

AIRPROX REPORT No 2014054

Date/Time: 7 Apr 2014 0915Z

Position: 5434N 00102W
(6nm NW RIKUD)

Airspace: UAR UL602 (Class: C)
Scottish UIR

Reporter: PC Montrose Sector

Aircraft 1 Aircraft 2

Type: B737 F15x3

Operator: CAT Foreign Mil

Alt/FL: FL330 descending FL370

Conditions: IMC NK

Visibility: NK NK

Reported Separation:

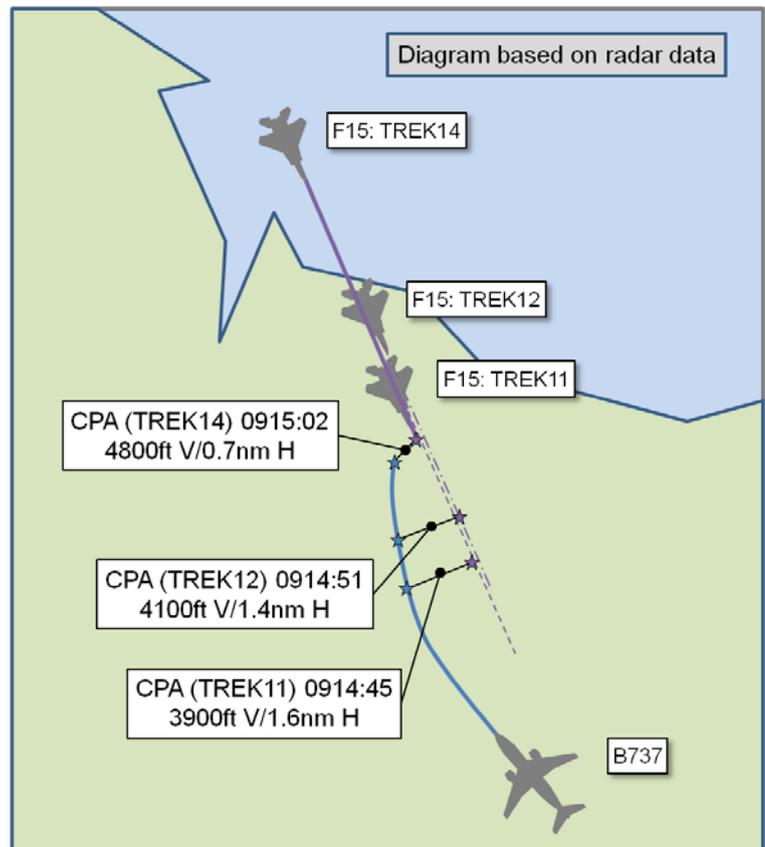
 NK NK

Recorded Separation:

TREK 11 3900ft V/1.6nm H

TREK 12 4100ft V/1.4nm H

TREK 14 4800ft¹ V/0.7nm



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE B737 PILOT reports that he was under IFR/IMC, in communication with Scottish Control. Navigation and strobe lights were illuminated. Whilst on his flight plan route, ATC gave him "heading 315° and descent to FL320". After he started descending he was re-cleared to FL280 with a high rate of descent. He was then issued with Traffic Information about military traffic in his 11 o'clock at 10nm. He was instructed to turn right 90° and to set transponder code 7700. When clear of the military traffic, ATC informed him he was about to enter a Danger Area. He was then re-cleared to OTBUN with a change of code to 3240. All the instructions given by ATC were complied with. In his opinion, considering the 5nm turn radius of an aircraft flying at M0.78, ATC should have been more pro-active in taking action to achieve separation. He did not receive a TCAS RA during the event.

He assessed the risk of collision as Low-Medium.

THE F15 FLIGHT LEAD PILOT (TREK 11) reports that there was no hand-off from BLACKDOG [the RAF Scampton Air Combat Weapons Controller] to London Mil but, instead, BLACKDOG handed him off to BLACKDOG Fighter Marshaller (FM). The last communication that he received was: "[Danger areas] 323 A/B/C active, avoid." After that, they desperately tried to contact either BLACKDOG FM, BLACKDOG Weapons Controller on the previous frequency, or Swanwick Mil on the 'frequencies that normally work' but without success. There was also a lot of communication blocking out Guard frequency. They avoided '323 A/B/C/D/E/F', and proceeded down the Vale of York, but were not in communication with anybody due to BLACKDOG's radio failure and communications on Guard being blocked from 'Android Preference' (with multiple "Security" calls on 243.0MHz). Finally, south of the Vale of York, 'London Mil' contacted them on Guard (243.0MHz) with a new frequency for BLACKDOG. The BLACKDOG controller then controlled them to RAF Lakenheath's airspace. He reported that he telephoned the BLACKDOG supervisor the afternoon after the Airprox had occurred and was told that the FM's radio had failed before they were handed off. With reference to a reported

¹ Ascertained from Trek 14's Head-up Display recording.

loss of SSR output from Trek 14 (squawking 6547), he stated that, from his point of view, there was very little reason for a member of Trek Flight to deselect Mode 3C, especially under a Radar service while flying in adverse weather; he opined that loss of Mode 3C display could have been due to a multitude of factors outside the aircrews' control and that F-15Es normally fly within visual formation when transiting through weather, or maintain a radar lock in a stream formation at the same altitude.

THE PRESTWICK CENTRE (PC) MONTROSE SECTOR TACTICAL/PLANNER CONTROLLER TRAINEE reports that traffic levels were quiet. Swanwick Mil P02 called at approximately 0907 to coordinate 2 tracks on F15s reported as 'PNTHR 21 & TREK 31' against his aircraft, a FL340 overflight. [UKAB note: there was a significant confusion surrounding this Airprox due to transposition of callsign numerals; all references to TREK 31 were actually TREK 13]. The military controller was obviously busy with interruptions from aircraft, and at one stage could be heard asking for help. Coordination was agreed against a K35R aircraft at FL340 and he also pointed out the B737 at FL360. After several attempts, he was satisfied that coordination had been agreed. Due to the length of that phone call, he called for a Planner at this stage and advised the Planner that the priority was to confirm that coordination for TREK 31 against the K35R at FL340 was going to be achieved because TREK 31 was still indicating FL340 and appeared to be climbing. Concerned that the coordination was not possible, he instructed the K35R pilot to turn toward TALLA (TLA) early to ensure lateral separation. At this time, via the Planner's telephone calls, he understood that there were 3 military squawks at FL370 tracking south, east of NATEB, that were not in communication with any agency [UKAB note: this was TREK 11, 12 & 14 flight, the subjects of the Airprox]. He then instructed the B737 pilot to descend to FL320 to attempt to achieve 5000' separation on this traffic and informed him of the traffic. He then realised that the pilot of TREK 31 had now turned head-on to the B737 at FL310 (non-RVSM²) so he gave avoiding action to the B737's pilot to turn right to avoid TREK 31 and passed more Traffic Information [UKAB note: TREK 31 (actually TREK 13) was recovering separately behind TREK 11, 12 & 14 flight and was not directly involved in the actual Airprox]. This turn was toward the active Danger Area D323A which was quiet at the time. As the B737 was going to penetrate the Danger Area he instructed the pilot to squawk 7700 (emergency squawk) to attract the attention of all other radar agencies. In anticipation of further un-coordinated military traffic approaching the area, he instructed the B737's pilot to descend to FL280 and expedited other traffic outbound from the TMA to clear this traffic.

