The deconfliction plan between Typhoon (A) and Typhoon (C) was communicated to the Lossiemouth Approach Controller and a Traffic Service was agreed with both. When Swanwick(Mil) handed over Typhoon (B), the Lossiemouth Approach Controller confirmed with the Typhoon (B) pilot that they were aware the other Typhoons and working the same task. The pilot of Typhoon (B) confirmed that they were speaking to 'them' on internal chat and this led the Lossiemouth Approach Controller to believe that internal deconfliction had taken place. The Unit investigation discovered that the pilot of Typhoon (B) was still under the impression that Typhoon (A) was not airborne and thus had only deconflicted himself with one other aircraft, despite the use of 'them'.

At the point of handover from Swanwick(Mil), all 3 Typhoons were operating within 30nm of each other and all parties believed that a deconfliction plan was in place between them. This belief was shared by the Lossiemouth Approach Controller who was now providing all 3 aircraft with a Traffic Service.

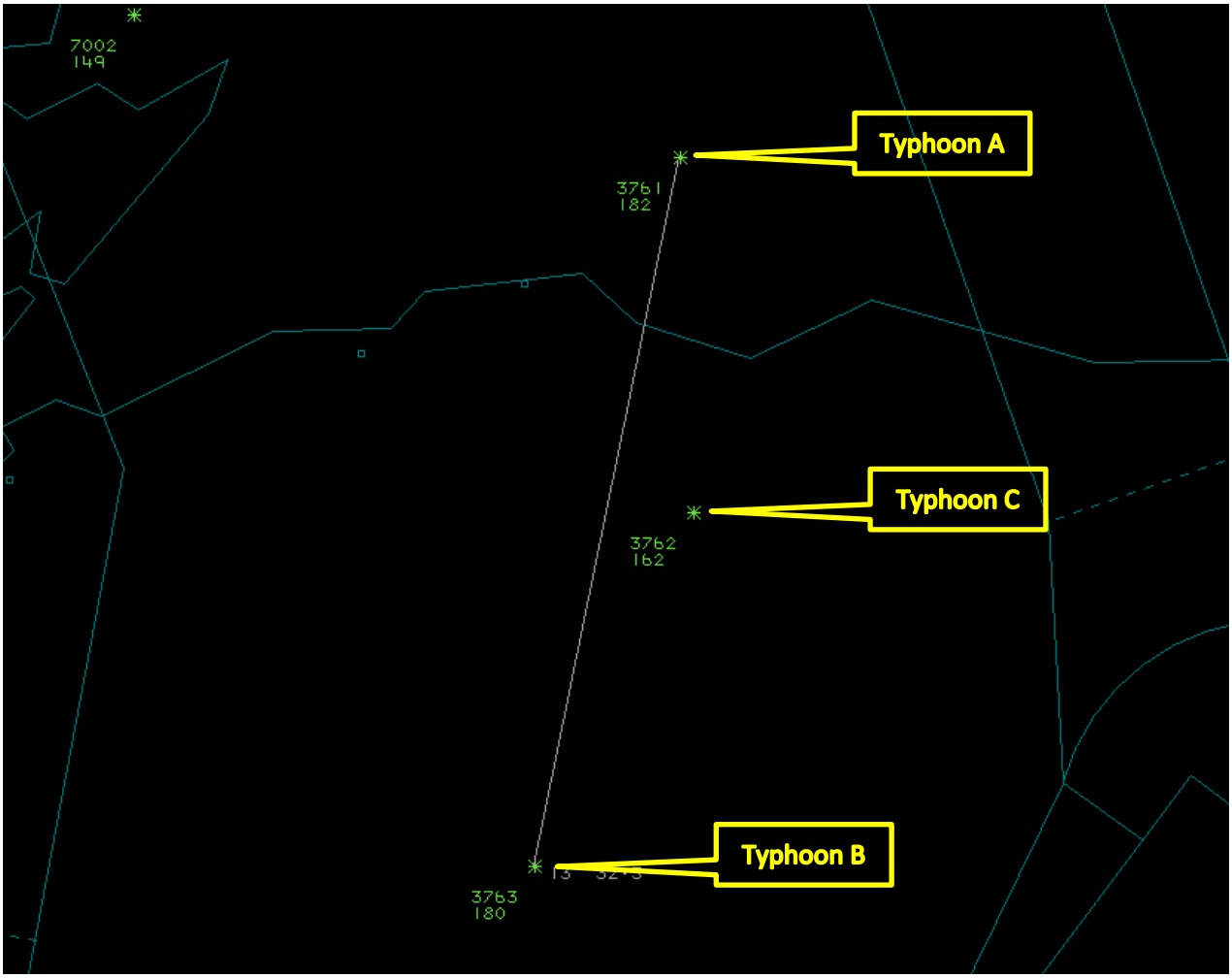


Figure 1 – 1316:42

