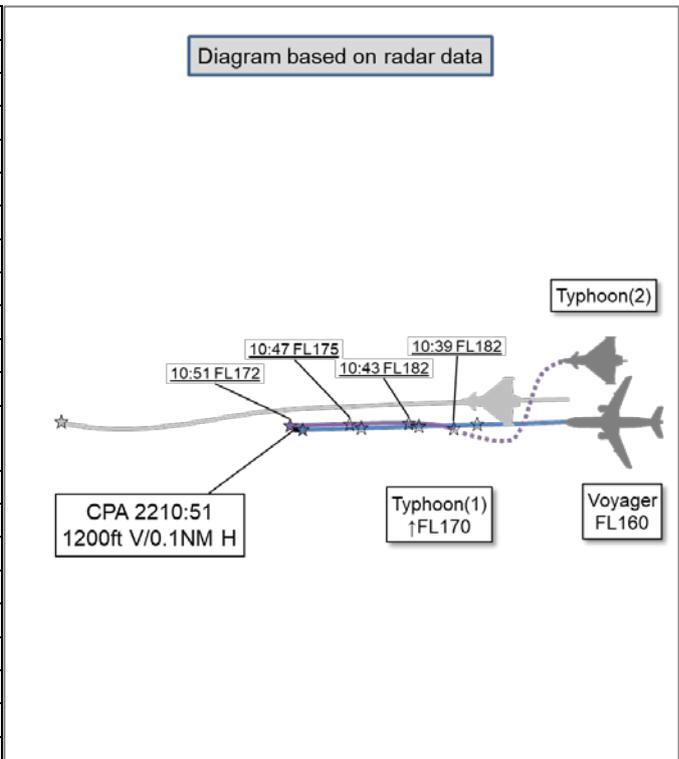


AIRPROX REPORT No 2020162

Date: 12 Nov 2020 Time: 2211Z (Night) Position: 5316N 00213E Location: AARA 8

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Voyager	Typhoon(2)
Operator	HQ Air (Ops)	HQ Air (Ops)
Airspace	London FIR	London FIR
Class	G	G
Rules	IFR	VFR
Service	Traffic	Traffic
Provider	Swanwick Mil	Swanwick Mil
Altitude/FL	FL160	FL172
Transponder	A, C, S	A, C (S off)
Reported		
Colours	Grey	Grey
Lighting	Strobes, beacons, nav, formation	Strobes, nav
Conditions	VMC	VMC
Visibility	100km	>10km
Altitude/FL	FL160	FL170
Altimeter	SPS	SPS
Heading	280°	NK
Speed	280kt	350kt
ACAS/TAS	TCAS II	Not fitted
Alert	RA	N/A
Separation		
Reported	NK V/NK H	NK V/NK H
Recorded	1200ft V/0.1NM H	



THE VOYAGER PILOT reports that a flight of two Typhoons were conducting night air-to-air refuelling (AAR) training. The weather was clear below with excellent all round visibility and broken cloud cover above with occasional light turbulence associated with forecast mountain wave. The Typhoons departed the tanker, climbing to FL170, and departed straight ahead, westwards. The Voyager maintained the same westerly track to complete after-refuelling checks prior to recovering to home base. As the tanker crew was watching the Typhoons depart ahead, one was seen to turn sharply left across the tanker's nose, well above. Shortly afterwards, TCAS gave a TA as this aircraft descended to an indicated 600ft above the Voyager. The aircraft was then seen to climb up and right before its aspect was lost. It appeared to recross the tanker's nose well above before descending directly ahead of the tanker. TCAS subsequently gave a descending RA with the Typhoon displaying about 1600ft above, descending rapidly. The TCAS manoeuvre was carried out iaw SOPs, passing FL155 before the warning ceased. CPA was not observed once the RA had sounded due to internal switching and monitoring workload. From the Voyager crew perspective, whilst they did not initially feel threatened, when the Typhoon aspect was lost and its manoeuvring became impossible to discern, the crew became increasingly concerned with its possible trajectory. Given that the Voyager had just completed air-to-air refuelling (AAR), it was fortunate that the after-refuelling checklist had been run as soon as the Typhoons had reached their departing altitude, which resulted in TCAS being reselected from TA only to TA/RA. It would have been reasonable for the Voyager to have TA only set immediately post-AAR and to have been rewinding hoses and therefore for a short period, less able to provide self-separation by manoeuvring. For the Voyager crew it reinforced the need to continue to monitor departing receivers, despite them being cleared to leave and no longer working the boom frequency. This was even more important during night conditions when perceptions of attitude and aspect could easily be lost or misinterpreted.

