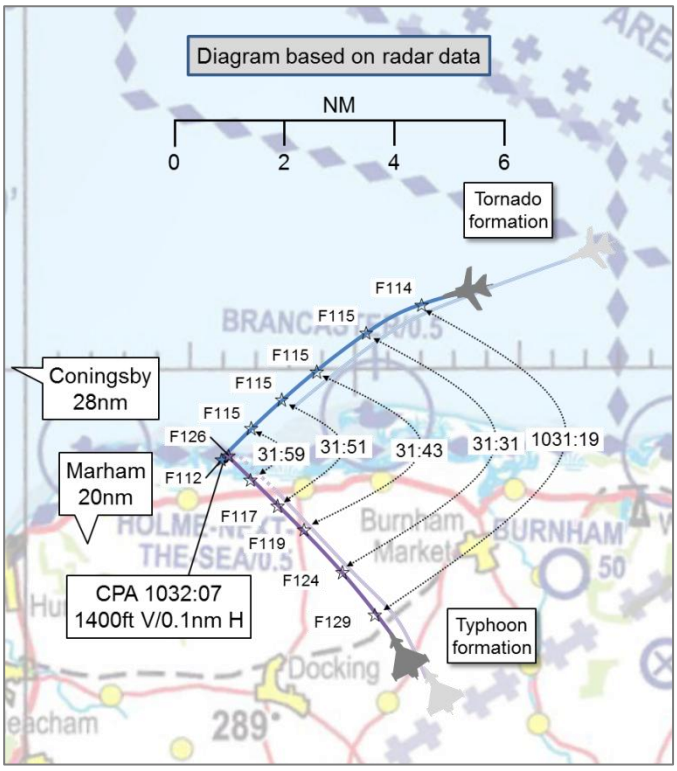
AIRPROX REPORT No 2014227

Date/Time: 11 Dec 2014 1032Z

Position: 5259N 00036E (11nm NW Sculthorpe)

Airspace: London FIR (*Class*: G)

	Aircraft 1	*Aircraft 2*
Type:	Tornado GR4x2	Typhoon FGR4x2
Operator:	HQ Air (Ops)	HQ Air (Ops)
Alt/FL:	FL115	FL130
Conditions:	VMC	VMC
Visibility:	40km	NK
Reported Separation:	600-800ft V/0 H	700ft V/1000ft H
Recorded Separation:	1400ft V/0.1nm H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE TORNADO PILOT reports that he was No2 in Voodoo formation. The aircraft were coloured grey; HISLs, strobes and other lights in accordance with SOPs were illuminated. SSR Modes C and S were selected; ACAS was not fitted. They were conducting a simulated attack on a target on the North Norfolk coast as part of an operational 'work-up'. They were operating VFR/VMC in receipt of a reduced Traffic Service from Marham. Voodoo 2 was in the lead with Voodoo 1 in trail in an altitude block of FL110-120. At 1031:51, the pilot of Voodoo 1 called visual on a pair of Typhoons which were in confliction with Voodoo 2. The pilot of Voodoo 2 sighted the pair slightly high in the left 9 o'clock position whereupon he conducted a descent to increase separation. The Typhoons subsequently went directly overhead. No calls were heard from ATC prior to the confliction. On the subsequent video debrief and analysis, Marham ATC did make a call to Voodoo at 1031:41 where the conflicting pair were called at FL120, 4nm to the South. This radio call, although clearly audible on the tape was not heard or acknowledged by either crew member of Voodoo 2. At 1031:51, Voodoo 1's pilot called visual with the pair and this call directed Voodoo 2 pilot's eyes to the confliction whereupon he simultaneously commenced a descent to aid separation and called visual at 1031:54. He estimated that the Typhoons passed overhead at a separation of 600-800ft. The crew were in the middle of a task where the Weapons Systems Officer (WSO) was predominately heads-in. Radios had previously been poor in reception. The Radar Homing and Warning Receiver (RHWR) was on but nothing was seen or heard by the crew.