THE MONTROSE SECTOR TACTICAL/PLANNER CONTROLLER MENTOR reports that the incident was a very difficult situation to monitor and it was not possible to give an adequate handover to the oncoming Planner. At one stage he reported that he was unaware why his trainee was trying to achieve 5000ft separation; the trainee had overheard the Planner say that the tracks at FL370 were not in communication (but had not explicitly been informed).

THE MONTROSE SECTOR PLANNER CONTROLLER reports that after being relieved from the Tay Sector Planner position he was requested by the Montrose Sector to assist with coordination against multiple military contacts tracking south, head-on toward several of their aircraft. He was asked by the On the Job Instructor (OJTI) to confirm previously agreed coordination because the military aircraft involved was not doing what was agreed. Before he had the chance to do that, he received a call about 2 squawks (6507 & 6547) which were non-RVSM at FL370 and had lost communication with the military. These were opposite direction to the B737 at FL360 so he advised the military controller that they would be taking avoiding action and immediately informed the Tactical controller of the situation. Further telephone calls only added confusion to the situation and, as the B737 pilot took the avoiding action instruction, he tried to speak to Swanwick Mil regarding 3-4 other tracks that were in conflict with their aircraft. The B737 pilot was given a right turn which took it toward and then into D323A and the controller advised the pilot to select A7700 as other military aircraft were manoeuvring in the area. After several attempts to contact Swanwick Controller 2 (P02 Tac Swanwick Mil), with the calls either ringing out or disconnecting, he telephoned the P02 Tac and

² Reduced Vertical Separation Minima (RVSM) approval allows aircraft to fly with a vertical separation reduced from 2000ft to 1000ft between FL290 and FL410 inclusive. Formations are to be considered non-RVSM compliant irrespective of the RVSM status of the individual aircraft types.

advised that he could not get through to coordinate. The P02 Tac controller transferred him and he eventually managed to coordinate the last of the military aircraft against the descending B737 and another aircraft west of the NATEB area. It is unclear how many times standard separation was lost with the Military contacts and the B737.

SWANWICK MILITARY TAC 2 CONTROLLER reports that when she took over Console 2 as Tac the level of traffic was adequate for her level of currency (which had never exceeded more than 3, occasionally 4 aircraft, most of which were standard civil transits). Both the Planner and herself were predominantly Distress & Diversion (D&D) Controllers who were only used to controlling very low intensity aircraft levels; her Planner had only 5 days currency in the previous calendar month, with only low-to-medium intensity sessions. Just before the incident occurred, the Planner took a hand-over on TPKNT 11 from Lossiemouth on frequency 233.325MHz for a Traffic Service transit to the West Coast. While she was identifying the aircraft, the Planner answered the landline to BLACKDOG and asked if she was also happy to take PNTHR 21 Flight who were exiting the '613 Complex' to the South. She was happy to accept these aircraft, even though it was a large geographical split. The Planner then pointed out a further handover of 2 more speaking units, 1 Pair and 1 Single Unit. At this stage she felt that she was at her controlling capacity; the Primary Planner and Supervisor were informed, who then told her to put her 'STOP' light on. Throughout this, her Planner was accepting a further hand-over from BLACKDOG. None of the aircraft had been pre-noted; therefore, the planner had to accept them as handovers and was responsible for generating new EDDUS (electronic flight strips) lines. After she placed PNTHR 21 Flight under a Radar Control Service (RCS), she noticed that there was conflicting civil north-bound traffic. She called Montrose South to coordinate against 1 aircraft [the K35R], and he co-ordinated a second aircraft [the B737]. Whilst on the landline coordinating, aircraft were still calling on frequency, and the Planner was highlighting the traffic on which she was receiving handovers. At this point, TREK 31 had been handed over from BLACKDOG but the call-sign was actually TREK 13, which resulted in confusion on the frequency and extra workload for the Planner trying to amend EDDUS. Immediately afterwards TREK 11 formation called her frequency, but she was unsure who these aircraft were, whether they had been handed over simultaneously with the other multiple south bound tracks, or if they were free-calling. After quick liaison with her Planner (who confirmed they had not been handed over), she told the Supervisor that she needed help. At this point she felt overloaded and very confused. Her Planner pointed out a conflicting Civil north-bound aircraft and suggested she descended PNTHR 21. She asked the pilot of PNTHR 21 to descend to FL 300 and to turn right heading 210°. The pilot did not respond, and the conflicting civil aircraft then started to descend further. She told PNTHR 21's pilot to turn right immediately 210° but there was still no response. She then noticed the civil aircraft taking an avoiding action turn which took him inside an active Danger Area. She was unsure about the exact time-line of events as everything appeared to happen extremely quickly. She felt very uncomfortable on Console and did not think that her Planner or herself had adequate currency to deal with the traffic levels.

She considered the Perceived Severity as 'High'.

THE SWANWICK MILITARY TAC 2 PLANNER CONTROLLER reports that at the start of her shift she was asked to take the Planner position for Tac 2. At the time there was one transit track, and then she received a pre-note on TOPNOT 11 out of Lossiemouth for the West Coast. The pilot called up as she answered a landline call from BLACKDOG. Initially the assistant said he had a pre-note but then asked if she could take them as a handover. She checked with the Primary Planner that he was aware of the call, and the Tac that that she was happy to take a handover. She then took a handover on PNTHR 21 Flight, 2 F15s, NE of Newcastle airport by approximately 10nm tracking south-bound. The BLACKDOG controller stated that he had further handovers and she transferred him back to the Primary Planner but received the line back again. The BLACKDOG controller stated that the handover was on TREK 31; there was some confusion at BLACKDOG, and he amended it to a handover on BREW 32, but then again changed it back to TREK 31. During these handovers she pointed out the tracks to the Tac, and she acknowledged the handover. She was also aware that the Tac was on a land-line carrying out some form of coordination. Due to the fact that she spent the majority of her shifts in D&D, her EDDUS work was slower than normal and this did not allow her to assist the Tac as much as she otherwise could have done had she been able to carry it out quicker.

