AIRPROX REPORT No 2013070

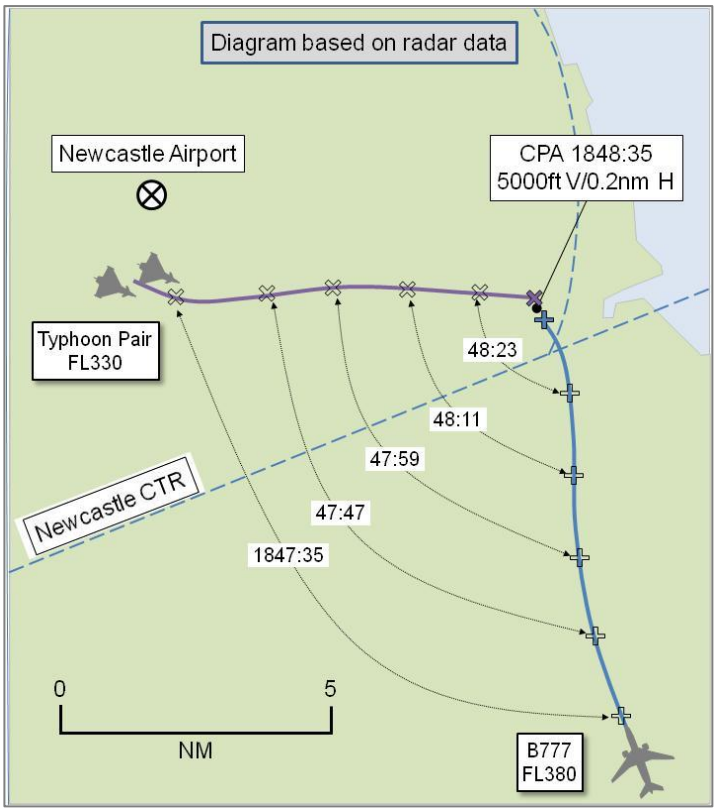
Date/Time: 9 Jul 2013 1845Z

Position: 5501N 00128W (8nm ESE NATEB)

Airspace: UAR UL602 (*Class*: C)

Reporter: PC Montrose Sector

	1st Ac	*2nd Ac*
Type:	B777	Typhoon FGR4
Operator:	CAT	HQ Air (Ops)
Alt/FL:	FL380	FL330
Weather:	VMC NK	VMC CLAC
Visibility:	N/R	10km
Reported Separation		
	Not seen	5000ft V/NK H
Recorded Separation:		
	5000ft V/0.2nm H	



CONTROLLER REPORTED

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE MONTROSE CONTROLLER reports working as Tactical (T) and Planner (P) on the band-boxed Montrose/Tyne/Humber Sectors. He was in the middle of a handover when he spotted two squawks (5111/5112) N of NATEB by 5nm at FL220, which were climbing and heading SE towards the B777. He had previously given the B777 a descent, when ready, to FL260 but as the military continued climbing and tracking head-on he cancelled the descent. The pilot advised he had already started descent but then advised he was maintaining FL380. The other controller took over as the P controller and telephoned the military to co-ordinate the traffic. As he was unsure if separation could be ensured he issued an avoiding turn to the right and then observed one of the military aircraft at FL330 and the other with no Mode C.

THE RELIEF MONTROSE CONTROLLER reports arriving at the Montrose sector to take over the band-boxed Montrose/Tyne/Humber Sectors as the T and P controller. During the handover both controllers observed a 5111 and 5112 squawk NW of NATEB climbing rapidly through FL230. The off-going controller had already cleared the B777 (maintaining FL380) to FL260. As the two military squawks passed FL260 he unplugged from the T controller side, plugged in on the P controller side and telephoned Boulmer MIL to request immediate co-ordination. The T controller wanted to give avoiding action but he advised him to keep the B777 on-route until the intentions of Boulmer MIL were known. He received traffic information (TI) that the squawks were climbing to maintain FL330 (he believed they were indicating RVN on radar). He observed the 5112 squawk passing FL340 before its SSR label disappeared. By this stage right-turn avoiding action had been given by the T controller and the B777 had been instructed to maintain FL380. He passed this information to Boulmer MIL and asked their intentions. On stating that they were turning to the E, the B777 was turned back towards the ScTMA. He decided to file the incident as an Airprox.

THE BOULMER WEAPONS CONTROLLER (WC1) reports he was controlling 2 Typhoons in Operational Training Area (OTA) E which called for return to base (RTB) at approx 18:44Z. The aircrew requested a climb to FL350 and a direct track to Coningsby. This was approved and the aircraft began to climb. The Allocator pointed out traffic in the Vale of York at FL380 that was going to

be a factor and so he decided to stop the climb of the Typhoons at FL330. This was agreed by the aircrew. He discussed with the SUP which sector would be controlling the traffic at FL380 and he subsequently attempted to telephone the Montrose sector, at approx 18:45Z, when the civil aircraft was approximately 45nm from the Typhoons. There was no response from the sector. However, the Typhoons were levelling at FL330 and the civil traffic was maintaining FL380 with no Mode S indications of a decent. At approx 18:46Z the Allocator transferred a call to him from the Montrose sector. The Montrose controller asked for TI about the Typhoons, which were now about 25nm from the civil aircraft. He subsequently asked him to avoid his traffic that was going to descend en-route. Accordingly, he issued a Radar Control turn to the Typhoons onto E in order to remain clear. Co-ordination was agreed with Montrose for the Typhoons to maintain FL330 and the civil traffic would not descend below FL350.

THE B777 PILOT reports inbound IFR to Glasgow Airport, squawking SSR code 3436, under control of Scottish Radar. Strobes and navigation lights were illuminated and SSR Modes S and C were selected. The flight-deck crew complement was three pilots. He was heading 310°, 498kt at FL350 (he thought) when radar instructed a right turn heading 100° (he thought). He was informed about a formation head-on at FL330. He did not see the traffic or receive a TCAS target on the display.