He assessed the risk of collision as 'Medium'.

THE TYPHOON PILOT reports that he was No2 in a 2-aircraft formation, operating VFR/VMC in receipt of a Traffic Service from Swanwick Mil. SSR state and Modes were not reported. They were operating in the East Anglia Military Training Area (EAMTA), cleared height block 5000–30000ft on the Regional Pressure Setting. He gave a '1 minute to completion' call to the ATS agency. On completion of the task both Apollo aircraft initially levelled and reported at FL130. Having obtained the latest Airfield state from Coningsby Automatic Terminal Information Service (ATIS) on the 2nd radio, Apollo lead reported to Swanwick Mil he had received the latest ATIS and, having been cleared 'own navigation' by Swanwick, was proceeding VFR to Coningsby. Apollo started a gentle descent leaving FL 130 and, shortly afterwards, Swanwick Mil called a 'contact right, 1 o'clock, at 4 miles, 2000ft below'. Coincident with this RT call, Apollo lead gained radar contact, 60° right at 5nm, allocated it as a system 'Priority Track' and quickly gained visual contact with one of the 2 Tornado

GR4s. Shortly afterwards a 2nd trailing Tornado GR4 was visually acquired at an estimated range of 4nm. Apollo lead perceived that a continued descent would generate a confliction and the Apollo formation initially levelled off, followed by a climb (Apollo 2 was in lose formation and followed his leader's flight profile throughout the event). Apollo lead assessed that the Typhoon formation passed above the Voodoo formation with approximately 700ft of vertical separation, with the radar showing 1000ft range. The trail Tornado GR4 was assessed as approximately 0.5nm behind Apollo formation, and that the closest aircraft throughout this event was the leading element of the Voodoo formation. Apollo formation both had radar situational awareness and visual contact post the initial Swanwick Mil call and at no time perceived there to be a collision risk once a climb had been initiated.

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

THE MARHAM ZONE CONTROLLER reports controlling Voodoo formation, conducting General Handling (GH) at the North Norfolk coast between FL100–FL120 on the Zone frequency. Voodoo 2 was transiting west along the coast at FL115 ahead of Voodoo 1. A Swanwick Mil squawk 6075 was seen transiting north-bound at FL125 descending. Traffic Information was passed to the pilot of Voodoo 2 at range of 5nm. The Traffic Information was then updated at range 2nm when the aircraft was seen to be at similar level. Mode C information was then briefly lost on the conflicting traffic. When the conflicting traffic was 2nm north of Voodoo 2, Mode C re-appeared indicating FL125 climbing. A further Traffic update was passed to Voodoo 2's pilot, at which point he declared that he would be filing an Airprox. He asked Voodoo 2's pilot for information on the conflicting aircraft type; the pilot reported two Typhoons. Shortly afterwards, the conflicting traffic changed squawk to 1763 and turned towards RAF Coningsby. The Supervisor was informed of the incident.

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

THE MARHAM SUPERVISOR reports that the Airprox was immediately reported to him by his Zone controller as he was monitoring other frequencies. As traffic levels allowed, he relieved the controller to complete reporting actions then informed Coningsby and Swanwick Mil of the incident. He received an update from the Swanwick Mil East Supervisor informing him that the Typhoon formation was callsign Apollo undergoing a handover to Coningsby. During this handover Voodoo formation was called and reported as visual by Apollo, who elected to descend towards Voodoo before then changing their minds and climbing again (this agrees with the report by his Zone controller).