She received a further handover on WILD 51, again pointing out the aircraft to the Tac, and then came off the land-line. The pilots started to call on frequency, including TREK 11 Flight at FL 370; the Tac asked her who and where they were; however, she had not received any information from BLACKDOG on these aircraft. There was also a mix-up with TREK 31/13 call-sign on the frequency that led to more confusion. She tried to change the call-sign on EDDUS to assist the Tac but the system would not allow her to do so. To aid the Tac she telephoned the NE sector to handover PNTHR 21, and he suggested a descent to FL300 to avoid civil traffic. She immediately came off the land-line and pointed out the traffic to the Tac and suggested a descent. The Tac then issued a turn and descent to the pilot. The Supervisor was also assisting the Tac at this time. In her previous shifts in North for currency, the traffic levels had been low-to-medium, and she was not used to these high traffic levels at such short notice; however, she felt pressured into accepting the traffic.

She considered the Perceived Severity as 'High'.

THE SWANWICK MILITARY TRAINEE SUPERVISOR reports that she was supervising at the time of the incident and was being examined. She was aware of the F15 traffic in the 613s, and a Tac and Planner were manned ready to take the traffic. BLACKDOG telephoned with a non-pre-noted handover, and the call was transferred from the Primary Planner to Planner 2 to take the handover. With the lack of experience/currency of Planner 2, the EDDUS lines did take slightly longer than expected but the track was handled with relative ease. This then quickly led to a further three non-pre-noted tracks in the UIR from BLACKDOG, causing the controller to reach capacity. The 'STOP' light was applied and one track (TPKNT 11) was allocated onto another console. She received a call from the BLACKDOG FM informing her of three high-level tracks that had left the 613s without speaking to them and were continuing to route back to Lakenheath; BLACKDOG had transmitted to them on Guard several times with no response. She passed this information onto the civil controller emphasising that these aircraft were 'NOT' under their control and they would have to take action to achieve the required separation. With all the confusion, she had not realised that the aircraft had free-called on Tac 2's frequency; therefore adding to her already high workload. It was difficult to step in and aid the controller as she was working hard coordinating with the Montrose South sector. Once coordination had been agreed she issued avoiding action to PNTHR 21 to achieve the required 5nm separation (requested by Montrose South). The pilot did not respond, and the civil controller took evasive action into the 323s, squawking emergency. Once separation was achieved and the controller had dealt with a couple of tracks, she then spoke to the free-calling tracks and sent them straight to North East.

THE SWANWICK SUPERVISOR EXAMINER reports that he was examining the Supervisor from 0700. She had received multiple inputs and requests from individuals who required currency. She correctly identified that there was the potential to have multiple tracks south-bound from the D613 complex returning to Lakenheath. As the time-frame was unknown she made the decision to not only put a Tac controller in place but also to increase the capacity of the console by putting a Planner in position at the same time. At the time, this was the only console open, and had frequency coverage for the whole of the AOR. A single track had been allocated to them to go low-level on the west coast before any information was received about the MDA traffic being complete. From a position a few steps back from the controllers, he was aware that the Primary Planner had transferred the land-line call from BLACKDOG to the Planner on Console 2, a standard practice. As she took multiple handovers on the console from aircraft returning to base from D613, the Tac asked not to receive any more traffic. She was then asked to put her 'STOP' light on, highlighting this to the Primary Planner. The Supervisor then instructed a Tac controller to open Console 4, and immediately asked Console 2 to off-load the west-bound track to that console. The initial stages of the handover were completed quickly; however, the Supervisor had to step in and prompt Planner 2 to transmit on frequency to transfer the aircraft; this was due to Tac 2 working hard on a different frequency. The Supervisor was also simultaneously dealing with a call from BLACKDOG about 3 aircraft being out of communication, and was asked to pass a message to the civil controller. The Examiner remained behind the controllers on Console 2, and observed the Tac coordinate 2 of her tracks with 2 north-bound civil tracks around RIKUD. He was happy that a course of action had been agreed, and that it relied on both pilots maintaining their headings initially. As both tracks were in the UIR and under a Radar Control Service he did not feel that there was any need for the Tac 2 to do anything more to allow this

coordination to stand. Traffic Information could have been passed to the aircraft, and the pilots reminded to maintain heading but, due to the high workload this was not possible. This allowed the Tac 2 controller to begin talking to the pilots of the other aircraft behind (BREW 32, WILD 51), getting them identified, and beginning to plan for them. There was also a delay in allocating the tracks to the next sector, which he had to lean over and ask Planner 2 to do. By this time the aircraft were already heading into NE airspace without them having received any data line. He then became aware that PNTHR 21 Flight had taken a left-hand turn down UAR UL602 and was now head-to-head with the civil aircraft it was coordinated against. He twice heard the Tac 2 give headings to turn the aircraft away, although avoiding action was never mentioned. She did the same with a second pair, and he offered a suggestion to turn the 3rd formation (he believed BREW 51) left to parallel the D323 complex and stay to the east of the UAR. He changed this decision with the Tac after noticing that the pilot of the civil aircraft began taking avoiding action, and Tac 2 left BREW 51 Flight on their initial heading to cross the UAR. All of the F15 tracks (including the 3 that at the time they did not think that they had communication with) made heading adjustments in the UIR without this being approved by the controller. The controller's capacity had been taken up not due to the specific tasks, but due both to a mistake while inputting the call-sign for TREK 13 (TREK 31) and TREK 11 Flight free-calling on the frequency.

Factual Background

The UK AIP³ states the requirements for operating in Class C airspace:

- 'Flight plan required.
- Separation is provided between all IFR flights and IFR/VFR flights.
- An ATC clearance required.
- Radio communication required.
- ATC instructions are mandatory.'

CAP 493 The Manual of Air Traffic Services (MATS) Part 1⁴ states:

'In Class C airspace if radar derived, or other information, indicates that an aircraft is making an unauthorised penetration of the airspace, is lost, or has experienced radio failure; IFR flights shall be given avoiding action and traffic information shall be passed.'

