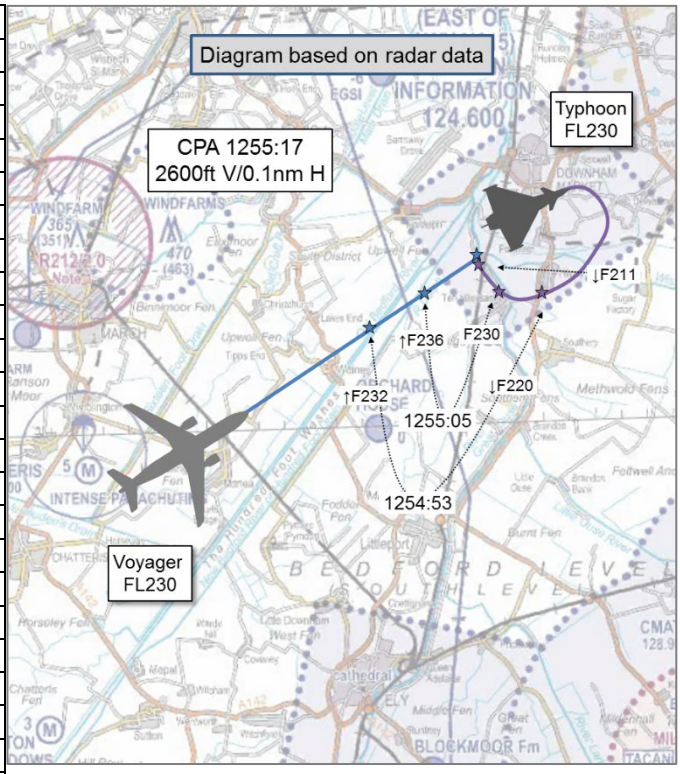
AIRPROX REPORT No 2019188

Date: 10 Jul 2019 Time: 1255Z Position: 5233N 00020E Location: SW Marham

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Voyager	Typhoon
Operator	HQ Air (Ops)	HQ Air (Ops)
Airspace	London UIR	London UIR
Class	C	C
Rules	IFR	VFR
Service	Traffic	Traffic
Provider	Swanwick (Mil)	Swanwick (Mil)
Altitude/FL	FL237	FL211
Transponder	A, C, S	A, C, S
Reported		
Colours	Standard	Standard
Lighting	HISL, Nav	NR
Conditions	VMC	NK
Visibility	30km	NR
Altitude/FL	FL230	NR
Altimeter	1013hPa	RPS (1011hPa)
Heading	055°	NR
Speed	315kt	NR
ACAS/TAS	TCAS II	Not fitted
Alert	RA	N/A
Separation		
Reported	4-500ft V/NK H	NR
Recorded	2600ft V/0.1nm H	



THE VOYAGER PILOT reports that following a transit through the Swindon corridor, he was cleared to route overhead Marham, then direct to ARA8 at FL230. Approaching Marham from the south-west, a TCAS TA was generated followed almost immediately by an RA to climb. SOPs were followed with the aircraft climbing approximately 700ft, before a secondary RA to adjust vertical speed was received. Clear of conflict followed swiftly afterwards. ATC were notified immediately on commencement of the RA, and again once clear of conflict when they returned to previous level. A single Typhoon in plan form was observed by the PM, which appeared to be manoeuvring in a hard, descending, banked turn. The Voyager resumed their transit at FL230 and routed towards ARA8. The Typhoon was later identified as operating under the control of another Swanwick(Mil) controller.

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

THE TYPHOON PILOT reports that he was No2 in a formation of two Typhoons. Having left the Westcott corridor they were given a Traffic Service by Swanwick(Mil) and the formation leader asked to operate in a block 5000 to 24,000ft on the RPS, and for the formation to split, with a separate squawk for the No2. At 1253:49, the controller cleared the formation to operate in the block requested, at which point the No2 Typhoon commenced a right turn at ~3g and 23,000ft. At 1254:48, the Voyager appeared on the Typhoon's radar at about 3nm, 15R TASP.[1] The pilot became visual with the Voyager and commenced a descent. At 1254:55, the controller pointed out the Voyager and asked if he was visual, the pilot confirmed he was. He descended to 3000ft below the Voyager, reversing the turn to remain visual as the tanker passed above at 1255:15. He did not consider the situation unusual in Class G airspace and consequently did not report the incident at the time, or after the sortie. In retrospect he would have executed a different manoeuvre if he had appreciated how close the Voyager was behind him, but the Voyager was not on Link 16 and Swanwick(Mil) did not give Traffic Information prior to the

[1] TASP: Target ASPect.

manoeuvre so there was no way of knowing the position of the Voyager and no SA to choose a different course of action.