Some 15 mins after this handover took place, the aircraft came close enough to trigger Traffic Information from Lossiemouth Approach to both pilots. Despite the use of correct callsigns, the Unit investigation established that the pilot of Typhoon (B) believed that the conflicting aircraft was Typhoon (C) (and therefore deconflicted); separation at this point was 9.4nm. Typhoon (C) was actually more than 10nm north east at this time.

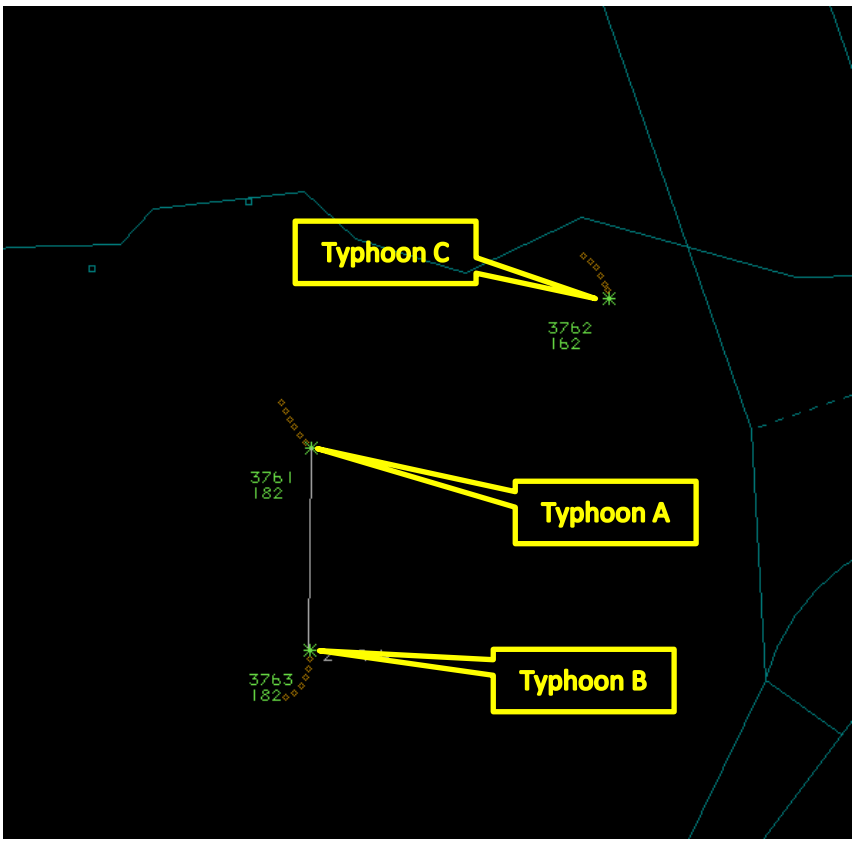


Figure 2 – 1329:31

The Unit investigation established that, over the next 13 mins, separation between the two Typhoons varied but, on two occasions, decreased to 4nm. The Lossiemouth Approach Controller assessed that the aircraft geometry would guarantee more than 3nm separation and therefore there was no formal requirement for Traffic Information. The belief that the aircraft were operating an internal deconfliction plan also led the controller not to pass Traffic Information on these occasions. However, once the geometry indicated that the aircraft would get within 3nm, the Lossiemouth Approach Controller again passed Traffic Information; separation at this point was 7.5nm and 200ft.