THE TYPHOON PILOTS report that all external lights and white HISLs were illuminated, the two aircraft were squawking Modes S and C, codes 5111/5112 respectively. They had completed a tactical training sortie in OTA E, during which time Hotspur (HR) had been providing a Traffic Service (TS). On completion, a recovery was initiated to RAF Coningsby, with Typhoon(1) initially heading 140°M and requesting a climb to FL350 at 1843:58. HR approved this request and a subsequent request, at 1844:28, for a right turn onto 155°M. Typhoon(2) was, initially, in approximately 2nm trail on Typhoon(1) but closed on it during the climb in order to achieve standard formation (inside 1nm). Due to being initially outside standard formation limits, Typhoon(2) continued to squawk M3/A+C during the climb. At 1844:48 HR instructed the Typhoon formation to stop climb at FL330, due to traffic at FL380. Typhoon(1) immediately gained radar contact on this traffic, 50.9nm away. At 1847:07 HR instructed Typhoon(1) to turn left onto 090°M. The Typhoon formation levelled at FL330 coincident with this transmission, with Typhoon (2) briefly ballooning to 33,250ft with 1013hPa set at 1847:12, before immediately correcting to FL330. At this time the civilian traffic was 16.2nm from Typhoon(1). During the level off Typhoon(2) closed inside standard formation parameters on Typhoon(1), deselecting M3/A+C and called “aboard” to Typhoon(1). Typhoon(1) then informed HR that the Typhoon flight were “standard formation” at 1847:18. HR then requested Typhoon(2) to descend to FL330 at 1847:25. Typhoon(1) replied that the Typhoon formation was in standard formation, level at FL330. At 1847:56 Typhoon(1) called steady 090°, level FL330, with no response from HR. At 1848:12 Typhoon(1), concerned at the lack of response from HR, requested a radio check. HR responded with an update on the civilian traffic. Typhoon(1) informed HR that the Typhoon formation was visual with the traffic (which had been tracked on radar throughout) and that the Typhoon formation was level at FL330. At this time the Typhoons were in the vicinity of the Newcastle airport overhead. At 1848:53 the Typhoon formation was cleared to route direct to RAF Coningsby, after requesting a right turn onto 155°M. This report was completed after reviewing the cockpit video recordings of both Typhoons.

The Typhoon pilots assessed the risk of collision as low.

Factual Background

The MATS Part 1[1] describes formations: ‘Formations are to be considered as a single unit for separation/deconfliction purposes provided that the formation remains within the parameters shown’. For Class C airspace these are 1nm laterally and longitudinally and at the same level.

The MATS Part 1[2] states that under a Radar Control Service: ‘If the intentions of Mode C transponding aircraft are not known, the minimum separation must be increased to 5000 feet.

[1] MATS Part 1, Section 1, Chapter 4, Page 8

[2] MATS Part 1, Section 1, Page 15

Unverified Mode C data may be used for separation purposes provided a minimum vertical separation of 5000 feet is maintained and radar returns, however presented, are not allowed to merge'.

The MATS Part 1[3] defines On-Route (ATS): **'**This term is used routinely by ATC for co-ordination purposes within the UK; aircraft are considered to be 'on-route (ATS)' when flying along the alignment and within 5 NM of the centre-line of published parameters of an Upper ATS Route (UAR) and other areas defined for the application of reduced co-ordination procedures'.

Analysis and Investigation

CAA ATSI

CAA ATSI reports that it had access to written reports from both pilots, the Montrose T an P controllers, area radar recordings, RTF recordings and transcripts of the Montrose Sector frequency, together with the unit investigation report.

At 1844:31 the B777 was 37.4nm SE of NATEB at FL380 (Figure 1). The Montrose controller instructed the B777 to descend when ready FL260.