For aircraft under a RCS, if the intentions of Mode C transponding aircraft are not known, the minimum vertical separation must be increased to 5000ft. (Lateral separation 5nm). Unverified Mode C data may be used for separation purposes provided a minimum vertical separation of 5000ft is maintained and radar returns, however presented, are not allowed to merge.

Analysis and Investigation

CAA ATSI

ATSI had access to reports from the PC Montrose Planner and Tactical controllers, area radar recordings, a transcription of the Montrose frequency and a copy of the unit report from the ATSU. ATSI also interviewed the Montrose Planner and Tactical controllers. Controller training was in progress on the Montrose sector with a trainee who was valid on other sectors. A large scale military exercise was in progress at the time of the incident.

The blue symbol  attached to an aircraft label in the screenshots indicates aircraft that are not RVSM approved.

³ ENR 1.4, Paragraph 2.3.

⁴ Section 1, Chapter 6, Page 20.

The On the Job Training Instructor (OJTI) and the trainee on the Montrose Sector were operating without a Planner. At 0908:17 a telephone call was received on the Montrose sector from Swanwick Military to co-ordinate military traffic 45nm ENE of NATEB, tracking SW not above FL310 (PNTHR 21 as labelled MIL1 on the display), against a Boeing KC-135R (K35R) working Montrose maintaining FL340. Another military track was co-ordinated with the military controller stating that the military track would take 5nm and be not above FL320, with TREK 31 [actually TREK 13 but communication thereafter continued to refer to the aircraft as TREK 31.] The Montrose controller brought the military controller's attention to the B737, routing towards NATEB, level at FL360 but needing to descend to FL260 to be level by NATEB. It was agreed that both PNTHR 21 and TREK 31 would turn right to pass 5nm ahead of the B737. The protracted telephone call ended at 0911:08 (2mins 51secs).

Figure 1 (0911:08) shows the F15s tracking SSW at FL370 with squawks indicating they were receiving a service from RAF Scampton, although the middle aircraft of the F15 formation subsequently changed squawk to 2622 (this should have been 4622 but the pilot was given the wrong squawk in error by the Swanwick Tac 2 controller).

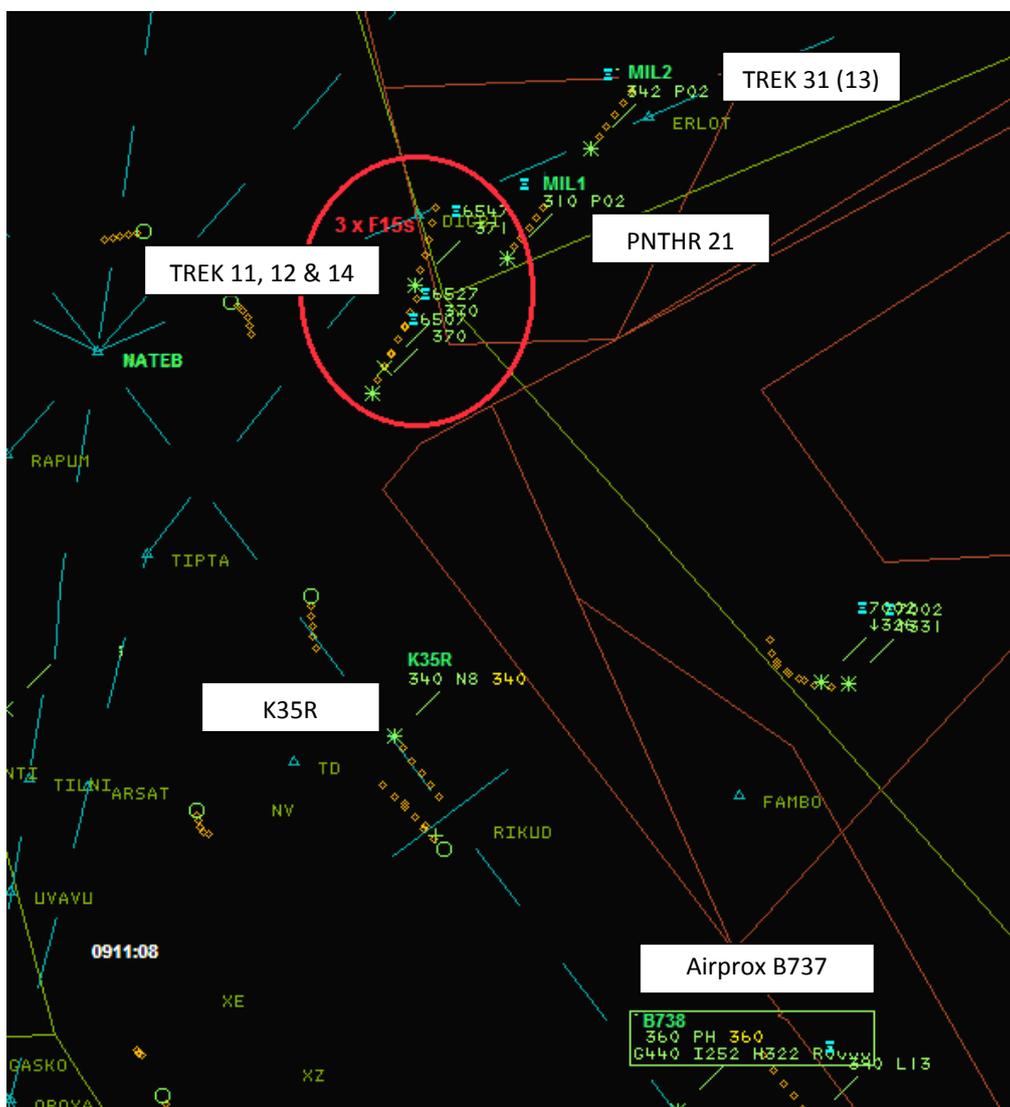


Figure 1.

The OJTI and the trainee requested a Planner to assist with co-ordination. As the Planner stepped in, the OJTI highlighted track K35R at FL340 against TREK 31 (that had not descended in accordance with the agreed co-ordination). The Planner contacted Swanwick Mil NE and was told that TREK 31 was still with Swanwick Mil N. Swanwick Mil N telephoned Montrose regarding the 6507 and 6547 squawks (TREK 11, 12 & 14) whose pilots had lost communication. With no

coordination in place, the separation required from the F15s was 5nm and/or 5000ft. The Montrose trainee overheard the conversation with the Planner and instructed the B737 pilot to descend to FL340 (2000ft above the co-ordinated level of TREK 31, which was supposed to be at FL320) and advised the crew of “*opposite direction military traffic unknown intentions and not speaking*”.