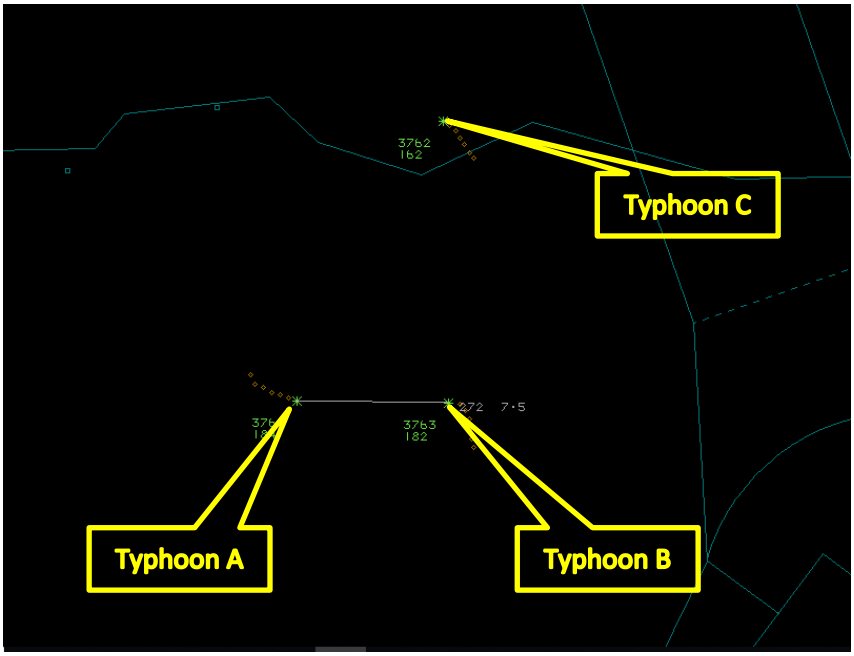


Figure 3 – 1344:52

CPA occurred just over a minute later. Once the incident occurred, Typhoon (B) requested the callsign of the other aircraft and it was at this point that the pilot of Typhoon (B) realised that Typhoon (A) was airborne. Having established this fact, they agreed a deconfliction plan and continued with their sorties.