THE SWANWICK EAST TAC LEFT CONTROLLER reports that she was informed of the incident 8 days after the event and so recollection of the incident was vague. She was controlling a pair of Typhoons in the vicinity of Marham, they had been released into the block FL050-240 and were ahead of the Voyager that they transited through the Westcott corridor and were working with, by about 10nm. At the time the RA was called she was activating airspace and, when she looked back at the radar, the No2 Typhoon had conducted a tight 180° turn. Traffic Information was passed on the Voyager when it was approximately 3nm away and she recalled the Typhoon descending through the Voyager's level.

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

THE UT SWANWICK EAST TAC RIGHT CONTROLLER reports that the Voyager had just exited the Westcott corridor into the East Anglia MTA, en route to ARA8 at FL230. Directly ahead by 8-10nm was a flight of 2 Typhoons, also at FL230 on the same heading. The Voyager pilot wished to remain at FL230 due to weather rather than descend ready for their tanker block of FL140-170. This meant that he had to assess airway Y70 prior to them crossing at FL230. Before scanning the airway, the Voyager was judged to be clear of confliction and safe on their present heading and level. The controller began to scan Y70 for any conflicting traffic that may need coordinating prior to their crossing. As he was doing this the Typhoons had been given clearance to manoeuvre in the EA MTA and one performed a 180° turn straight towards the Voyager. As the controller was busy scanning the airway he heard a transmission from the Voyager pilot but had to ask again what he said. It was the pilot responding to a TCAS RA informing the controller he was climbing immediately to avoid. The controller then passed Traffic Information, 3nm away and 300ft below. Once the Voyager was clear, its pilot asked to resume flight at FL230, which was approved, and Traffic Information was updated. The pilot requested the callsign of the aircraft he avoided and continued with the rest of his sortie.

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

THE SWANWICK(MIL) SUPERVISOR reports that at the time of the incident East and North-East sectors were split out with East Sector being manned by 2 TACs. TAC right was controlling the Voyager on transit at FL230 from the Westcott radar corridor inbound to AARA8, whilst TAC left was controlling 2 Typhoons from the Westcott radar corridor also with intentions to GH. Due to the low traffic levels in East sector, a planner was not required to support the two TACs. His attention as the Supervisor was focussed on North-East sector where both TACs were in position with a planner. He was made aware of the incident when the TAC-right informed him that the Voyager had reported a TCAS RA. Both TAC-left and TAC-right informed him that they had passed Traffic Information albeit at a late stage due to being surprised by the sharp turn taken by the Typhoon. On subsequently reviewing the radar replay it was confirmed that Traffic Information had been passed to both aircraft at a range of 3nm. The Typhoon had acknowledged the Traffic Information whilst the Voyager had responded to the TCAS RA. Whilst both the Typhoons (10nms ahead co-level) and the Voyager were exiting the Westcott RC as transits there was no requirement for Traffic Information to be passed. However, it was debriefed with the TAC left controller that the Typhoons should have been provided with SA on the Voyager when they were approved to commence GH.

Factual Background

The weather at Marham was recorded as follows:

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METAR EGYM 101250Z 24007KT 9999 SCT040 BKN110 23/15 Q1017 NOSIG RMK BLU BLU=
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Analysis and Investigation

Military ATM

The Typhoon was part of a pair of aircraft that had transited through the Wescott RC and were intending to conduct general handling in the East Anglia Military Training Area (EA MTA). The Voyager had also completed a transit of the Wescott RC having departed RAF Brize Norton routing to Air-to-Air Refuelling Area 8 (AARA 8). Shortly after leaving the Wescott RC, the Typhoons split into individual elements and were authorised to conduct general handling between 5-24,000ft. The Airprox occurred as the Typhoons manoeuvred for the start of their GH.

Figures 1-4 show the positions of Voyager and Typhoon at relevant times in the lead up to and during the Airprox. The screen shots are taken from a replay using the Debden Radar, which is utilised by Swanwick(Mil), therefore is representative of the picture available to the controllers.