THE SWANWICK MIL EAST PLANNER CONTROLLER reports that he was operating a busy session with multiple fast-jet aircraft conducting GH in East Anglia. He had 2 Tactical controllers in position so was dividing his attention between each. Apollo, a pair of Typhoons, reported 1 minute to completion and he pre-noted them inbound to Coningsby. Shortly afterwards they began to track back towards Coningsby from the east of Holbeach Range, D207. There appeared to be fast-jet traffic operating in the Sculthorpe area working Marham, manoeuvring through similar levels. The controller called the traffic to Apollo who reported visual. He was not aware of any climb or descent instructions given by the Tactical controller, and it appeared that the Apollo crews were descending at their own discretion. They then climbed slightly to go above one of the returns they had called visual with. Apollo were handed to Coningsby for recovery. Shortly afterwards he took a call from the Marham Supervisor, informing him that Voodoo 2's pilot had reported an Airprox against the Typhoons, which he passed on to his Supervisor.

THE SWANWICK MIL EAST TACTICAL CONTROLLER was screening a trainee controller in Tac E, workload at the time was medium/high, with 4 F15's conducting GH under a Traffic Service in the EAMTA, 2 E121's transiting under a Deconfliction Service, a GR4 free-calling in the Humberside area for recovery, and 2 Typhoons conducting GH under a Traffic Service in the EAMTA. The Typhoon pilots (Apollo 1 and 2) called ready for recovery so were instructed to report steady and level; they were in the Sculthorpe area at the time when they reported level at FL130, steady on a heading for Coningsby. This was acknowledged by the trainee controller, who then asked if they required the latest weather and what type of recovery they intended. During this time, attention was also being diverted to a pair of E121's under a Deconfliction Service in the Cambridge area that required vectoring on recovery to Coningsby due to the high level of primary contacts in the area. The

controller then passed Traffic Information to Apollo Flight on traffic 4nm away, indicating 2000ft below. At this point it was realised that Apollo had started a descent without informing the controller. Apollo called visual with the traffic and continued to descend, so were asked what their intended level was as he had thought they were maintaining FL130. The reply to this was "Standby, climbing above that contact". The Mode C information indicated 4-500ft separation between Apollo and the aircraft previously called as below them. Once the traffic was no longer a factor, Apollo informed them that they were visual with the ground and happy to descend at their discretion on recovery to Coningsby, no mention was made on the frequency about an Airprox. Approximately 10 minutes later, the Planner took a call from Marham ATC informing him that the other aircraft involved was Voodoo and had reported the incident as an Airprox, Apollo crews were off the frequency at this point so could not be informed.

THE SWANWICK EAST SUPERVISOR had just signed the log book after taking over the Supervisor's position following a short break when the East Coordinator informed him that the Marham Supervisor had called to say that one of their pilots was filing an Airprox against Apollo formation. He did not witness the occurrence. He went over to the sector and ascertained the information from the Tac instructor, who had noted down all the relevant details, and the Coordinator, who had taken the telephone call from Marham. After writing the information in the Supervisor's log book, he telephoned the Marham Supervisor to request the other aircraft's callsign, which was Voodoo 2. He then instructed both the Tac and Coordinator to complete a DASOR due to the 'level bust' by Apollo formation.

Analysis and Investigation

Military ATM

The Airprox occurred on 11 December 2014 at 1032 between a pair of Tornados under a Traffic Service with Marham Zone and a pair of Typhoons under a Traffic Service with RAF(U) Swanwick.

The radar replay was captured from the Cromer Radar based on the London QNH of 1010hPa.

The combined tape transcript is below:

From	To	Transcript	Time
Apollo	Swanwick	Apollo level FL130, heading 320 R T B Coningsby	10:30:23
Swanwick	Apollo	Apollo roger, own navigation direct Coningsby, Apollo 2 squawk standby.	10:30:28
Swanwick	Apollo	Apollo traffic right 1 o'clock 4 miles crossing right left indicating 2000 feet below fast moving two tracks	10:31:31
Marham Zone	Voodoo Two	Voodoo Two Marham Zone you have traffic south at four miles tracking north west indicating flight level one two zero in the decent	1031.39
Apollo	Swanwick	Apollo is [**significant pause**] visual.	10:31:41
Swanwick	Apollo	Apollo what's your requested level for descent now?	10:31:51
Marham Zone	Voodoo Two	And Voodoo Two traffic south at two miles tracking north east indicating flight level one one eight…… in the descent	1031.53
Apollo	Swanwick	Standby, climbing over that.	10:31:55
Marham Zone	Voodoo Two	Voodoo Two Marham Zone previously called traffic now indicating flight level one two five and climbing	10:32.18
Voodoo Two	Marham Zone	Voodoo Two copies I will be (????) as an Airprox when we get on the deck	10:32.24

At 1030:23, Apollo reported at FL130, heading 320° to return to Coningsby (Figure 1).