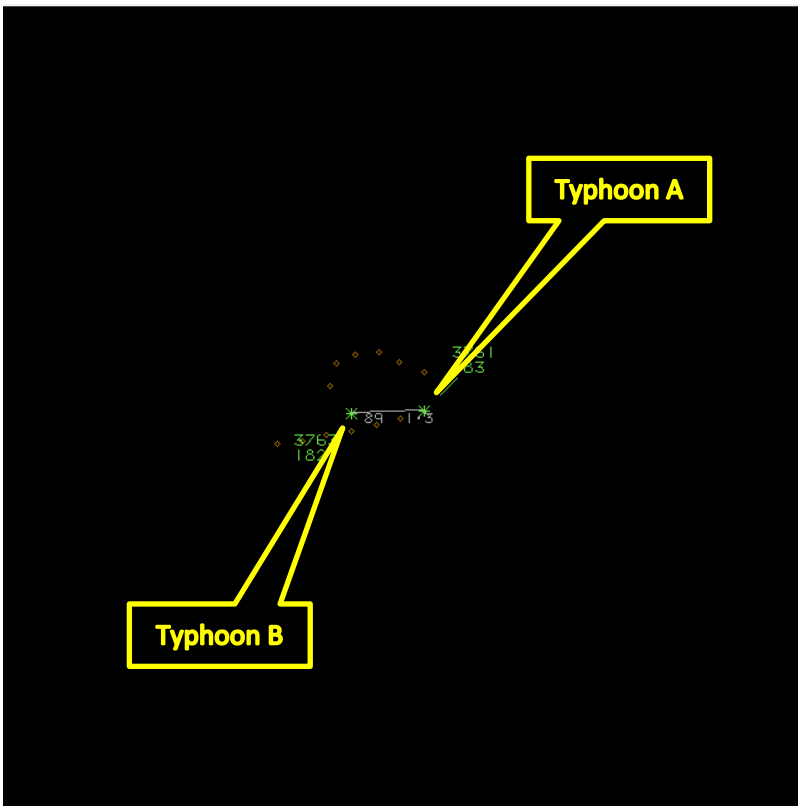


Figure 4 – 1345:34 CPA

This was a confusing situation in which all parties involved believed that a deconfliction plan existed between the aircraft. Notwithstanding this fact, the Lossiemouth Approach Controller passed Traffic Information at appropriate times on two separate occasions and therefore discharged their responsibilities appropriately.

UKAB Secretariat

The Typhoon (A) and Typhoon (B) pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard.[5] If the incident geometry is considered as head-on or nearly so then both pilots were required to turn to the right.[6] If the incident geometry is considered as converging then the Typhoon (A) pilot was required to give way to the Typhoon (B).[7]

Occurrence Investigation

An Occurrence Safety Investigation (OSI) was initiated by the unit concerned and the OSI Team examined the mission replays from the 2 Airprox aircraft (Typhoon (A) and Typhoon (B)), as well as conducting interviews with the pilots and controller involved in the event. Synchronisation issues meant that, although aircraft data was available, the accuracy of the relative geometrical data was reduced; however, radar data made available by the Radar Analysis Cell (RAC), in conjunction with

[5] MAA RA 2307 paragraphs 1 and 2.
[6] MAA RA 2307 paragraph 13.
[7] MAA RA 2307 paragraph 12.

the ATC transcript and aircraft mission planning and replay data allowed a detailed reconstruction of the sequence of events.

The OSI Team considered that the 4 individuals involved had developed erroneous mental models of the dynamic situation in the vicinity of Lossiemouth and the deconfliction measures in place:

The pilot of Typhoon (B) considered that deconfliction from the non-Airprox Typhoon had been achieved by altitude and being in receipt of a Traffic Service from Lossiemouth Approach, but was unaware that Typhoon (A) was airborne. It appears that the aural triggers regarding the status of Typhoon (A) were not sufficient to have broken this erroneous mental model. It is also probable that a degree of confirmation bias was inadvertently applied by the pilot of Typhoon (B) when assimilating traffic calls made by ATC.

The pilot of Typhoon (A) had not assimilated that Typhoon (B) was operating in a similar area and therefore suitable deconfliction was considered to be in effect; deconfliction from the non-Airprox Typhoon was achieved both procedurally by altitude and by being in receipt of a Traffic Service. Aural cues as to the presence of Typhoon (B) were either not heard or mis-heard, probably due to the high level of communication on the JTAC frequency, on a radio that was fixed at maximum volume.

The pilot of the Typhoon (C) was content that deconfliction from Typhoon (A) had been achieved by altitude and considered that Typhoon (B) was operating in a suitably laterally deconflicted area (and had MIDS SA of Typhoon (B)); however, due to the lack of a MIDS track, there was no MIDS SA of Typhoon (A)'s position. The pilot of Typhoon (C) was also unaware of the altitude being worked by the pilot of Typhoon (B). The earlier MIDS B call from the pilot of Typhoon (B) had either not been received or not heard. The pilot of Typhoon (C) was in receipt of a Traffic Service for all traffic with the exception of Typhoon (A) from which MARSA had been declared.

The controller believed that all 3 aircraft were operating an internal deconfliction plan as this had been intimated and reinforced through communication with Swanwick(Mil) ATC and the pilot of Typhoon (B). Whilst aware that the pilot of Typhoon (B) was in receipt of a Traffic Service and therefore not MARSA with Typhoon (A) and Typhoon (C), the controller was not aware that the pilots of Typhoon (A) and Typhoon (C) were working hard sanctuaries for deconfliction and that the pilot of Typhoon (B) was not part of this plan. The controller also stated the belief that all 3 aircraft were operating with the JTAC on the other radio; cognisant that communication traffic would be high on the other radio, the controller reduced communication to the minimum necessary. Despite the appropriate Traffic Service calls to the pilots of both Typhoon (A) and Typhoon (B), prior to the most severe erosion of separation, it appears that they were not sufficient to break either of their mental models or to bring about earlier visual acquisition and therefore maintain safe separation. It is likely that the controller's SA was further hampered by a reduced radar picture refresh rate when operating SSR only. The incorrect, and conflicting, mental models of all 4 individuals combined to allow separation to reduce.