The Typhoons departed the Wescott RC at 1253:04 and were handed over to Swanwick(Mil) East Controller Two. At this point the Voyager was still under the control of Swanwick(Mil) South-West. Both aircraft were at FL230, heading in the same direction and were separated by 10.5nm.

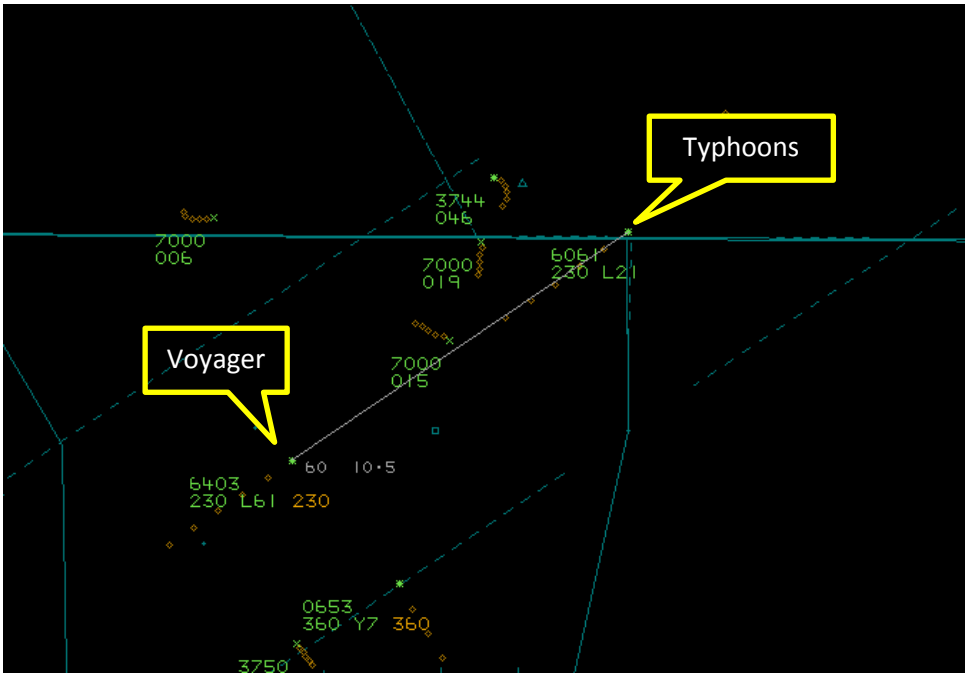


Figure 1

On leaving the Wescott RC, the Voyager established contact with Swanwick(Mil) Controller One (who was undergoing training and was being supervised by an OJTI) and requested a transit at FL230 due to weather. Because a transit at FL230 would also mean a crossing of airway Y70, Swanwick(Mil) Controller One began to scan for potential conflicting traffic on the airway. At almost the same time, Swanwick(Mil) Controller Two approved the Typhoon request to general handle in a block of airspace 5-24,000ft and issued an individual squawk to the incident Typhoon. Separation at this point remained 10.5nm.