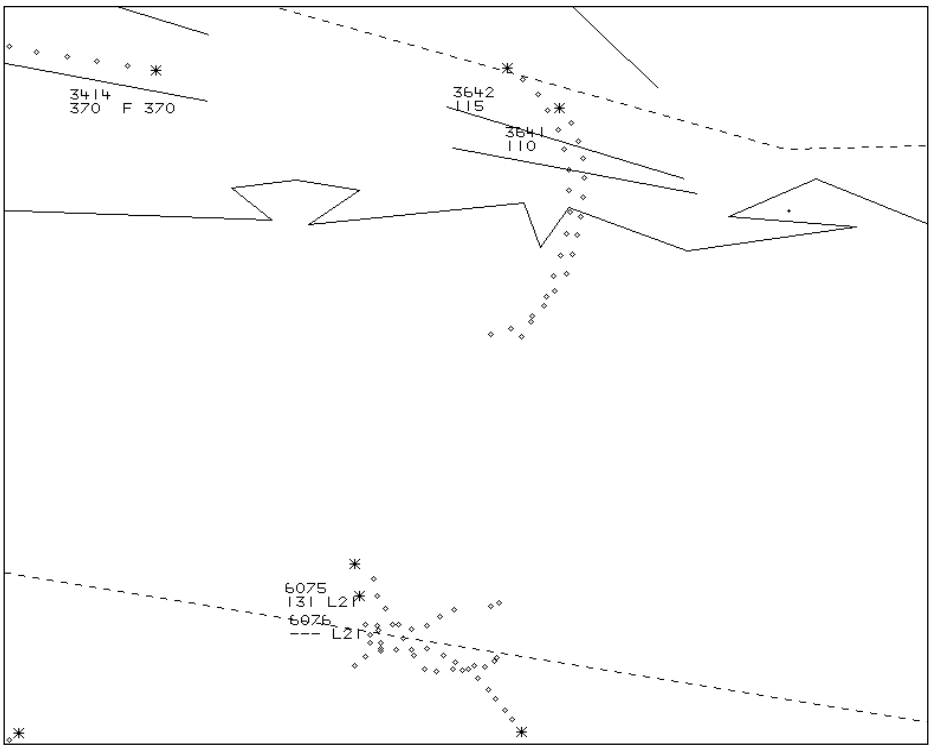


Figure 1: Geometry at 1030:23 (Apollo squawks 6075/76; Voodoo squawks 3641/42).

At 1031:31 (Figure 2), Swanwick passed information, "*Apollo traffic right 1 o'clock 4 miles crossing right left indicating 2000 feet below fast moving two tracks*."