Comments

HQ Air Command

This Airprox led to an Occurrence Safety Investigation (OSI) on the unit concerned, which established twenty causal factors and made recommendations to prevent a similar occurrence of this kind.

The incident serves to highlight how erroneous mental models without the correct information, can quickly develop to a total breakdown in SA. It emphasises the need for clear and concise communications to build a clear air picture by all parties. As a direct consequence of this Airprox and the recommendations from the investigation, this occurrence has been used as a case study to educate aircrew at RAF Lossiemouth and Coningsby. RAF Lossiemouth has also re-allocated callsigns across the wing as a barrier to prevent multiple aircraft with similar callsigns working in the same airspace.

Of note, CWS on Typhoon remains a high priority as a mitigation to the risk of MAC. Recent trials of Enhanced Collision Awareness System (ECAS) have been unsuccessful, delaying the installation onto the front-line aircraft. The trial produced recommendations for a comprehensive review of the system concept and highlighted areas that needed improvement if ECAS was to be integrated effectively onto the Typhoon. Once a workable solution is available, further trials will take place.

Summary

An Airprox was reported when 2 Typhoon aircraft flew into proximity around 12nm SE of Elgin at 1345hrs on Monday 12th August 2019. Both pilots were operating under VFR in VMC and both were in receipt of a reduced Traffic Service from Lossiemouth Approach.

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 controller involved and investigation reports from the appropriate ATC and operating authorities. Relevant contributory factors mentioned during the Board's discussions are highlighted within the text in bold, with the numbers referring to the Contributory Factors table displayed in Part C.

The Board first heard from a military member who briefed that the training being conducted by all 3 Typhoon pilots was extremely labour-intensive and that it was likely that a degree of task-saturation was experienced at various points in the mission and likely to have been a factor at the time of the Airprox (**CF7**). This could offer an explanation as to why some of the clues as to the presence of all 3 aircraft in the same operating area were not sufficient to break the erroneous – and differing – mental models of all involved (**CF5**). Furthermore, the use of MARSA between Typhoons (A) and (C) may well have confused the situation further, because the controller would not have been required to provide Traffic Information between the MARSA aircraft; the very fact that Traffic Information was being passed should have alerted the pilots of Typhoons (A) and (C) that there was an aircraft in the vicinity with which they were not MARSA. On this latter point, the military ATM advisor confirmed with the Board that, according to MAA RA3234(1) – Air System Formations, paragraph 2, MARSA can only be used between aircraft that are part of the same formation; this is also reflected in CAP493 – MATS Part 1, paragraphs 9B.3(2) and 15A.4. Further discussions on the use of MARSA amongst members with military aviation experience (current and previous) revealed that, anecdotally, MARSA is employed more widely than just within military formations. Board members considered that if MARSA had not been used during this event then perhaps more attention would have been devoted to the individual aircraft callsigns used during the Traffic Information calls such that it may have become obvious to the pilots of all the Typhoons that there were, in fact, 3 aircraft in their operating area. The Board was concerned that this 'practical drift' has led to a mis-application of MARSA and therefore resolved to recommend that 'The MAA ensures that military operators fully understand the definition and application of the term 'MARSA'.'