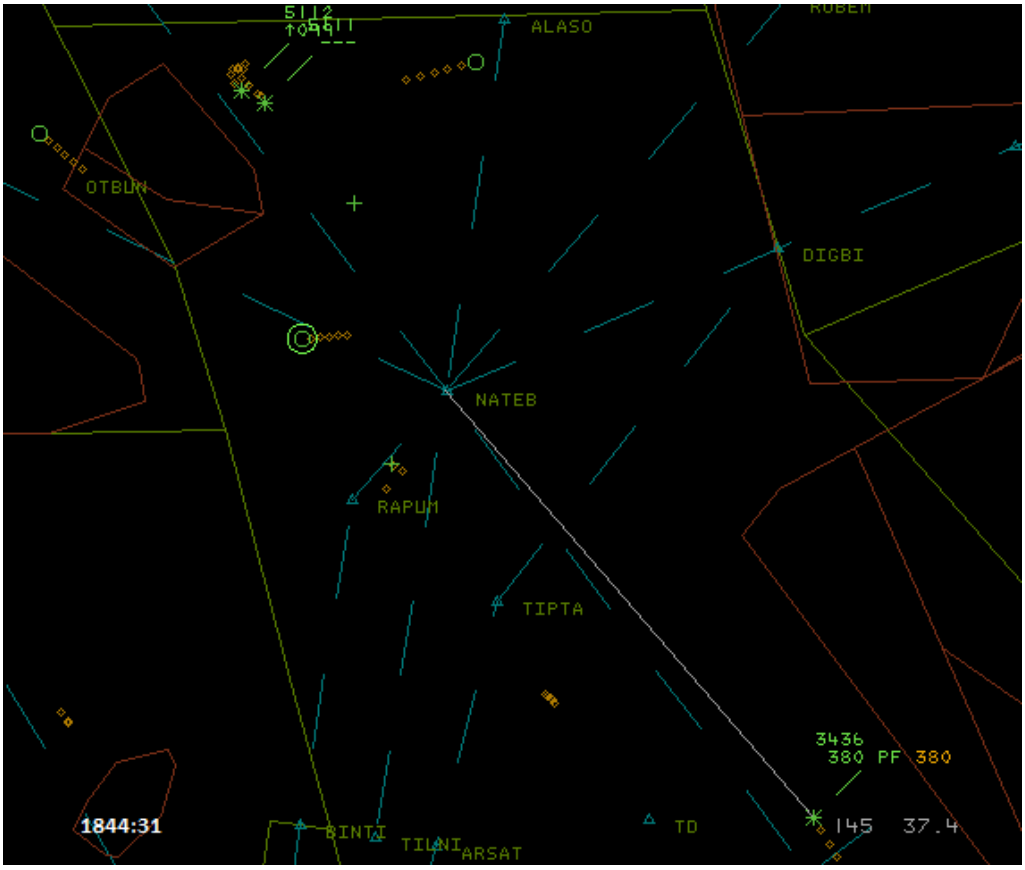


Figure 1

At 1845:58 the Montrose controller, having observed the 5111 and 5112 squawks climbing, cancelled the B777's descent (Figure 2), and instructed the crew to maintain FL380 (the Montrose controller was planning for 5000ft separation against the Typhoons). The B777 replied that they had just started descent. The Montrose controller instructed the B777 to maintain FL360 due to unidentified military traffic whereupon the B777 replied that they were maintaining FL380.

[3] MATS Part 1, Glossary, Page 10

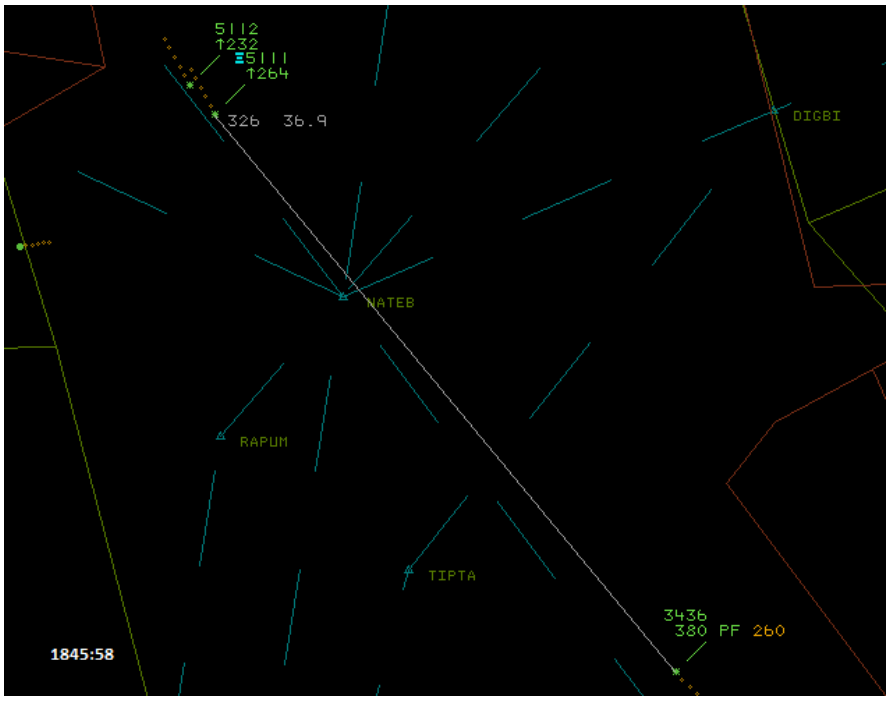


Figure 2.

At 1846:10 the P controller initiated a telephone call to RAF Boulmer for 'immediate coordination please 5111 5112 squawks radar controller please'. The P controller was instructed to 'standby for controller'. The Montrose T controller instructed the B777 to turn right 15° however, the P controller instructed the T controller to leave the B777 on route (General Air Traffic (GAT) on-route has priority over Operational or Defence Air Traffic and military controllers are required to avoid the GAT and co-ordinate conflicting traffic).

At 1846:50 RAF Boulmer spoke to the P controller who requested information on 5111 and 5112 squawks before instructing Boulmer that they needed to avoid their 3436 squawk immediately as they were descending FL260 on route.

At 1847:00, as the 5111 squawk was climbing through FL325, the T controller issued avoiding action to the B777, instructing the crew to turn right immediately heading 060° (Figure 3).

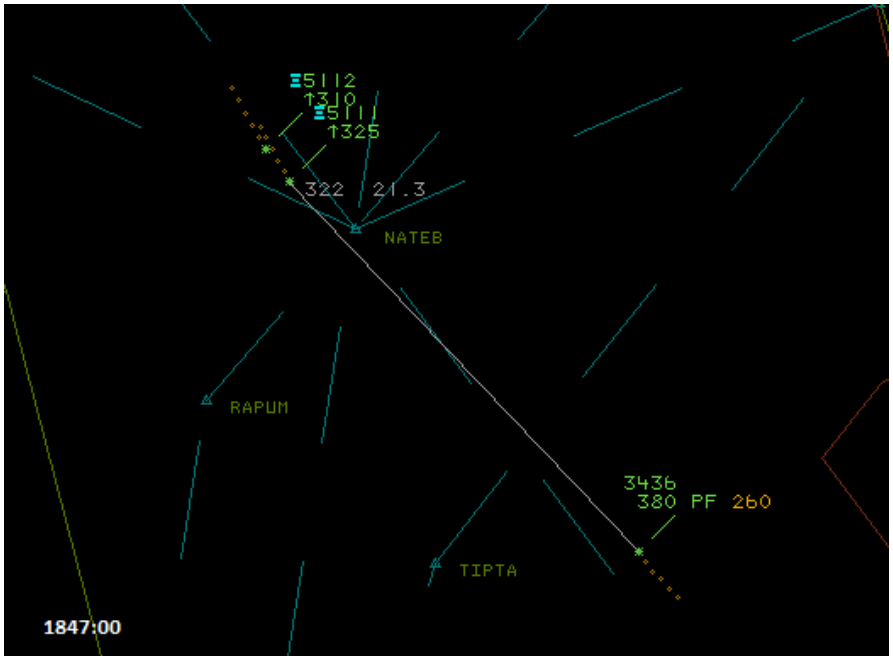


Figure 3.