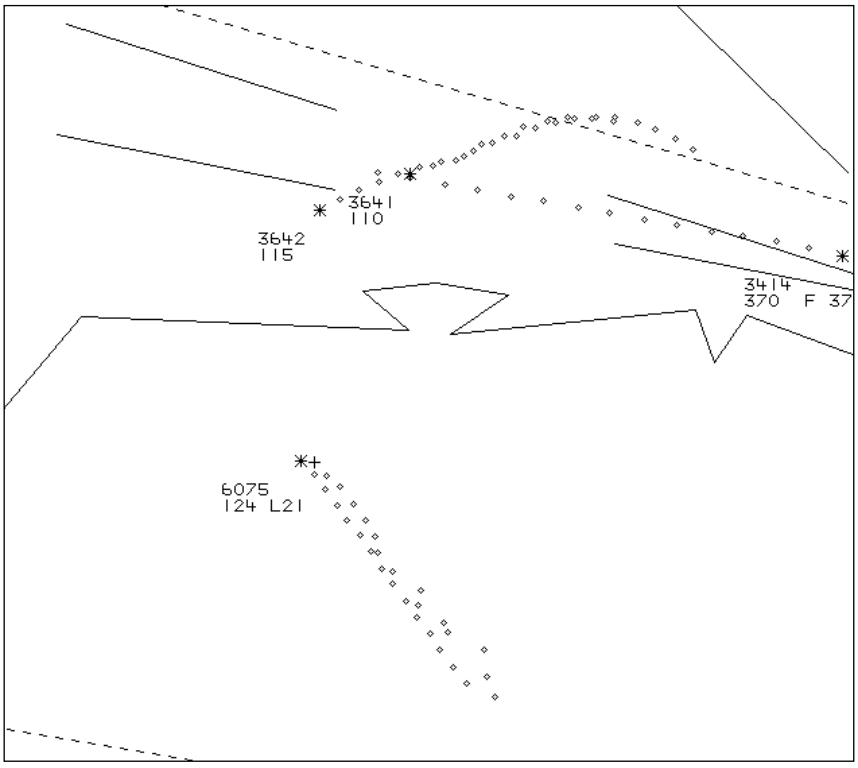


Figure 2: Traffic Information at 1031:31.

At 1031:39 (Figure 3), Marham Zone called information as, "*Voodoo Two Marham Zone you have traffic south at four miles tracking north west indicating flight level one two zero in the descent.*"

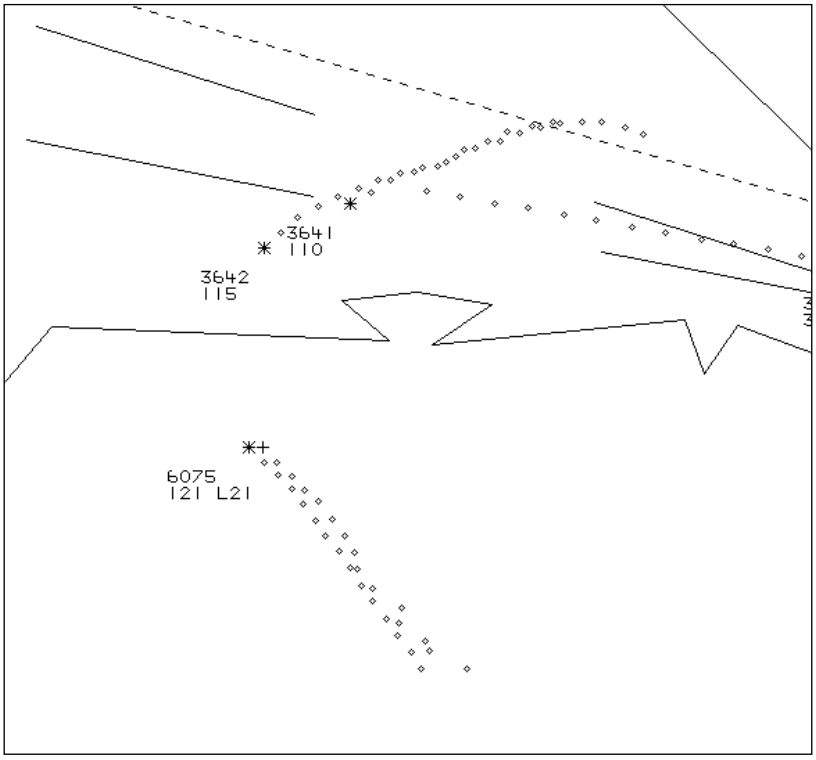


Figure 3: Marham Traffic Information at 1031:39.