The Board then considered the actions of the Typhoon pilots. Members agreed that the pilot of Typhoon (A) had not been helped by equipment unserviceabilites, in that he had had one of his radios fixed at maximum volume and no MIDS Link 16. This latter point had not only denied him SA of the presence of Typhoon (B) but had also denied the pilot of Typhoon (B) SA of the presence of Typhoon (A) (**CF6**). When the controller had passed Traffic Information to the pilots of Typhoons (A) and (B) to alert them to the proximity of the other aircraft, the use of similar callsigns had led each of them to believe that the traffic was Typhoon (C) and so each of them considered that they had been vertically deconflicted from the subject aircraft. Members were heartened to hear from a military member that RAF Lossiemouth has reviewed its allocation of pilot callsigns with a view to minimising the likelihood of similar-sounding callsigns being used in the same area at the same time in future. The Board felt that it had been for the pilot of Typhoon (B) to positively deconflict from Typhoons (A) and (C) when he had decided to operate in the vicinity of Lossiemouth; he had not received positive confirmation from the pilot of Typhoon (C) of his height deconfliction plan (because the pilot of Typhoon (C) had not received the message on MIDS) and at no point had he sought positive confirmation from any source other than his MIDS picture that Typhoon (A) had been a ground abort (**CF3, CF4**). One member questioned whether the

Swanwick(Mil) controller that had handed over the pilot of Typhoon (B) to the Lossiemouth controller could have issued Traffic Information on the 2 aircraft in the vicinity of Lossiemouth, but controller members were quick to point out that the handover would have been conducted at around 30nm from Lossiemouth and so Traffic Information would have been irrelevant at that time. The Board discussed the importance of a continued lookout scan during all phases of flight and commended the pilot of Typhoon (A) for visually acquiring Typhoon (B) and then questioning its presence with the Lossiemouth controller when it did not appear to 'fit' his mental model. Ultimately, it was the concern of the pilot of Typhoon (A) over the proximity of Typhoon (B) (**CF8**) that had led to the resolution of the conflict and had enabled those involved to 're-align' their collective understanding of the situation.

In considering the actions of the Lossiemouth controller, members noted that she had been operating with a radar picture of a lower refresh rate than would usually have been the case due to the primary radar being unserviceable and the picture being provided by SSR only (**CF1**). That being said, she had taken the conscious decision to minimise the number of traffic calls issued to the Typhoon pilots because she had perceived that they would be busy with radio traffic on their secondary radios and she had been of the mistaken belief that all aircraft were operating an internal deconfliction plan. The controller had asked the pilot of Typhoon (B) if he had contacted the pilots of the other Typhoons (in the plural) and he had confirmed that he was talking to 'them', which had reinforced her erroneous mental model (**CF2**). Members agreed that there was no way that the controller could have known that none of the pilots had been aware that there were 3 aircraft operating in the same area.

Turning to the assessment of collision risk, some Board members felt that, given the speed and relative positions of the two Typhoons, safety had been much reduced and that a degree of collision risk had existed. Others considered that a lateral separation at CPA of 1.1nm with an element of vertical separation – albeit the vertical separation was variable in the lead-up to CPA – meant that, whilst safety had been degraded, there was no risk of collision. After some discussion, members agreed that the pilot of Typhoon (A) becoming visual with Typhoon (B) at a range of approximately 1nm had effectively removed the collision risk and, consequently, the Board apportioned Risk Category C to this event.

PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK

Contributory Factors:

	2019238		
CF	**Factor**	**Description**	**Amplification**
	Ground Elements		
	• Manning and Equipment		
1	Technical	• Aerodrome and ATM Equipment	Non-Functional equipment
	• Situational Awareness and Action		
2	Contextual	• Situational Awareness and Sensory Events	Generic, late, no or incorrect Situational Awareness
	Flight Elements		
	• Tactical Planning and Execution		
3	Human Factors	• Insufficient Decision/Plan	Inadequate plan adaption
4	Human Factors	• Accuracy of Communication	Ineffective communication of intentions
	• Situational Awareness of the Conflicting Aircraft and Action		
5	Contextual	• Situational Awareness and Sensory Events	Generic, late, no or incorrect Situational Awareness
6	Human Factors	• Understanding/Comprehension	Pilot did not assimilate conflict information
7	Human Factors	• Distraction - Job Related	Pilot was engaged in other tasks
	• See and Avoid		
8	Human Factors	• Perception of Visual Information	Pilot was concerned by the proximity of the other aircraft

Degree of Risk: C

Recommendation:

The MAA ensures that military operators fully understand the definition and application of the term 'MARSA'.