The P controller advised the Boulmer controller that the B777 was turning right to avoid their traffic to which Boulmer replied that the 2 Typhoons were turning E (due to conflicting traffic to the W) and would stop the climb at FL330. The Planner controller replied that the 5112 squawk was indicating FL340 on his screen (although this is likely due to the predictive element of Multi Radar Tracking (MRT) and the high climb rate of the 5112 squawk (calculated to be in excess of 8,000fpm)). Assessment of the Mode C readout from individual radars indicated that the 5112 squawk did not climb above FL323 before the Mode C was switched-off as the Typhoon joined formation with the lead aircraft.

The Planner and Boulmer controllers established between them that the 2 Typhoons were stopping the climb at FL330 and the B777 was instructed to resume own navigation. The Planner controller queried why Boulmer were climbing traffic against the B777 descending into the Scottish TMA and Boulmer replied that they did not know the B777 was descending and had climbed to FL330. Boulmer military controllers are permitted to operate autonomously inside certain areas of controlled airspace providing that they either co-ordinate against civil aircraft or apply 5nm or 5000ft separation.

At the closest point of approach (CPA) the B777 and the two Typhoons were 0.2nm and 5000ft apart where 5nm or 2000ft was required (as the Typhoons had been co-ordinated). Separation was not lost.

Military ATM

The Typhoon Formation was climbing to FL330 en-route to RAF Coningsby, in receipt of a Radar Control Service (RCS) from WC1 at Hotspur CRC, RAF Boulmer. WC1 was a relatively inexperienced controller and assessed workload as 'high to medium' with moderate task complexity.

The incident sequence commenced at 1844:04 as the Typhoon's advised WC1 that they were "*complete, looking for climb FL3-5-0*". In reply, WC1 instructed them "*clear join and climb FL350…Radar Control above FL195*." At this point, the B777 was 63.1nm SE of the Typhoons, tracking NW'ly, at FL380 with a Mode S Selected Flight Level (SFL) of FL380; the Typhoons were tracking SE'ly in 1.6nm trail, indicating a climb through FL106 and FL95 respectively.

At 1844:30, the FA contacted WC1 and asked them "*seen the 3-4-3-6* [the B777] *yeah? Coming in at 3-8-0?*" WC1 replied, "*3-4-3-6? Yeah. I'll stop them* [the Typhoon Formation] *at 33, think they are going direct CGY anyway*." The FA seemed to agree with WC1's plan, replying "*yeah makes sense*." WC1 then advised the Typhoon Formation "*civilian traffic tracking north up the coast, stop climb FL 3-3-0*" which was acknowledged. At this point, 1844:42, the B777 was 56.6 nm SE of the Typhoon Formation, tracking NW'ly at FL380; the Typhoon Formation was tracking SE'ly in 1.8nm trail, indicating climbing through FL135 and FL108 respectively. At 1844:43, the B777's Mode S SFL changed to FL260.

The Hotspur CRC incident investigation determined that neither WC1, the FA, nor the Master Controller (MC) identified that the B777's Mode S SFL had changed and that all believed that the B777 was an over-flight of the UK. The ASACS UKASACS Command and Control System (UCCS) displays both Plot and Track information for aircraft that it detects. A Plot is the digital representation of the analogue radar response from primary and secondary sensors and can be displayed as a primary, secondary or a combined Plot. A Track is generated by the UCCS, based on the information fed into it from a combination of radars which need to be manually set by the operator. The Track is displayed 'on top of' the appropriate Plot. Track information is displayed in summary form next to a Track identifier. Generally a WC will display only the Track identifier and the aircraft callsign with the remainder of the Track information contained in the Track Tote in the Command and Control Display (CCD), located in the top right of the surveillance display. The Track Tote contains a large amount of information, including the aircraft flight plan, current SSR Mode C and Mode S SFL.

The radar Plot of the B777 had 2 Tracks associated with it. On reviewing the CRC's surveillance data for the incident, tracking responsibility for the B777 transferred to Hotspur CRC at 1820:26 as the aircraft entered the London Upper Information Region (UIR). At 1821:27 UCSS generated a 2nd 'pending' Track for the B777, 1nm NE of the original Track. At 1822:07, this 2nd 'pending' Track 'moved' to become super-imposed on the original Track but no significant information was displayed in this 2nd Track; this Track picture was maintained throughout the incident sequence. The 'pending' Track is displayed as orange on a dark grey background, whilst an 'active' Track is displayed as green on grey; controllers may then 'toggle' between the Tracks. The CRC's investigator determined that the colour scheme for 'active' Track symbology is distinguishable from the 'pending' Track symbology and has confirmed that Track information is visible on the 'lower' Track, through the 'upper' Track. The CRC investigator stated that this 'pending' Track should have been manually deleted by the CRC's Surveillance team but was not.

Dual Tracking is a known issue that occurs when the UCCS determines that there are 2 Plots in the same location, usually as a result of using surveillance sensors with over-lapping coverage where one of the contributing radars is not 'registered' correctly. In this instance, one of the sensors initially reported a Plot for the B777 in a slightly different location to the existing Plot and a separate Track was generated, appearing adjacent to the existing Track.

Between 1843:28 and 1844:39, the B777's Mode S SFL of FL380 'dropped out' and 're-appeared' on the Track on 4 occasions. UCCS detected and displayed the B777's Mode S SFL change to FL260 at 1844:43 but 'dropped out' at 1844:47. Between 1844:53 and 1846:50, the B777's Mode S SFL of FL260 'dropped out' and 're-appeared' on the Track on a further 8 occasions. It is believed that these problems were associated with the UCCS' dual tracking of the B777.

The CRC investigation assessed that 'co-ordinating a recovery of climbing aircraft is one of the busiest times in a WC's routine and [they] would not necessarily have the spare capacity to ensure that [they] had the correct track selected and would not be looking at [the Track Tote] overlooking at the radar display'. That said, even had WC1 selected the 'pending' Track, the 'active' Track information would still have been visible to them beneath the 'pending' track, if it had been displayed correctly by the UCCS. Flight plan information separate to the track information is selectable by the user in the UCCS and provides both a blue 'flight plan line' on the WC's surveillance display and textual information on the Tote; however, this option does not seem to have been utilised by WC1, the FA or the MC to determine the B777's routing.