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

THE TYPHOON FORMATION LEADER PILOT reports leading a formation pair of Typhoons, tasked to conduct a night AAR training sortie. This was the student's first sortie to the tanker at night. After successful completion of AAR at FL160, the pair departed the tanker at 300kt and climbed to FL170 on the tanker track. The formation leader directed the number 2 to take up radar trail and subsequently set 350kt to build separation between the 2 aircraft. Whilst attempting to gain a radar lock, the number 2 pilot inadvertently accelerated to 393kt, whilst keeping the lead aircraft in the head-up display (HUD) field of view. Separation between the 2 aircraft reduced to 192ft with 40kt of closing velocity. Having identified the potential conflict, the number 2 pilot initiated an overshoot to the left whilst also commencing a descent. The formation leader was not aware of the rate of closure or [separation] prior to the overshoot. On actioning the overshoot, the number 2 pilot called "2 breaking left" which the leader asked him to repeat. Aware of the proximity of the tanker, the lead pilot called "Do not descend" to the number 2 pilot, shortly followed by a call to climb immediately back to FL170. The number 2 pilot descended to 300ft above the tanker altitude before initiating a climb to FL185 and gaining radar contact on the lead aircraft. On review, task saturation was a factor in this incident and highlighted the requirement to ensure safe deconfliction is prioritised over sensor management.

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

THE SWANWICK MIL CONTROLLER reports having the Voyager on frequency, operating in AARA 8 in the Block from FL140 to FL170 with the Typhoon pair conducting AAR. The Typhoon pair were pre-noted for general handling in East Anglia following AAR and had been instructed to climb to 1000ft above the Voyager on completion. The Typhoon pair checked in on the frequency at about 2208Z, climbing to FL170. A squawk was allocated, the formation identified and placed under a Traffic Service, with a clearance for 'own navigation' for the East Anglia MTA. The Typhoon lead ran ahead of the Voyager on a similar heading, with a second squawk appearing slightly behind the leader, believed to be the number 2. At about 2210Z, the Voyager pilot stated that they were responding to a TCAS RA, which was acknowledged, and the controller awaited a call that the situation was resolved. Shortly after this, the number 2 Typhoon pilot came on frequency to say that he had 'become slightly disorientated, overshoot, did not descend below 163, now climbing back to 170'. The Voyager pilot then requested a climb back to FL160, which was approved as soon as it became apparent that both Typhoon squawks indicated FL170.

THE SWANWICK MIL SUPERVISOR reports that they had just taken over as ATCO I/C and was also the controller in question when the incident occurred.

Factual Background

The Airprox occurred at medium-level over the sea off the Norfolk coast. Local airfield weather reports were not considered to be pertinent.

Analysis and Investigation

Military ATM

The reported Airprox occurred at a point where the controller could not have provided a barrier to MAC and therefore an analysis of Military ATM is not germane.

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 hazard¹.

Occurrence Safety Investigation

The RAF Coningsby Occurrence Safety Investigation (OSI) found that the Typhoon number 2 pilot had mishandled his aircraft such that he closed to below the minimum safe separation range for

¹ MAA RA 2307 paragraphs 1 and 2.

Radar Trail and that he could not gain a Radar Lock and therefore should not have continued the exercise. This was the first unplanned, unexpected and genuine emergency overshoot for the Typhoon number 2 pilot at night. The subsequent manoeuvres, while ensuring safe separation initially, posed a potential hazard to the [Voyager]. A positive intervention from [Typhoon lead pilot] ordering [Typhoon number 2 pilot] not to descend, mitigated the risk. However, in his eagerness to avoid the [Voyager's] Flight Level, [Typhoon number 2 pilot] pitched his aircraft upward such that he ballooned through his leader's level to FL 185. His subsequent positive manoeuvre to recover to FL 170, following his radar contact with [the lead Typhoon], caused [Typhoon number 2 pilot] to achieve a rate of descent to FL 170 that triggered the TCAS Warning for [the Voyager]. [Typhoon number 2 pilot] levelled out at FL170.