At 1031:51, Swanwick requested the descent level of Apollo. At 1031:53 (Figure 4), Marham updated information as, "*And Voodoo Two traffic south at two miles tracking north east indicating flight level one one eight… in the descent*." The tracks were actually routing north-west. At 1031:55 Apollo reported, "*Standby, climbing over that*."

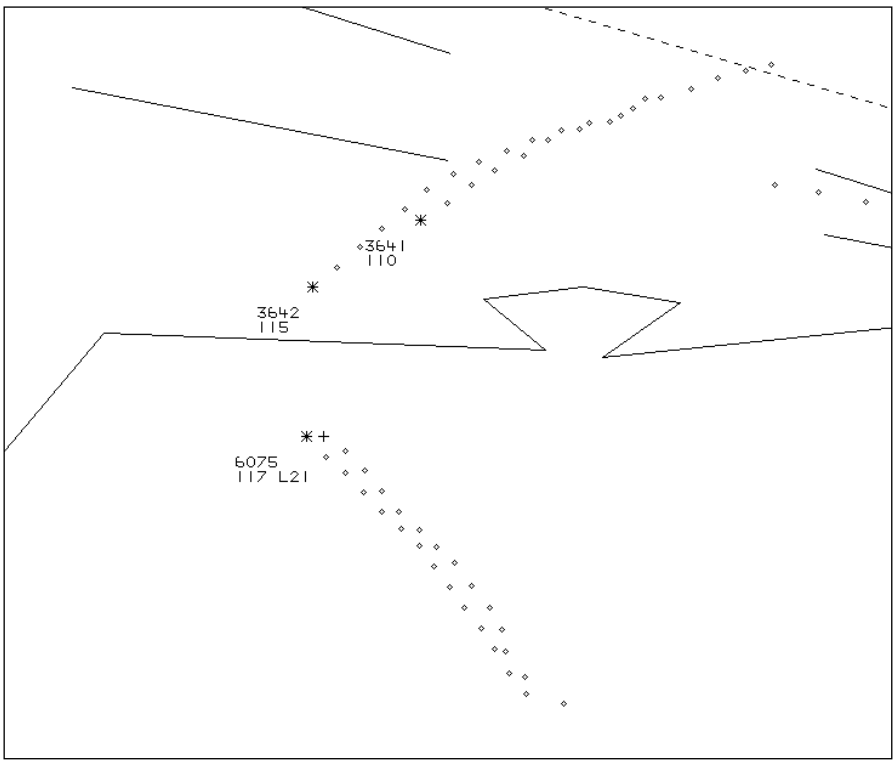


Figure 4: Marham traffic update at 1031:53.

The CPA was estimated at 1032:02 (Figure 5) with 0.5nm horizontal separation and 1000ft vertical separation.

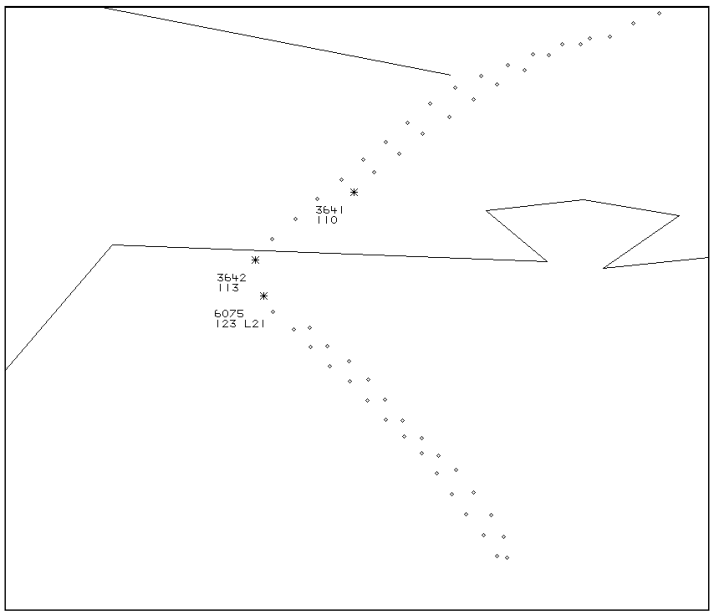


Figure 5: CPA at 1032:02.