At 1845:20, the MC initiated a conversation with the FA over unrelated GAT "just west of Leeming and climbing to 28 and that's going to conflict. That's going to be a bit close…33 it's going to be smack bang in the middle. That's 5000 ft both ways, no margin for error." The FA agreed that the unrelated GAT was going to conflict and replied "Okay, I he [sic] stops at 28, happy." The MC then advised "It looks like it's going up to 28 by the look of it and maintaining. I think a quick call to the civvies might help."

The FA then called WC1 suggesting that the developing situation "*might be worth a call to the civvies otherwise you will be sandwiched between the 2 and no-one knows what's going on*." The call ended at 1846:20 as WC1 advised the FA "*I'll call Montrose*." At this point, the B777 was 31.1nm SE of the Typhoon Formation, tracking NW'ly at FL380 with a Mode S SFL of FL260; the Typhoon Formation was tracking SE'ly in 2.2nm trail, climbing through FL288 and 266 respectively.

WC1 then attempted to contact Montrose; however, there was no response, possibly as a result of Montrose attempting to contact WC1, through the FA. At 1846:39, WC1 connected into a call from Montrose, transferred to them by the FA, and initially heard a voice at Montrose saying "*I know but you've got to because otherwise there's no co-ordination mate, you're en-route until further*." WC1 then identified their control position and Montrose replied "*Hi Hotspur, information please 5-1-1-1, 1-2 squawks*?" WC1 read back the squawks and a second voice on the Montrose

line stated "*you need to avoid our 3-4-3-6 immediately, we're descending FL 260 en-route*." As this was said, at 1846:59, the B777's Mode S SFL changed to FL360, then at 1847:03 to FL380, in response to Montrose's reported instruction to maintain FL380; the change to FL380 was detected and displayed by UCCS at 1847:04. In addition, at 1847:00 it becomes evident on the radar replay that the B777 had commenced a slow turn to the right.

WC1 immediately replied "*Descending 2-6-0? Hang on, left East*" and instructed the Typhoon Formation "[c/s] *Radar Control, turn left 0-9-0*" which was acknowledged. At this point, the B777 was 18.8 nm SE of the Typhoon Formation, tracking NW'ly at FL380 with a Mode S SFL of FL380; the Typhoon Formation was tracking SE'ly in 1.5 nm trail, indicating through FL331 and a climb through FL325 respectively. Co-incident with the Typhoon Formation's acknowledgement, the second voice at Montrose told WC1 "*we're going right on avoiding action, we're turning right*." The landline exchange continued until 1848:02 when vertical coordination was achieved between both parties, with 7.1nm lateral and 5000ft vertical separation still existing at that point. During that exchange, it transpired that the Montrose controllers had observed the SSR Mode C of the trailing Typhoon indicate FL340, before SSR information was lost as the trail Typhoon joined formation with their leader and the pilot set the transponder to stand-by.

Further analysis by CRC Hotspur determined that the trail Typhoon had not climbed above FL330. Analysis by NATS of the trail Typhoon's SSR Mode C data determined that the aircraft had exceeded the 8000fpm Rate of Climb (RoC) Regulation[4] from 1846:43, until SSR data was lost at 1847:05 as the pilot selected the transponder to standby. Moreover, the level information presented to the Montrose controllers by the NATS MRT system is predictive. Thus, when the trail Typhoon's SSR data was lost, MRT extrapolated the Typhoon's potential level based on the last known RoC and SSR Mode C data. Consequently, the Montrose controllers observed the trail Typhoon's level read-out indicate a climb above FL330. This is a known issue with MRT.

Following the Montrose controller's instruction to the B777 to maintain FL380, separation was maintained throughout the incident sequence. This occurrence has highlighted a number of known latent conditions within our ATM system; specifically, the display of predictive level information by NATS' MRT system, ergonomic issues with the representation of symbology on the UCCS display and a technical issue relating to dual-sensor tracking by the UCCS.

Comments

HQ Air Command

It appears that the Typhoon pair were in compliance with all ATC instructions and used their sensors to gain situational awareness of the B777 at considerable range. Other than the slight balloon through the cleared height, which was quickly corrected, there does not appear to be anything more that the miitary aircraft could have done.

Summary

The Airprox occurred in Class C airspace, whilst the B777 was routeing on UAR UL602. The aircraft involved were being provided respectively with a RCS by the Montrose Sector and RAF Boulmer. The Boulmer controller believed that the B777 was maintaining FL380 so instructed the Typhoons to climb to FL330 in order to provide 5000ft separation. The Montrose T controller instructed the B777 to maintain FL380, planning to provide 5000ft separation against the Typhoons. When the 5111 squawk was passing FL325 and co-ordination had not yet been effected, the Montrose T controller, unsure whether the Typhoons would stop the climb at FL330, gave the B777 avoiding action to the right in order to comply with the Rules of the Air. Boulmer turned their traffic to the E due to potential conflicting traffic to the W. The Montrose T and P controllers believed that the 5111 squawk had climbed through FL330 due to the predictive element of MRT. The Mode C displayed on their

[4] MMATM Chapter 12 Paragraphs 28-32.

situation displays briefly showed the 5111 squawk at FL339 although this was inaccurate. No loss of separation occurred.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of the aircraft involved, radar recordings, transcripts of the relevant RT frequencies, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