The Occurrence Review Group (ORG) considered 2 separate events – the [loss of safe separation] between [the 2 Typhoons] whilst departing the tanker and the reported Airprox (TCAS RA) between [Typhoon number 2] and the Voyager. The risk of MAC in the second incident was considered as LOW (given the lateral and vertical displacement of both ac and the SA of the Voyager crew) and a result of the initial, more serious, [loss of safe separation] during the attempted trail manoeuvre. The ORG considered the first event to be the cause of the second and, thus, much of the discussion and the recommendations pertained to [that] event. The ORG agreed with the OSI that the [Typhoon number 2 pilot] had mishandled his ac such that the initial [loss of safe separation] occurred and that his lack of SA had led to the second. However, the ORG noted that, given the pilot's [lack of] experience, his lack of capacity (which contributed to his degradation of SA and subsequent poor prioritisation) was understandable. This was, essentially, a training incident which should attract no personal accountability, hence no requirement for FAIR Tool discussion; rather, the training system which had been developed to allow ab-initio pilots the opportunities to develop their airmanship & mental capacity (and which has hitherto proved effective) had not been fully successful in this case. Of note, however, was the fact that the AAR portion of the sortie, including the Join, AAR and subsequent formation prior to departure, was entirely successful. The ORG agreed, however, that the AAR portion of the sortie may have had a detrimental effect on the pilot's capacity. It was, therefore, entirely correct to task the OCU with reviewing the scheduling of AAR for student pilots. That review, plus the potential implementation of a 'safety call' (for all RAF Typhoon Sqns) should have a positive effect on capacity and SA-building.

Finally, the ORG considered the overall flying experience of the pilot being asked to carry out complex training at night. The ORG noted that all training syllabi (including course input standards) were robustly assured through 1st, 2nd and 3rd party organisations; this fact, coupled with the information that this was the first incident of its kind and that similarly experienced ab-initio students had successfully completed these events on the same serial, led the ORG to the conclusion that no further recommendations were necessary as this report would inform the next, routine syllabus review.

Comments

HQ Air Command

This Airprox was subject to an Occurrence Safety Investigation which made four recommendations to help mitigate reoccurrence. Air-to-air refuelling (AAR) forms a vital part of training and for ab-initio students, who's first exposure will be on the Operational Conversion Unit (OCU), it is extremely demanding. Coupled with the added complexities of night flying, it is understandable that events transpired so quickly, given the pilot's limited experience and reduced capacity. In this situation, the [Typhoon number 2 pilot] went 'heads in' and became fixated on the radar screen, denying the ability to correctly assimilate all the threats that were in the peripheral. The unnoticed overtake resulted in a Loss of Safe Separation (LoSS) with [the lead Typhoon], forcing a breakout situation and a descent towards the Voyager. Due to the careful monitoring and SA of [the lead Typhoon] (the instructor), the student arrested their rate of descent. The Coningsby DDH states: 'I also publicly recognise the swift actions and superb awareness of the Instructor; without whose intervention the second LoSS could have been significantly more dangerous.' The crew of the Voyager are also to be commended for their actions and close monitoring of the departing aircraft.

As a result of the recommendations, night AAR will only be conducted once a student pilot has completed all the OCU day AAR sorties to ensure currency and competency with the task. Night sorties will take place later in the course to help build experience and capacity and time to consolidate day AAR before completing night AAR. The night emergencies and procedures simulator sorties are to include tanker join / depart / overshoot procedures and will be completed within 7 days prior to night AAR, allowing the student to practise and consolidate their learning before the 'live' airborne sortie. With the risk of task fixation during a radar trail, the Typhoon Force are considering the introduction of a 'target parameters' check call (Target Height/Heading/Speed/Range) at a designated separation range, which would allow the lead/target aircraft both to monitor and to manage formation safety.

Although unfortunate, this Airprox has identified some important lessons, which the Typhoon Force have embraced by implementing the recommendations from the investigation. The distances involved between the [Voyager] and [Typhoon number 2] may have been large, but the risks within it should not be underestimated.

Summary

An Airprox was reported when a Voyager and a Typhoon flew into proximity in AARA 8 at 2211Z (night) on Thursday 12th November 2020. Both pilots were operating in VMC in receipt of a Traffic Service from Swanwick Mil, the Voyager pilot under IFR and the Typhoon pilots under VFR.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from both pilots, radar photographs/video recordings, reports from the air traffic controllers involved and reports from the appropriate 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.

Due to the exceptional circumstances presented by the coronavirus pandemic, this incident was assessed as part of a 'virtual' UK Airprox Board meeting where members provided a combination of written contributions and dial-in/VTC comments.

Board members were first briefed by a military pilot member that the Coningsby OSI had addressed the concerns raised by the investigation and had made recommendations that would help mitigate an occurrence such as this in the future. Of note, night flying and night AAR training had been examined and recommendations made to ensure that ab initio students receive a sufficiently high level of night training before undertaking night AAR.