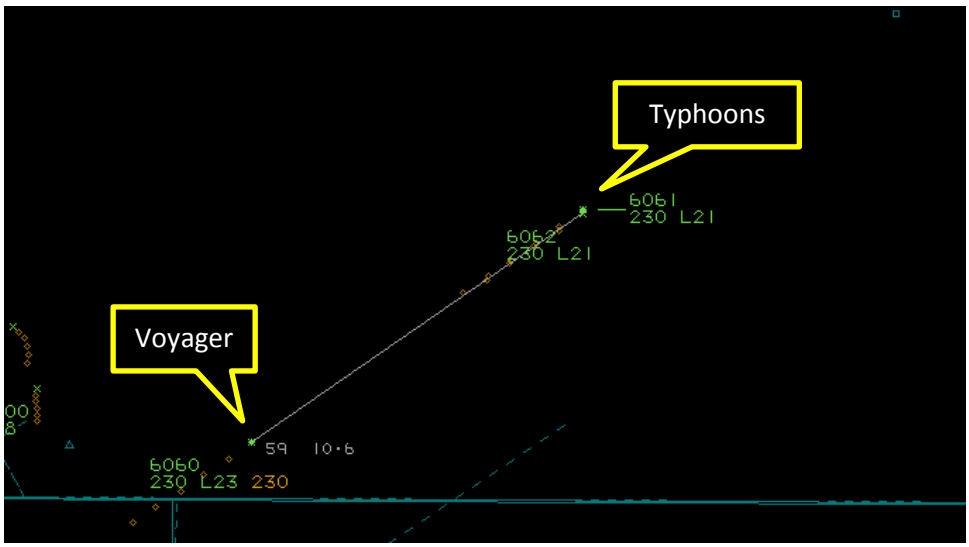


Figure 2

The incident Typhoon pilot reversed their heading in preparation for their exercise and, at 1254:54, Swanwick(Mil) Controller Two issued Traffic Information to the Typhoon who reported visual with the Voyager. Just prior to this Traffic Information, the Voyager reported manoeuvring following a TCAS RA. Although separation at this point was 4.3nm and 200ft there was a recorded closing speed of 746kts.

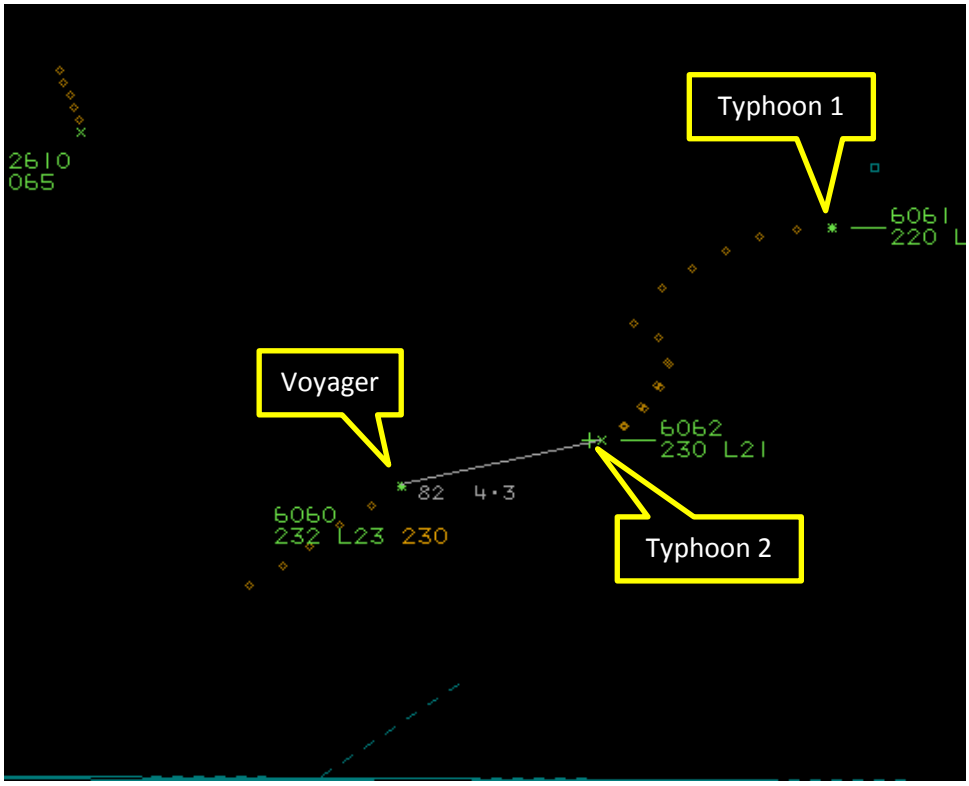


Figure 3

Following the Traffic Information, and coincident with the TCAS RA climb instruction, Typhoon 2 initiated a descent at approximately 6000ft/min. As the lateral separation decreased to one mile, vertical separation was 2300ft. CPA occurred as the radar returns merged and showed a vertical separation of 2600ft.