The Board first considered the actions of the Boulmer controller. The ASACS advisor confirmed that the Boulmer Weapons controller (WC) was aware of the presence of the B777; however, the WC was not aware of the aircraft's routeing or descent profile. The advisor briefed the Board that this was largely because of the mechanisation of the UCCS system and he gave the Board a brief description of the radar displays available to Boulmer WCs. The WC radar displays differ significantly from those provided to the civil controllers at the Prestwick Centre (PC) and this was a significant feature of this Airprox. On this occasion, the PC radar display showed the B777's data block, including callsign, level, Selected Flight Level (SFL) and destination (the last two letters of the airport's 4-letter code (*EG***PF**), alongside the aircraft's position. The WC display only showed Modes A and C alongside the aircraft. Additional information, including Mode S (SFL) was available, but only in a 'tote' displayed in the radar display's top right-hand corner. This has to be interrogated to obtain the information. Although this was a quick procedure, the WC did not interrogate the 'tote' in the period leading up to the incident. Consequently, he was not aware, from the SFL, that the B777 pilot had been cleared for descent. The advisor commented that the range shown on the radar display could have been extended to show the aircraft's intended track and destination. However, the WC believed that the B777 was on an overflying flight path and, therefore, would not be descending. A civil ATC area member, with experience of this airspace, commented that at the time of this Airprox (1845) it was unlikely that aircraft routeing NW to NATEB would be overflying i.e. it was outside the usual Oceanic operating times. The ASACS advisor commented that the WC was relatively inexperienced and would probably not have been aware of this information. He added that he was also occupied with another possible confliction in his operating area.

Turning to the Montrose controller, approximately 1½min after clearing the B777 pilot to descend to FL260, he observed the Typhoons climbing towards the B777. He instructed the B777 pilot to maintain FL380. Although the pilot initially reported descending, he then advised maintaining FL380. The civil ATC area member added that it was fortuitous that the B777 had not descended earlier. In his experience, once aircraft on this route were given descent it was usually carried out expeditiously in order to meet any ATC level restrictions.

Board members then considered the actions of the Typhoon pilots and, specifically, the rate of climb (ROC) of the trailing Typhoon as it was climbing towards the lead aircraft. In doing so, the trailing Typhoon pilot had exceeded the 8000fpm ROC limit, which was a contributory factor in influencing the Montrose controller's thinking. Although the trail Typhoon pilot had in fact not climbed above FL330, due to the prediction algorithms of the NATS Multi Role Tracking (MRT) system, the Montrose controller's radar display showed it passing FL340. As the MRT system is predictive; when the trailing Typhoon switched off Mode C (as it joined formation) with a high ROC, MRT extrapolated the last known ROC and SSR Mode C in order to generate a potential level which it calculated would be FL340.

Having been presented with two fast-jet aircraft climbing rapidly towards his aircraft with no knowledge of their intentions, it was apparent to the Board members why the Montrose controller had decided to file an Airprox. However, his action to instruct the B777 to maintain FL380, and the co-ordination carried out with Boulmer for the Typhoons to maintain FL330, ensured that they remained separated by at least 5000ft vertically. It was therefore considered that although the incident met the criteria for reporting, normal procedures, safety standards and parameters pertained and it was determined that it would be misleading to consider this an Airprox occurrence.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A perceived conflict by the Montrose Sector controller.

Degree of Risk: E.

Contributory Factors:

1. One of the Typhoons exceeded 8000fpm rate of climb in CAS.

2. The Boulmer Weapons Controller assumed that the B777 would remain in level flight.

3. The UCCS display mechanisation did not allow for display of destination and did not facilitate ready display of Mode S.

ERC Score[5]: 1

[5] Although the Event Risk Classification (ERC) trial had been formally terminated for future development at the time of the Board, for data continuity and consistency purposes, Director UKAB and the UKAB Secretariat provided a shadow assessment of ERC.

ANNEX A

UKAB 2013/070: CAA ATSI Report

1 Background

1.1 An AIRPROX was reported by the Prestwick Centre Montrose Sector controller when 2 military squawks (2 Typhoons) were observed to be climbing rapidly in confliction with a Boeing 777 (B777) at FL380 in the vicinity of NATEB.

1.2 The B777 was operating IFR inbound to Glasgow, squawking 3436, and was in receipt of a Radar Control Service from Scottish Control (Montrose) on frequency 126.925MHz.

1.3 The Typhoons were returning to Conningsby, squawking 5111 and 5112 and were in receipt of a Radar Control Service from RAF Boulmer.

1.4 CAA ATSI had access to written reports from both pilots, the Montrose Tactical (Montrose) and Planner (Planner) controllers, area radar recordings, RTF recordings and transcripts of the Montrose Sector frequency, together with the unit investigation report.

2 Factual History

2.1 At 1844:31 UTC the B777 was 37.4 nautical miles (NM) southeast of NATEB at FL380 (Figure 1). The Montrose controller instructed the B777 to descend when ready FL260.