The unit held an in-depth Occurrence Safety Investigation that reviewed the incident and made a number of recommendations. Both crews were under a Traffic Service in Class G with the Tornados operating to the right of the Typhoons. The Typhoons had entered a slow descent without informing Swanwick but had called visual on Voodoo at 4nm. CAP774 (UK Flight Information Services), Chapter 3 (Traffic Service), paragraph 3.11 (Levels), provides guidance on aircrew responsibility:

> 'Unless safety is likely to be compromised, a pilot shall not change level or level band without first advising and obtaining a response from the controller, as the aircraft may be co-ordinated against other airspace users without recourse to the pilot. Pilots remain responsible for collision avoidance, even when flying at a level allocated by ATC and shall advise the controller in the event that they need to deviate from a level in order to comply with the Rules of the Air with regard to collision avoidance.'

The Tornados received two sets of Traffic Information at 4nm and 2nm but the details were not assimilated or acknowledged by the crews; it was found during the investigation that the transmissions did get through to the cockpits but high workload meant they were not acted upon.

The normal barriers to an Airprox of this nature would be, Traffic Information, ACAS/TAS and the 'see-and-avoid' principle. The appropriate type of service was chosen for the conditions and Traffic Information was passed by the controllers. The information was not assimilated by the Tornado crews but updates to the Typhoon crews enabled radar/visual contact and situational awareness for Apollo formation. Neither aircraft was fitted with ACAS or TAS; this barrier was absent. The Typhoon crew were aware of their collision avoidance responsibilities and maintained awareness of the Tornado formation, eventually leading to a climb that prevented any risk of collision. However, due to the limitations of the barriers listed above for the Tornados, the busy crew had a late sighting leading to a descent to provide safe separation.

UKAB Secretariat

Each pilot had equal responsibility for avoiding collisions and for ensuring that their aircraft were not flown in such proximity to other aircraft as to create a danger of collision[1]. The aircraft were converging; the Tornados were to the right of the Typhoons, consequently the latter were required to give way to the Tornados[2]. Pilots obliged to keep out of the way of another aircraft should avoid passing over, under or in front of the other, unless passing well clear[3].

[1] Regulatory Article 2307(1), Rules of the Air, AMC: Avoidance of Collisions, paragraph 1.
[2] Regulatory Article 2307(1), Rules of the Air, AMC: Avoidance of Collisions, paragraph 12.
[3] Regulatory Article 2307(1), Rules of the Air, AMC: Avoidance of Collisions, paragraph 5.

Comments

HQ Air Command

Following a review of the available information, it appears that this incident resulted from a descent by the Typhoon formation without instruction or informing the Swanwick Mil controller of their intentions; the descent may have been initiated as a result of a misunderstanding of the 'own navigation' clearance when proceeding towards Coningsby. This factor may also be coupled with a lack of ability from the Tornado crew to assimilate the Traffic Information provided to them by Marham, resulting in later than expected visual acquisition of the conflicting traffic. Further investigation into this incident concluded that the lack of acknowledgement of Traffic Information from the Tornado crew was attributable to high cockpit workload, although degraded radio performance cannot be ruled out. Notwithstanding the factors leading up to this occurrence, the barrier of see–and-avoid was successful, and both formations became visual at a distance where appropriate action was taken to ensure safe separation.

A thorough unit Occurrence Safety Investigation was conducted into this incident and produced a number of recommendations including the reinforcement of aircrew training with regards to obligations when in receipt of ATSOCAS. Additionally, a Swanwick review has also recommended positive instruction to be issued when providing an 'own navigation' clearance with emphasis on maintenance of headings and level, or avoidance of specific areas.