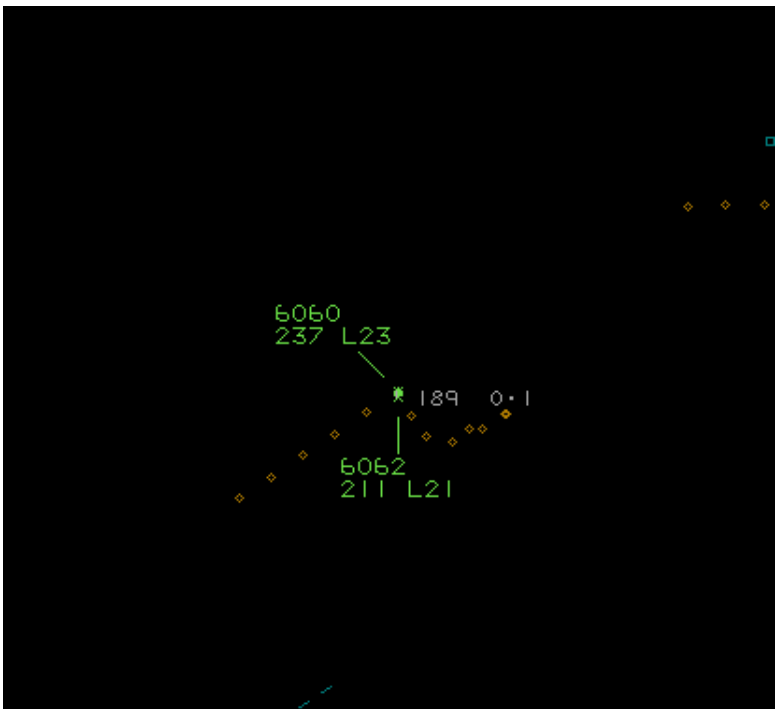


Figure 4 CPA

The Swanwick investigation identified that Controller Two did not initially appreciate the Typhoon general handling would impact the Voyager transit. However, Controller Two did issue Traffic Information to the Typhoon, at which point he was visual with the Voyager. It was unfortunate that, due to the closing speeds of the aircraft, the Voyager had already received a TCAS RA climb instruction.

Both Swanwick(Mil) Controller One and their OJTI anticipated the Voyager transiting to AARA 8 at FL170 and therefore below Y70. Once they realised the Voyager would cross Y70 they became preoccupied with identifying conflicting aircraft on the airway to the detriment of a scan closer to the Voyager; this resulted in Traffic Information not being passed until 30 secs after CPA.

UKAB Secretariat

The Voyager and Typhoon pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard[2]. If the incident geometry is considered as head-on or nearly so then both pilots were required to turn to the right[3].

Comments

HQ Air Command

Initially both aircraft had limited situational awareness of each other's proximity; however, this improved as the situation developed. Both aircraft received an internal warning of each other's proximity (Voyager TCAS, Typhoon Radar) and Traffic Information from Swanwick at 3nm, although arguably later than would have been optimal, especially given the high closing speed of 746kts. Cued by their sensors and ATC, both aircraft became visual with each other prior to CPA.

The Typhoon generated an RA on the Voyager's TCAS which caused the Voyager pilot to initiate a climb. At the time of the RA, the Swanwick controller controlling the Voyager was looking further ahead of the aircraft for traffic in the Y70 airway. The Voyager RA, called on frequency, prompted them to issue Traffic Information on the Typhoon. The Voyager appeared on the Typhoon pilot's radar at about 3nm, the Typhoon pilot became visual shortly afterwards and commenced a descent,

[2] SERA.3205 Proximity. MAA RA 2307 paragraphs 1 and 2.
[3] SERA.3210 Right-of-way (c)(1) Approaching head-on. MAA RA 2307 paragraph 13.

just before Traffic Information was called to them. The Typhoon pilot states that a different manoeuvre would have been carried out if they'd appreciated how close the Voyager was behind them.

The Controller working the Typhoon pair didn't perceive that the Voyager was a hazard when approving the Typhoon pair for general handling. Clearly the Airprox would have been far less likely had a lower upper height limit been imposed on the Typhoon pair or if the Typhoon pair had been informed about the proximity of the Voyager when cleared for general handling.

Whilst 2,600ft of separation was recorded at CPA, this Airprox draws out a few lessons – the requirement to monitor a situation, appreciate how it could develop, and issue early information to improve situational awareness and deconflict activity to make a loss of separation less likely. This Airprox was subject to a Local Investigation at RAF(U) Swanwick. As a result, action has been taken internally with Unit Standards Officers to ensure that personnel are conducting their duties as expected. The Typhoon currently has no CWS but the provision of a suitable solution remains a high priority.

Summary

An Airprox was reported when a Voyager and a Typhoon flew into proximity near Marham at 1255hrs on Wednesday 10th July 2019. The Voyager pilot was operating under IFR in VMC and in receipt of a Traffic Service from Swanwick(Mil), the Typhoon pilot was VFR in VMC and also in receipt of a Traffic Service from Swanwick(Mil).