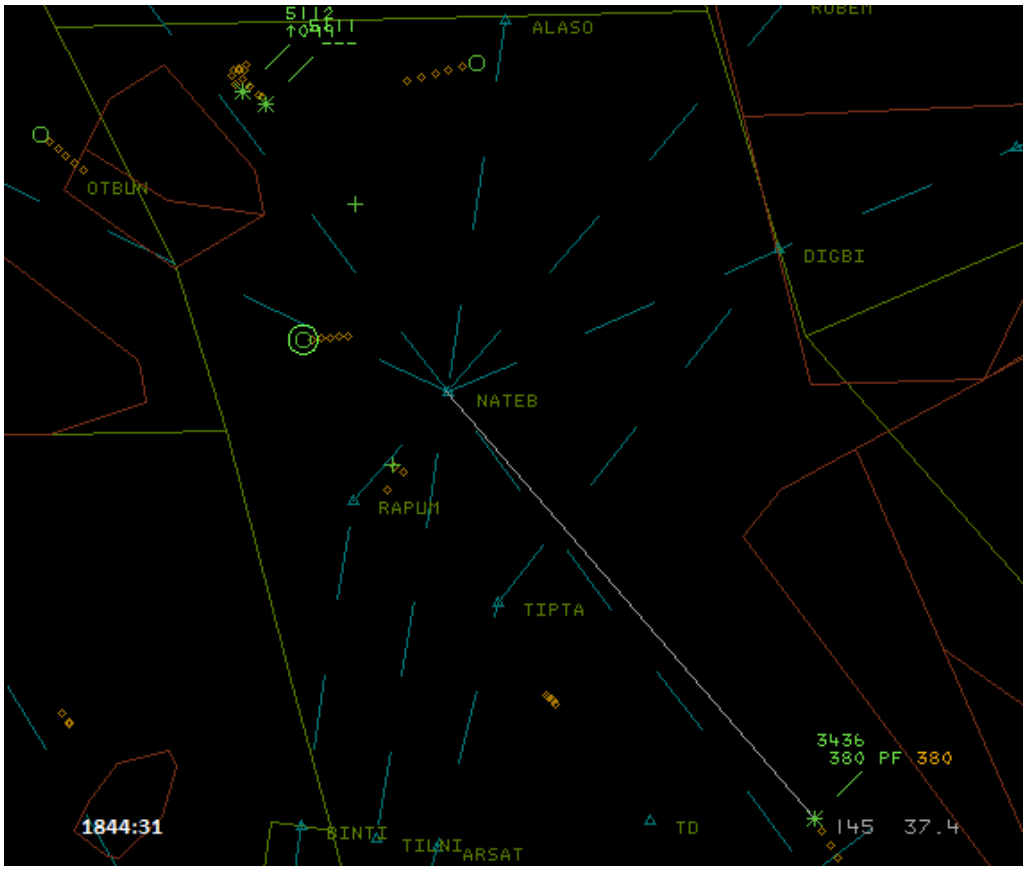


Figure 1

2.2 At 1845:58 the Montrose controller, having observed the 5111 and 5112 squawks climbing, cancelled the B777's descent (Figure 2), and instructed the crew to maintain FL380 (the Montrose controller was planning for 5000ft separation against the Typhoons). The B777 replied that they had just started descent. The Montrose controller instructed the B777 to maintain FL360 due to unidentified military traffic whereupon the B777 replied that they were maintaining FL380.

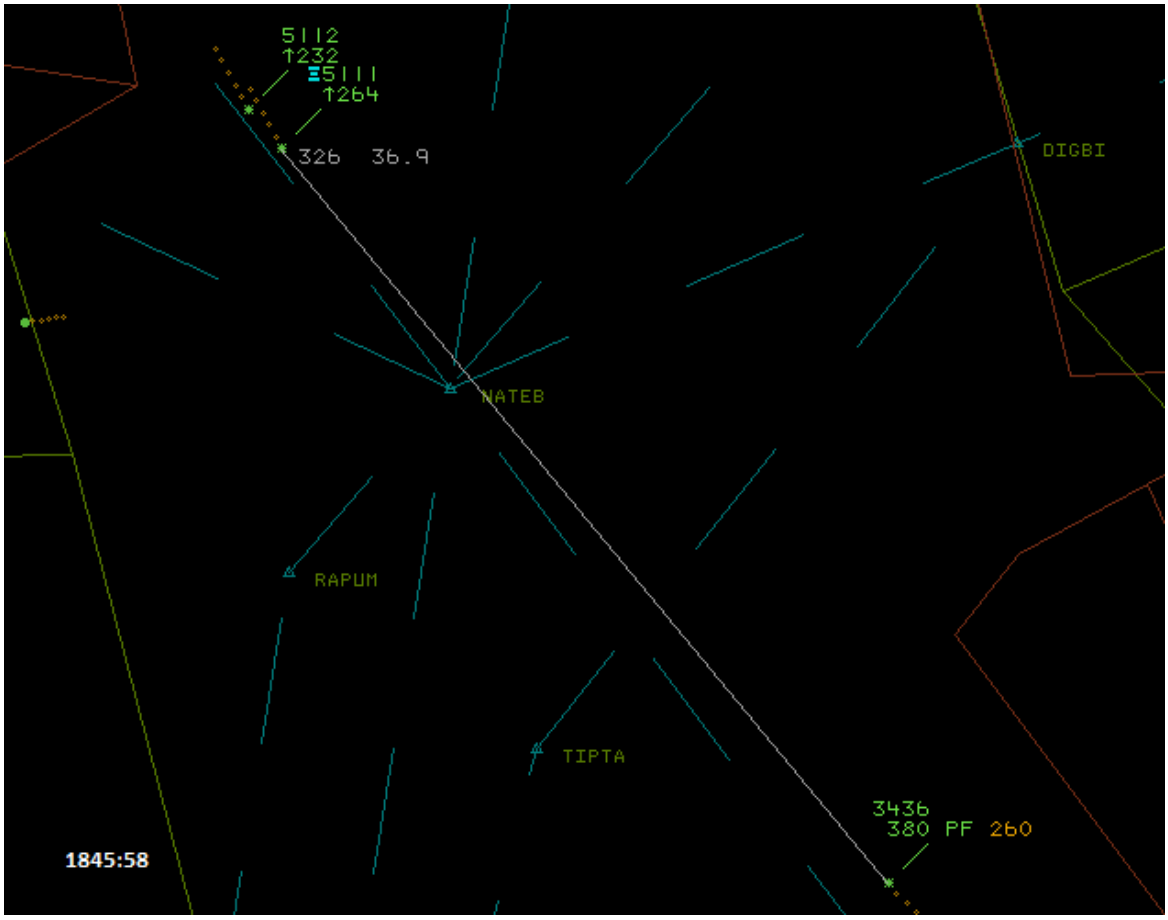


Figure 2.

2.3 At 1846:10 the Planner initiated a telephone call to RAF Boulmer for 'immediate coordination please 5111 5112 squawks radar controller please'. The Planner was instructed to 'standby for controller'.

2.4 The Montrose controller instructed the B777 to turn right 15 degrees however the Planner instructed the Montrose controller to leave the B777 on route (General Air Traffic on route has priority over Operational or Defense Air Traffic and military controllers are required to avoid the GAT and co-ordinate conflicting traffic).

2.5 At 1846:50 RAF Boulmer spoke to the Planner who requested information on 5111 and 5112 squawks before instructing Boulmer that they needed to avoid their 3436 squawk immediately as they were descending FL260 on route.

2.6 At 1847:00, as the 5111 squawk was climbing through FL325, the Montrose controller issued avoiding action to the B777, instructing the crew to turn right immediately heading 060 degrees (Figure 3).