Turning to the Airprox, members commented that the circumstances for the Airprox had been created by the Typhoon(2) pilot's handling of the radar trail departure, the break-out when they detected that they had closed on the lead Typhoon, the subsequent climb away from the Voyager's level and then descent back to FL170. The geometry of the incident was such that the Typhoon(2) pilot's descent back to FL170 had taken place overhead the Voyager, which triggered a TCAS RA (**CF4**) in the Voyager cockpit. To that extent, the Typhoon(2) pilot had not conducted the trail departure iaw SOPs (**CF1**) and it had not been executed correctly (**CF2**). The Typhoon(2) pilot's realisation that they had moved to a position abeam the lead Typhoon had resulted in their break-out manoeuvre and subsequent deviation from the cleared altitude of FL170 (**CF3**). The Board discussed whether a Swanwick Mil controller could have influenced events but agreed that this would not have been possible given that the Typhoon formation had only just transferred to their own Traffic Service and were in any case in proximity with the Voyager, having just commenced their departure. Radar replay also showed that the Typhoon(2) manoeuvres could not have been detected in a timely manner and therefore that the controller had no SA concerning its deviation from SOP. Members also noted that the intra-Typhoon proximity appeared to involve a significantly higher degree of risk than the reported Airprox and wondered why this had not been reported as an Airprox in its own right. A military pilot member briefed the Board that intra-formation events such as this were analysed during the formation de-brief, safety lessons were identified and action taken if required. Generally, reporting of such events as an Airprox did not provide

a useful additional safety process but this did not prevent a service pilot filing an Airprox if they felt it warranted. Turning to the risk, members agreed that although the Voyager crew had received and correctly actioned a TCAS RA, the Typhoon(2) pilot had in any case levelled at FL170, 1000ft above the Voyager's level. As such, the Board felt that although safety had been degraded, there had not been a risk of collision between the descending Typhoon(2) and the Voyager.

PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK

Contributory Factors:

	2020162		
CF	Factor	Description	Amplification
	Flight Elements		
x	• Regulations, Processes, Procedures and Compliance		
1	Human Factors	• Flight Operations Documentation and Publications	Regulations and/or procedures not fully complied with
x	• Tactical Planning and Execution		
2	Human Factors	• Action Performed Incorrectly	Incorrect or ineffective execution
3	Human Factors	• Flight Level/Altitude Deviation (Level Bust)	
x	• Electronic Warning System Operation and Compliance		
4	Contextual	• ACAS/TCAS RA	

Degree of Risk: C.

Recommendation: Nil.

Safety Barrier Assessment²

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 **not used** because the Swanwick Mil controller could not provide mitigation in this barrier.

Manning and Equipment were assessed as **not used** because the Swanwick Mil controller could not provide mitigation in this barrier.

Situational Awareness of the Confliction and Action were assessed as **not used** because the Swanwick Mil controller could not provide mitigation in this barrier.

Flight Elements:

Regulations, Processes, Procedures and Compliance were assessed as **ineffective** because the Typhoon(2) pilot closed to below the minimum safe separation range for Radar Trail and the ensuing manoeuvres resulted in the Airprox.

Tactical Planning and Execution was assessed as **partially effective** because the Typhoon(2) pilot triggered a TCAS RA in the Voyager but nonetheless levelled 1000ft above.

See and Avoid were assessed as **not used** because lookout was not a factor in the Airprox.

² The UK Airprox Board scheme for assessing the Availability, Functionality and Effectiveness of safety barriers can be found on the [UKAB Website](#).

Airprox Barrier Assessment: 2020162		Outside Controlled Airspace						
Barrier	Provision	Application	Effectiveness					
			Barrier Weighting					
			0%	5%	10%	15%	20%	
Ground Element	Regulations, Processes, Procedures and Compliance							
	Manning & Equipment							
	Situational Awareness of the Confliction & Action							
	Electronic Warning System Operation and Compliance							
Flight Element	Regulations, Processes, Procedures and Compliance							
	Tactical Planning and Execution							
	Situational Awareness of the Conflicting Aircraft & Action							
	Electronic Warning System Operation and Compliance							
	See & Avoid							
Key:			<u>Full</u>	<u>Partial</u>	<u>None</u>	<u>Not Present/Not Assessable</u>	<u>Not Used</u>	
Provision								
Application								
Effectiveness								