The Montrose trainee assessed that the track of the B737 would take it behind PNTHR 21 (MIL1) and TREK 31 (MIL2) on their current headings and, at 0913:11, instructed the B737’s pilot to descend to FL320 (to achieve separation with the unknown aircraft at FL370) and to expedite descent. The B737 was passing FL359, opposite direction to the F15s, at a range of 24.2nm (Figure 2). The pilot of the B737 was then instructed to turn left heading 315°.

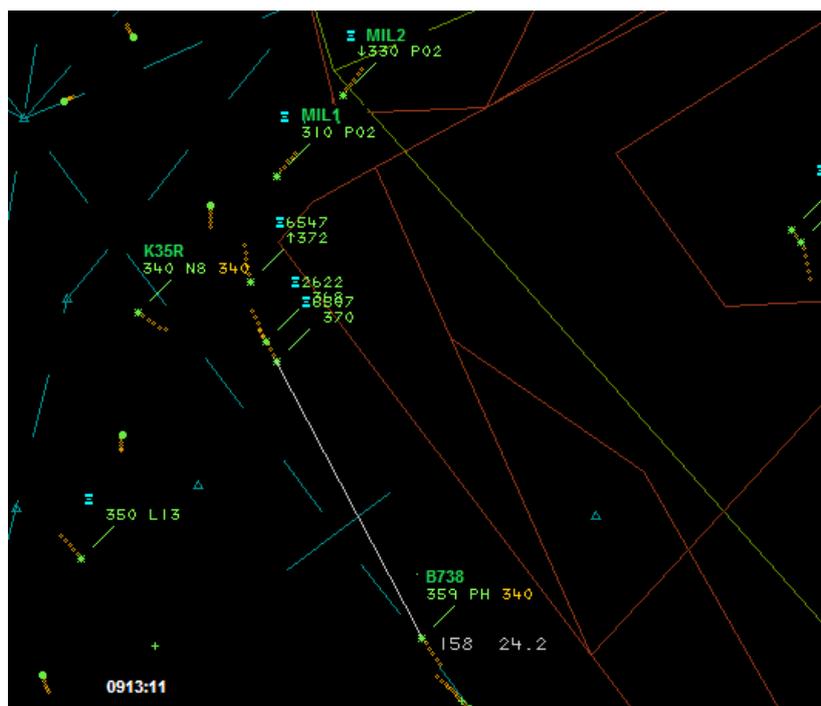


Figure 2.

At 0913:47 (Figure 3) the Trainee instructed the B737 pilot “*avoiding action turn r-left immediate-correction [B737 C/S] avoiding action turn right immediately heading zero nine zero degrees*”. At interview the OJTI revealed that the trainee had wanted to turn the B737 pilot left but he had instructed the trainee to turn the B737 pilot right due to a potential confliction with PNTHR 21, TREK 31 and traffic working Spadeadam from 5000ft-30000ft in the Otterburn region. The pilot of the B737 replied “*now heading three one five [B737 C/S] do you mean right zero nine zero*”. The Trainee replied “*[B737 C/S] affirm turn right heading zero nine zero degrees immediately*”. This was read-back by the crew of the B737.

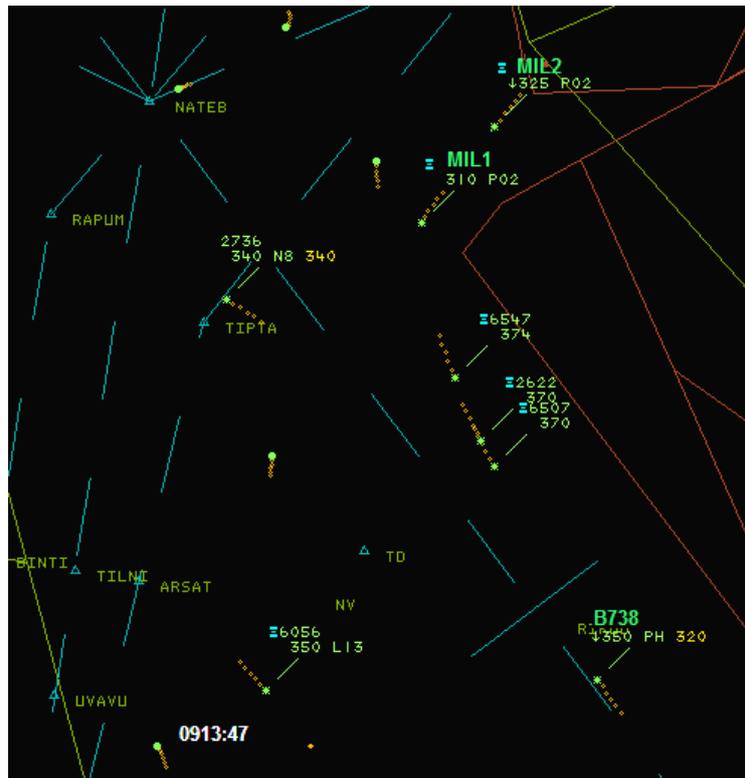


Figure 3

During this conversation the SSR label of the aircraft previously squawking 6547 (TREK 14) disappeared (the remaining primary target is ringed in red on Figure 4). Traffic Information was passed to the pilot of the B737 as *“traffic is opposite direction five miles indicating flight level three seven zero unverified”* (0914:20, Figure 4). In the meantime, PNTHR 21 (MIL1), which had been co-ordinated as turning right and tracking ahead of the B737, turned left, towards the B737. PNTHR 21 was at FL310. As PNTHR 21 was not RVSM approved, the minimum required vertical separation from the B737 was 2000ft.



Figure 4.

The Montrose Planner was talking to Scampton to try and co-ordinate the military traffic against the B737. It was revealed that neither the 3 F15s nor PNTHR 21 were talking to Scampton, and that Scampton believed they were in communication with Swanwick Mil. The Montrose Planner attempted to communicate with Swanwick Mil.

At 0914:41, almost a minute after the instruction to turn immediately was first issued, and with the pilot having queried the request, the B737 track started to turn right. Due to the length of time elapsed and the relative position of the F15s, the right turn for the B737 reduced the lateral separation from the F15s, resulting in a loss of separation.

CPA with the F15 squawking 6507 occurred at 0914:45 (Figure 5); minimum distance between these two aircraft was **1.5nm, 3900ft**.



Figure 5.