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from the pilots of both aircraft, transcripts of the relevant RT frequencies, radar photographs/video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities. 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 the military area radar controller member that the aircraft had previously been conducting mutual air-to-air refuelling in the south-west of the country prior to returning to the east through the Westcott radar corridor under the control of the same Swanwick(Mil) controller. On exit from the corridor, the Typhoon pilots were transferred to a different controller and had then requested a block of airspace in which to conduct manoeuvring. Meanwhile, the Voyager pilot had remained with the previous controller for transit to his next task in ARA8 and would not have heard the Typhoon pilots' request. The military controller member went on to explain that, at the time of the change of controllers, the Typhoons and Voyager were co-altitude and separated by approximately 10nm; neither controller would have considered it necessary to issue Traffic Information to either aircraft with this degree of separation as they exited the Westcott radar corridor.

With the Voyager pilot requesting to remain at FL230 due to weather, the East Tac-Right controller now had to scan ahead for traffic on the airway ahead with which he would need to coordinate. Given that he had no expectation that the Typhoons would be deviating from their current track, his attention was therefore drawn away from the Voyager and Typhoon tracks. For her part, the East Tac Left controller responded to the Typhoon pilots' request for a GH block by clearing them to commence manoeuvring in a block of airspace that included the Voyager's current level. Controller members opined that before giving the Typhoon pilots this clearance, she should either have limited their maximum altitude to below the Voyager's (on the assumption that it would continue on track and height) and passed Traffic Information to the Typhoon pilots and the Voyager controller (so that he could also inform the Voyager crew). Unfortunately, having then started to generate the necessary flight strips for the two Typhoon aircraft, the East Tac-left controller did not notice the No2 Typhoon pilot turn through 180° as she was engaged in this administrative task (**CF5**). The Board agreed that the Typhoon pilot should have been issued Traffic Information on the Voyager when the block was requested (**CF1**, **CF4**) and/or that the block should have been limited until the Voyager had passed well clear (**CF3**). They further agreed that

the East Tac-Right controller did not notice the Typhoon turning into conflict with the Voyager due to his scanning the airway ahead for the Voyager's airway crossing (**CF2**, **CF5**).

Turning to the actions of the Voyager and Typhoon pilots, the paucity of information from onboard sensors (i.e. the lack of Link 16 information and no collision warning system fitted to the Typhoons), allied to the absence of Traffic Information, meant that neither pilot had specific SA on the relative position and intentions of the other aircraft (**CF6**). Some members wondered whether the Typhoon pilot should have been more aware of the presence of the Voyager given that they had just been working together and transiting through the Westcott corridor at the same time. Others felt that this was not a reasonable expectation given that the Voyager could have taken a very different routing at any time and so there would be no reason to believe that it would be right behind the Typhoons without specific information of such. As it happened, when the No2 Typhoon pilot turned through 180° and introduced a closing speed with the Voyager in excess of 700kts, an immediate RA was generated by the Voyager's TCAS II (**CF7**) and, now pointing at the Voyager, the No2 Typhoon's radar registered the contact and alerted the No2 Typhoon pilot to its presence at approximately the same time as the East Tac-Left controller issued Traffic Information. The Typhoon pilot quickly gained visual with the Voyager and immediately initiated a descending turn to increase vertical separation, achieving a CPA of around 2600ft vertically as the Voyager passed overhead (**CF8**).

In considering the risk, the Board was of the view that the prompt and positive actions of the Typhoon pilot, coupled with the Voyager pilot's response to the TCAS RA, had generated a significant vertical separation between the two aircraft at CPA such that, notwithstanding the closure speed, any risk of collision had been quickly averted. Accordingly, the Board agreed that the risk was Category C.

PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK

Contributory Factors:

	2019188		
CF	**Factor**	**Description**	**Amplification**
	Ground Elements		
	• Regulations, Processes, Procedures and Compliance		
1	Human Factors	• ATM Regulatory Deviation	Regulations and/or procedures not complied with
	• Situational Awareness and Action		
2	Human Factors	• Conflict Detection - Detected Late	
3	Human Factors	• Inappropriate Clearance	Controller instructions contributed to the conflict
4	Human Factors	• Traffic Management Information Provision	Not provided, inaccurate, inadequate, or late
5	Human Factors	• Distraction - Job Related	
	Flight Elements		
	• Situational Awareness of the Conflicting Aircraft and Action		
6	Contextual	• Situational Awareness and Sensory Events	Generic, late, no or incorrect Situational Awareness
	• Electronic Warning System Operation and Compliance		
7	Contextual	• ACAS/TCAS RA	TCAS RA event
	• See and Avoid		
8	Contextual	• Near Airborne Collision with Aircraft, Balloon, Dirigible or Other Piloted Air Vehicle	A conflict in the FIR

Degree of Risk: C

Safety Barrier Assessment[4]

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

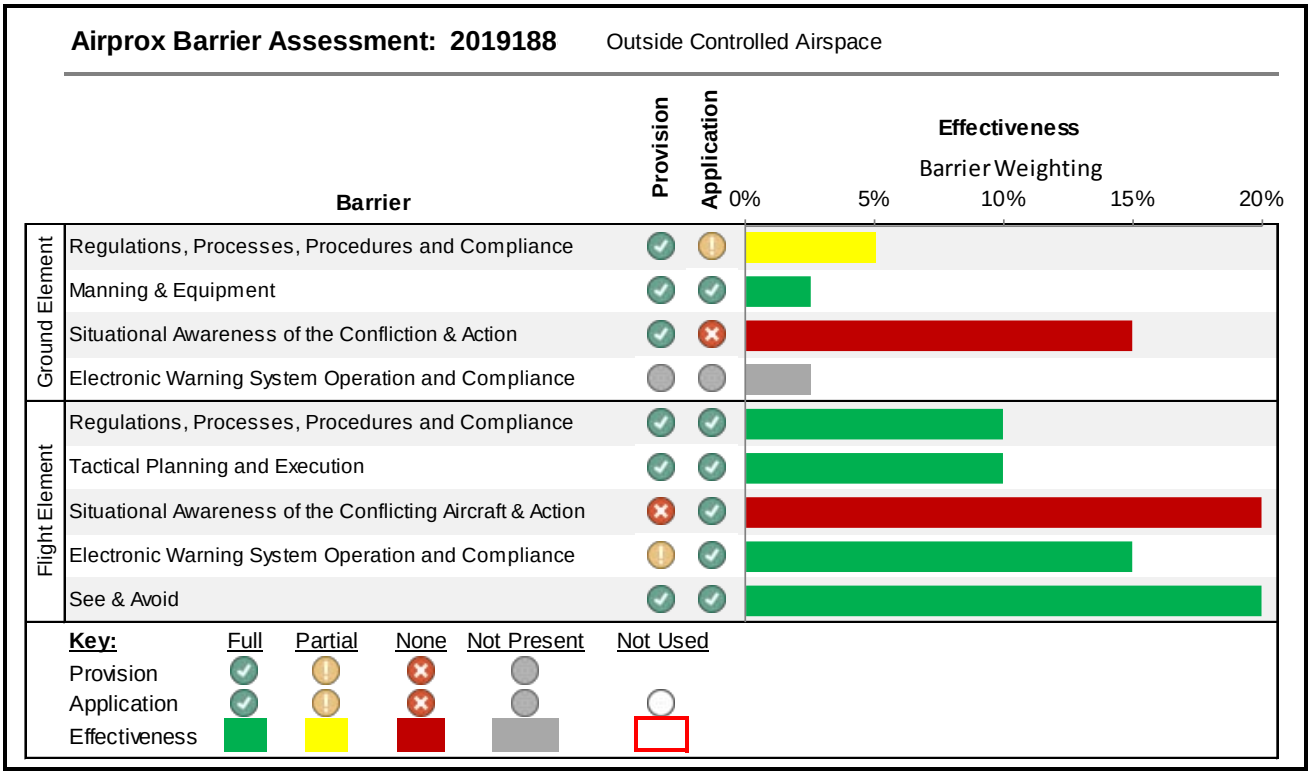
Ground Elements:

Regulations, Processes, Procedures and Compliance were assessed as **partially effective** because ATC did not pass Traffic Information or limit the Typhoon's maximum block altitude before clearing them to begin their manoeuvring.

Situational Awareness of the Confliction and Action were assessed as **ineffective** because the conflict was not identified by the controllers in a timely fashion.

Flight Elements:

Situational Awareness of the Conflicting Aircraft and Action were assessed as **ineffective** because the Typhoon pilot did not know that the Voyager was 10nm behind him.



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