Summary

The Airprox occurred in Class G airspace between 2 Typhoons whose pilots were in receipt of a Traffic Service from Swanwick Mil, and 2 Tornados (Voodoo) whose pilots were in receipt of a Traffic Service from Marham Zone. Marham provided early Traffic Information to the Tornado crews and continued to update the information, although it was not assimilated by them. Just prior to the CPA the pilot of Voodoo 1 called visual on a pair of Typhoons which were in confliction with Voodoo 2. The pilot of Voodoo 2 sighted the pair slightly high in the left 9 o'clock position and conducted a descent to increase separation. Swanwick Mil issued Traffic Information to the Typhoon crews, who had begun to descend without informing ATC, at a range of 4nm. The Typhoons reported visual contact and climbed above the traffic. None of the aircraft were equipped with ACAS/TAS. The minimum separation was recorded as 1400ft vertically and 0.1nm horizontally.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots and controllers concerned, area radar and RTF recordings and reports from the appropriate ATC and operating authorities.

The Board first discussed the actions of the Typhoon pilots and noted that they had been in receipt of a Traffic Service from Swanwick Mil. Having completed their task, they had reported level at FL130, steady on a heading to return to Coningsby. The controller had cleared them on their 'own navigation' direct to Coningsby Approximately one minute later, Traffic Information had been issued to the pilots about the Tornado formation 4nm away, 2000ft below. The Board noted that the controller had then realised that the Typhoons had started a descent without informing ATC. The Board acknowledged that this was contrary to the Traffic Service guidance stated in CAP774 (where pilots 'shall not' change level without first advising and obtaining a response from the controller) and agreed with the HQ Air Command comment that this may have been due to the fact that the Typhoon pilots might have misunderstood the 'own navigation' clearance. They noted that there had been other Airprox in the past where pilots had believed incorrectly that such a clearance allowed them to change level as well as horizontal direction without informing ATC. The Board were therefore heartened to be advised by the Military Air-Ops member that pilot obligations when in receipt of UK FIS ATS will be reinforced during aircrew training. They were also encouraged to hear that, additionally, a recommendation has been made by Swanwick Mil to ensure that controllers pass positive instructions when issuing 'own navigation' instructions with an emphasis on maintaining

headings, levels or avoidance of specific areas as deemed appropriate. The Board opined that had the Typhoons been reminded to maintain their level, the Airprox would likely not have occurred.

The Board noted that the Marham Zone controller had been providing a Traffic Service to the Tornados, that appropriate Traffic Information had been issued on two occasions before the CPA, but that the crews had not assimilated either call. The Military Air-Ops member commented that it was possible that the high cockpit workload at the time could have precluded them from hearing or assimilating the information, and that it was also possible that the RT receiver volume had also been turned down to avoid distraction during their task. Unfortunately, it had not been possible to determine conclusively the reason for the Tornado crews not assimilating the information, but the Board observed that the Marham Zone controller had attempted to reinforce his calls three times in the time available in order to try to make them aware of the presence of the Typhoons.

The Board then turned its attention to the cause of the Airprox. They noted that the Typhoon pilot had reported visual with the Tornados at a range of 4nm; however, instead of stopping descent or changing routeing away from the Tornados, the aircraft had continued on a conflicting course. The Typhoon pilot had only started to climb at a range of approximately 2nm from the Tornados, and had subsequently passed virtually overhead but by this time about 1400ft above them. For his part, the Tornado pilot had only sighted the Typhoons just prior to the CPA, and the Board opined that there may have been an element of startle-factor in his assessment. In the end, the Board agreed that the cause of the incident had been that the Typhoon pilot had flown close enough to cause the Tornado pilot concern. As for risk, the Board considered that the effective, albeit late, action taken by the Typhoon crews had prevented any risk of a collision; consequently, the Airprox was categorised as Risk C.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Typhoon pilot flew close enough to cause the Tornado pilot concern.

Degree of Risk: C.