CPA with the F15 squawking 2622 occurred at 0914:51 (Figure 6), the minimum distance between these two aircraft was **1.4nm, 4100ft**. At the same time, the Short Term Conflict Alert (STCA) activated against PNTHR 21. At this point, TREK 31, at FL320 and co-ordinated to track ahead of the B737, also started a left turn towards the B737.



Figure 6.

The SSR code (6547) of the F15 that had reverted to primary only reappeared just before CPA at 0915:05 (Figure 7): the minimum distance between it and the B737 was measured as **0.7nm**. (It was established after the event that the 6547 squawk was maintaining FL370, some **4800ft** above).

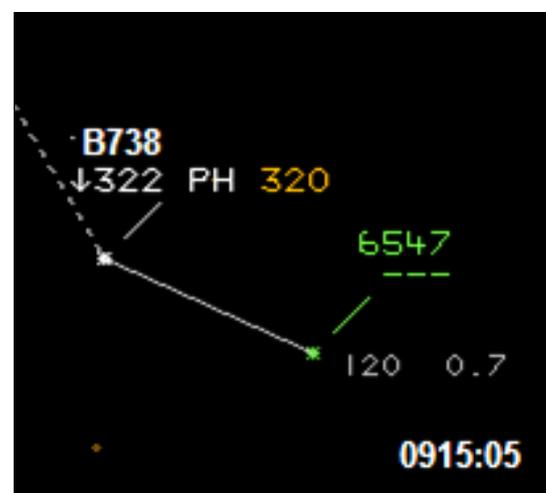


Figure 7.

The Montrose Planner managed to contact the Swanwick NE Mil controller to ask if they were working PNTHR 21; he was informed that the aircraft was with Scottish control; the Montrose Planner asked the Swanwick NE Mil controller to transfer the telephone call. At 0915:42 (Figure 8) the Planner was still trying to co-ordinate PNTHR 21 and could be heard on the open line stating that no-one was picking up. The Montrose Tactical controller had instructed the B737 pilot to descend to FL280. The B737 pilot was tracking away from PNTHR 21 and TREK 31 but towards an active Danger Area (D323A). Two other non-RVSM approved aircraft (squawking 4623 and 4625) could be seen as potential conflicts with the B737 (2000ft vertical separation was required). At 0915:49 the B737 pilot was instructed to turn north but was still heading towards the Danger Area. At 0916:05, the Montrose Tactical controller instructed the B737 pilot to squawk 7700 and advised the crew that they were entering an active Danger Area. The B737 pilot was instructed to resume his own navigation to OTBUN. The B737 penetrated D323A for approximately 20 seconds. Once clear of the conflicts with the military traffic and the Danger Area, the B737 pilot was instructed to re-select his previous SSR code and he was transferred to the next sector.

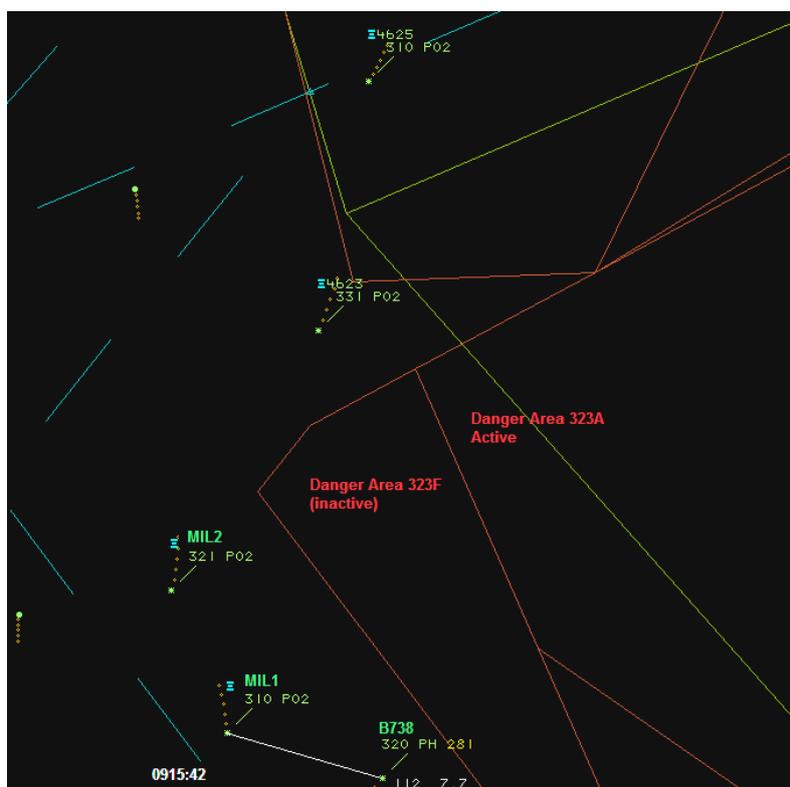


Figure 8.

Military ATM

The 1 ACC Weapons Controller at RAF Scampton, callsign 'BLACKDOG', recalled TREK 11, 12 and 14 were beginning their transit to Lakenheath at FL370. After exiting the D613C airspace complex, BLACKDOG's radio failed and several attempts were made to gain contact with TREK formation. TREK were out of radio communication with BLACKDOG for 18 minutes prior to D&D successfully managing to call the F15s on Guard to provide a new BLACKDOG frequency.

The Swanwick Mil Tac 2 controller had just returned from a week's leave and previous currency had been on three tracks, occasionally four. The Tac 2 had been predominantly controlling in D&D and was used to very low-intensity controlling. A west coast of Scotland transit was handed over from RAF Lossiemouth under a Traffic Service. Next, the Planner asked the Tac 2 controller if they were content to accept PNTHR 21 Flight, exiting the 613 complex to the south. Despite a large geographical split, the controller was content; then the Planner pointed out a handover on two more speaking units. The controller was now feeling at capacity. The Primary Planner and Supervisor were informed, and they told the controller to put on the 'Stop' light. Montrose South

were called to coordinate with PNTHR 21 Flight and a second civil track was coordinated. Whilst Tac 2 was on the landline coordinating with civil, the Planner was pointing out tracks and aircraft were calling on frequency. TREK 31 had been handed over from BLACKDOG but the callsign had been typed into EDDUS as TREK 13, which was causing confusion; the Planner was trying to amend EDDUS. Immediately afterwards, the pilot of TREK 11 free-called and the controller did not know which they were. The Tac 2, at this point, recalled being overloaded and confused, and assistance was requested. The Planner identified a civil conflictor and the controller instructed the pilot of PNTHR 21 to descend and turn in order to de-conflict; he did not respond to the RT and the civil track also started to descend, prior to taking avoiding action into the active Danger Area. The controller felt uncomfortable on console and commented upon the lack of currency for the controller and Planner.