Safety Barrier Assessment[8]

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

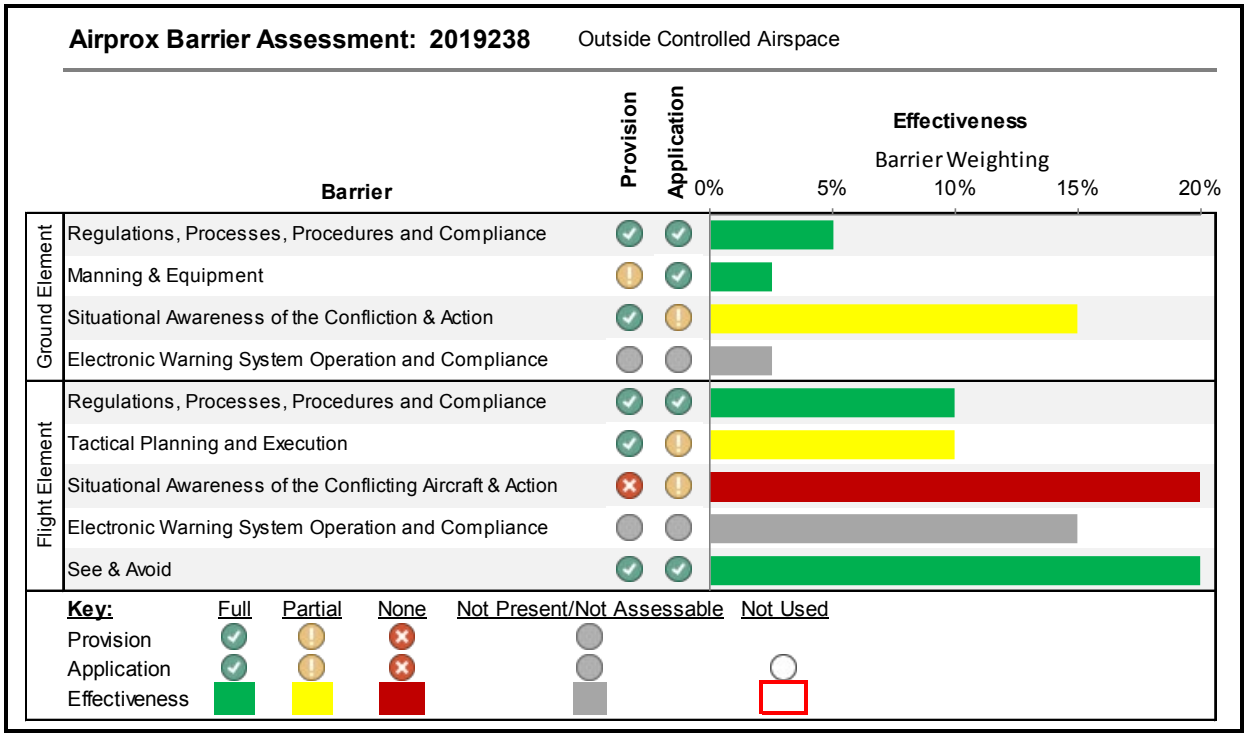
Ground Elements:

Situational Awareness of the Confliction and Action were assessed as **partially effective** because the Lossiemouth Approach controller had incorrect SA because, although timely Traffic Information was passed, the controller was unaware that the pilots of Typhoons (A) and (B) did not know about each other's presence in the operating area.

Flight Elements:

Tactical Planning and Execution was assessed as **partially effective** because the pilot of Typhoon (B) did not fully deconflict his aircraft from Typhoon (A) and Typhoon (C) that were already operating in the area.

Situational Awareness of the Conflicting Aircraft and Action were assessed as **ineffective** because the pilots of Typhoon (A) and Typhoon (B) had no awareness of the presence of each other in the operating area. The unserviceability of Typhoon (A)'s MIDS contributed to this lack of SA and the pilot of Typhoon (C) did not receive the MIDS message from the pilot of Typhoon (B), so had no awareness that the height deconfliction plan between all 3 aircraft was flawed.



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