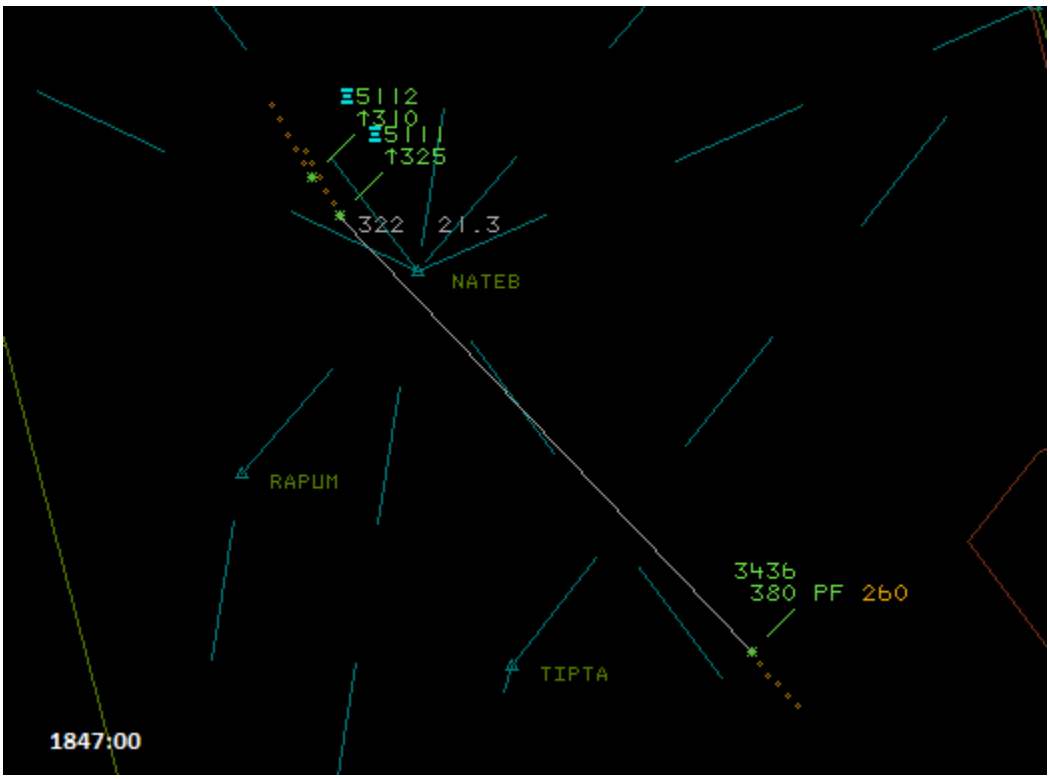


Figure 3.

2.7 The Planner advised the Boulmer controller that the B777 was turning right to avoid their traffic to which Boulmer replied that the 2 Typhoons were turning east (due to conflicting traffic to the west) and would stop the climb at FL330. The Planner replied that the 5112 squawk was indicating FL340 on his screen (although this is likely due to the predictive element of Multi Radar Tracking (MRT) and the high climb rate of the 5112 squawk (calculated to be in excess of 8,000fpm)). Assessment of the Mode C readout from individual radars indicated that the 5112 squawk did not climb above FL323 before the Mode C was switched-off as the Typhoon formatted with the lead aircraft.

2.8 The Planner and Boulmer controller established between them that the 2 Typhoons were stopping the climb at FL330 and the B777 was instructed to resume own navigation. The Planner queried why Boulmer were climbing traffic against the B777 descending into the Scottish TMA and Boulmer replied that they did not know the B777 was descending and had climbed to FL330. Boulmer military controllers are permitted to operate autonomously inside certain areas of controlled airspace providing that they either coordinate against civil aircraft or apply 5NM or 5000ft separation.

2.9 At the CPA the B777 and the two Typhoons were 0.2NM and 5000ft apart where 5NM or 2000ft was required (as the Typhoons had been co-ordinated). Separation was not lost.

2.10 The report from the captain of the B777 stated that they were told by radar of a military formation at FL330 but they did not see the traffic and no TCAS target was displayed.

2.11 The report from the Typhoons stated that although the 5112 squawk briefly climbed to 33,250ft on 1013 hPa, both aircraft were level at FL330 when 16.2NM away from the B777. The transponder on the 5112 squawk was switched off when the aircraft was in standard formation with the 5111 squawk.

2.12 RAF Boulmer reported that the Mode S indication of the B777, which was available to the Boulmer controller, but on a separate part of the screen, was only intermittently displayed. The Boulmer controller reported that they had instructed their Assistant to telephone Prestwick Centre to coordinate the Typhoons however the call had not been answered. Information that the B777 was likely to descend into the Scottish TMA was also available by calling up a flight plan, however, the unit report stated that the controller would not necessarily have the spare capacity to select it while coordinating a recovery of climbing aircraft.

3. Analysis

3.1 The RAF Boulmer controller believed that the B777 was maintaining FL380 so instructed the Typhoons to climb to FL330 in order to provide 5000ft separation.

3.2 The Montrose controller instructed the B777 to maintain FL380, planning to provide 5000ft separation against the Typhoons. When the 5111 squawk was passing FL325 and co-ordination had not yet been effected, the Montrose controller, unsure whether the Typhoons would stop the climb at FL330, gave the B777 avoiding action to the right in order to comply with the Rules of the Air. Boulmer turned their traffic to the east due to potential conflicting traffic to the west.

3.3 The Montrose controller and Planner believed that the 5111 squawk had climbed through FL330 due to the predictive element of MRT. the Mode C displayed on their situation displays briefly showed the 5111 squawk at FL339 although this was inaccurate.

4. Conclusion

4.1 An AIRPROX was reported when the Montrose controller, working a B777 that had been given descent to FL260, became concerned about a potential confliction with two uncoordinated Typhoons working RAF Boulmer. The Typhoons had been given climb to FL330 by RAF Boulmer to give 5000ft separation against the B777, which had been maintaining FL380. The Boulmer controller was unaware that the B777 had been given descent. No loss of separation occurred.