The Swanwick Mil Planner 2 recalled that Tac 2 had one aircraft on frequency that was transiting to the west coast of Scotland. The BLACKDOG assistant called with a pre-note that turned into a handover on PNTHR 21 Flight, a pair of F15s southbound. The BLACKDOG controller stated that they had further non-pre-noted handovers and the Primary Planner re-allocated the call to the Planner 2. During the handover, there was confusion over callsigns, given as TREK 31 and BREW 32. During the handover, the Planner identified the tracks to Tac 2 (who was on a landline coordinating with Montrose) to gain acknowledgement of the traffic. Planner 2 was inputting the details onto EDDUS, but was slower inputting details than normal because of lack of familiarity. The Planner received a further non-pre-noted handover on WILD 51 Flight. As the pilots of the aircraft started to call on frequency, a call was received from TREK 11 Flight at FL370. The Tac 2 had asked the Planner who TREK 11 Flight were, but the Planner had not taken a handover on that callsign. The Planner attempted to update EDDUS to solve the confusion over TREK 13/31 but the system would not allow a callsign change. To help the Tac 2 controller, the Planner had tried to handover PNTHR 21 to Swanwick Mil NE sector, but the receiving controller had identified a confliction and suggested a descent on PNTHR 21 Flight. Tac 2 passed a turn and descent to PNTHR 21 Flight as avoiding action. The Planner had been controlling for a period in D&D with low-intensity traffic and was not used to such high traffic levels, especially the rapid increase in levels. The Planner felt under pressure to accept the traffic. The Tac 2 and Planner 2 assessed workload, task difficulty and incident severity as 'high'.

The Swanwick Mil Supervisor was under training and recalled manning Tac 2 and Planner 2 to deal with the flow of F15 traffic in the 613 complex. The first un-pre-noted handover was taken with ease, but the next three non-pre-noted handovers caused the controller to reach capacity. When the 'Stop' light was illuminated, the west coast transit was allocated to another console to avoid a geographical split. BLACKDOG called Swanwick Mil to highlight three tracks leaving the 613 complex, without speaking to them, that were continuing to route to Lakenheath. Civil were informed that the aircraft were not working Swanwick Mil but, in the meantime, they did free-call the Tac 2 frequency. The Supervisor concentrated on assisting the Tac 2 controller but the protracted landline conversation with Montrose took up a lot of Tac 2's capacity and this was compounded when PNTHR 21's pilot did not respond. The OJTI Supervisor closely monitored the situation and was content when the trainee Supervisor had allocated a Tac 2 and a Planner for the D613 traffic. Console 4 was opened as the non-pre-noted handovers began, and the calls from BLACKDOG and Montrose kept the trainee busy. The OJTI was content with the planned coordination, but calls from BREW and WILD formations increased the workload. The OJTI was aware that PNTHR 21 Flight had taken their own navigation under Radar Control, and their left-hand turn down UL602 had put them head-to-head with a civil track. The OJTI offered a heading to the controller to deconflict, but the plan had to change when civil started to take avoiding action. All of the F15 tracks, including the three callsigns that the trainee Supervisor did not realise were on frequency, were taking their own navigation in the UIR without controller consent. The Swanwick Mil OJTI Supervisor believed that the callsign confusion had sapped controller capacity as much as the specific controlling task.

The BLACKDOG Supervisor recalled the situation and the unit actions to reach TREK formation on UHF Guard frequency. The BLACKDOG enquiry with USAFE led to a review of the cockpit tapes to understand the radio issues. Specifically, TREK 11/12's tapes were reviewed and there

was found to be a lot of chatter on Guard. TREK formation realised that they had lost communication with BLACKDOG and, because they were well south, they attempted to contact Swanwick Mil on local frequency 234.5 MHz. Numerous incidents of multiple transmissions on Guard disrupted the frequency. TREK 11 were told to 'standby' on many occasions by Swanwick Mil because the Swanwick Mil controller was expecting 'TREK 31' to call (because of the EDDUS error), and a call from TREK 11 was not expected. She initially thought TREK 11's call was from TREK 31, and TREK 11 kept answering her calls to 'TREK 31' (and there was no TREK 31 to answer her anyway because the callsign was actually TREK 13). Only two transmissions were collected on TREK 11/12's tape from Swanwick Mil on Guard, and this allowed TREK to re-contact BLACKDOG.

Due to the complex nature of a series of incidents, a timeline of events will describe the factual analysis:

[UKAB note: for ease of interpretation, specific calls and instructions passed to, relevant to or made by TREK 11, 12 & 14 flight are in bold italic].

0901:00 – BLACKDOG Weapons Controller (WC)1 – instructed the following squawks allocation: TREK 11, squawk 6507; TREK 12 squawk 6527; TREK 14 squawk 6547.

0901:30 – Tac 2 had TPKNT 11 manoeuvring at FL 170 to the SW of Lossiemouth on Frequency 233.32MHz and HOWLR 41 at FL 340 north of Newcastle tracking south soon to be handed over with co-ordination.

0901:1 - TREK 13's pilot called BLACKDOG westbound at 35000ft looking for clearance out of the airspace to recover as a singleton.

0901:8 – BLACKDOG Fighter Marshall (FM) informed TREK 13's pilot, 'you are cleared own navigation'.

0901:48 – WC 2 – “**All callsigns, BLACKDOG, you are now Radar Control at and above FL245** due to cold airspace.” [UKAB note: 'cold airspace' refers to the fact that the D613 airspace that they had been using was now not in use].

0901:49 – BLACKDOG Assistant 2 rang Planner 2 with a pre-note for PNTHR 21 and 24. Planner 2 was then immediately transferred to BLACKDOG WC 2 for the handover of PNTHR 21 Flight. On completion of this handover BLACKDOG WC 2 attempted to handover WILD 51; however, Planner 2 transferred BLACKDOG WC 2 to Primary Planner (PPLN).

0901:58 – BLACKDOG FM – “TREK 13, BLACKDOG, do you copy you are clear own navigation?”

0903:40 – HOWLR 41 was handed over with co-ordination by Tac 2 to Swanwick Mil North East.

0904:22 – BLACKDOG WC 1, “**TREK 11, 323 A, B, C active, maintain clear.**”

0904:38 – PNTHR 21 Flight checked in at FL130 RTB Lakenheath. Tac 2 identified the aircraft, confirmed the pair were in fact at FL 310 as per their Mode C, then placed them under a Radar Control Service (RCS).

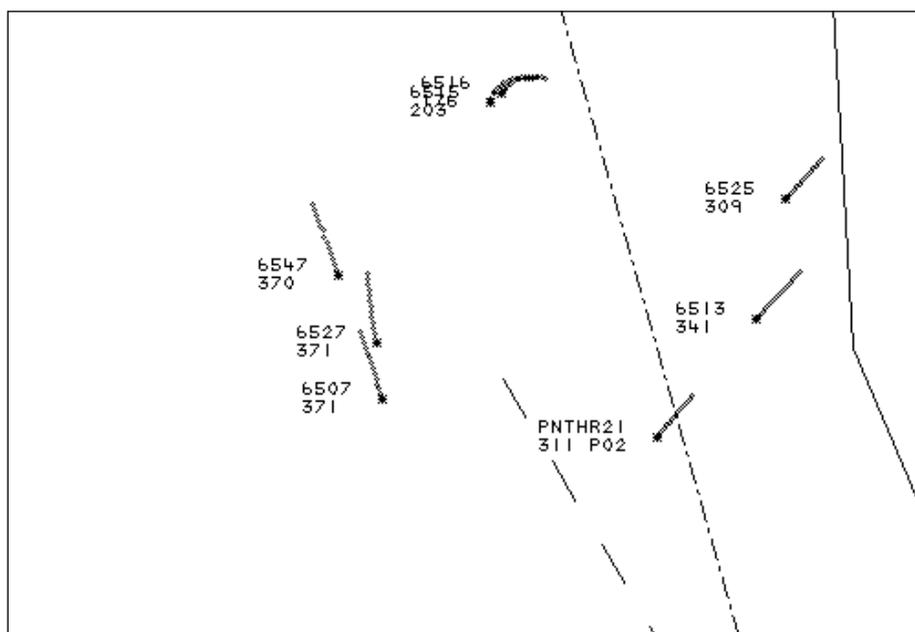


Figure 1: Panther 21 Flight check-in with Tac 2 at 0904:39;
 numerous other formations recovering southbound.

0904:46 – BLACKDOG WC 2 was transferred back from PPLN for the non-pre-noted handover of WILD 51. On completion of the handover of WILD 51 Planner 2 was then transferred directly to BLACKDOG WC 1 for additional handovers.

0905:54 – BLACKDOG WC 1 stated he had 2 handovers, TREK 13 and BREW 31. BLACKDOG WC 1 then began the handover of TREK 13. After TREK 13's pilot did not respond to a squawk request BLACKDOG WC 1 suspended the handover of TREK 13 and asked to handover BREW 32 (incorrect callsign) instead. Within seconds, BLACKDOG WC 1 then converted back to the handover of TREK 13. Planner 2 input TREK 13 into EDDUS incorrectly as TREK 31; during the handover Planner 2 identified TREK 13 on the landline as TREK 31 however, this was not rectified by BLACKDOG WC 1. BLACKDOG WC 1 then went back to the handover of BREW 31 Flight, which had already been input into EDDUS as BREW 32, as per a disjointed handover. Planner 2 questioned the callsign BREW 31, however, did not update EDDUS accordingly. BLACKDOG landline call was terminated at 0908.45. An incorrect EDDUS entry corrupts the callsign information available to the controller; hence Tac 2 was expecting TREK 31 and BREW 32 on frequency; actual callsigns were TREK 13 and BREW 31.

0907:24 – Fighter Allocator, ***“TREK 11 Flight, TREK 11 Flight, this is BLACKDOG Allocator on Guard, come up frequency 361.525, 361.525.”***

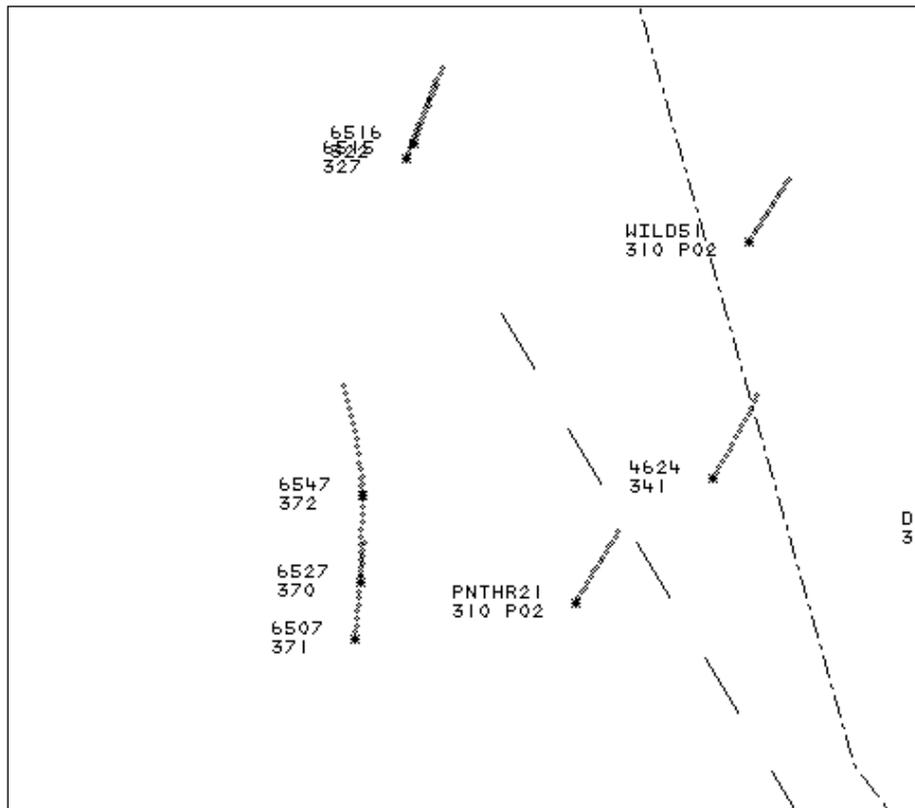


Figure 2: Geometry at 0907:24; Trek 11 Flight squawking 6507, 6527, 6547.

0908:30 – Tac 2 rang Montrose sector to instigate co-ordination with WILD 51 and PNTHR 21 Flight against over-flight at FL340. The co-ordination continued whilst other aircraft checked in on 234.50MHz.

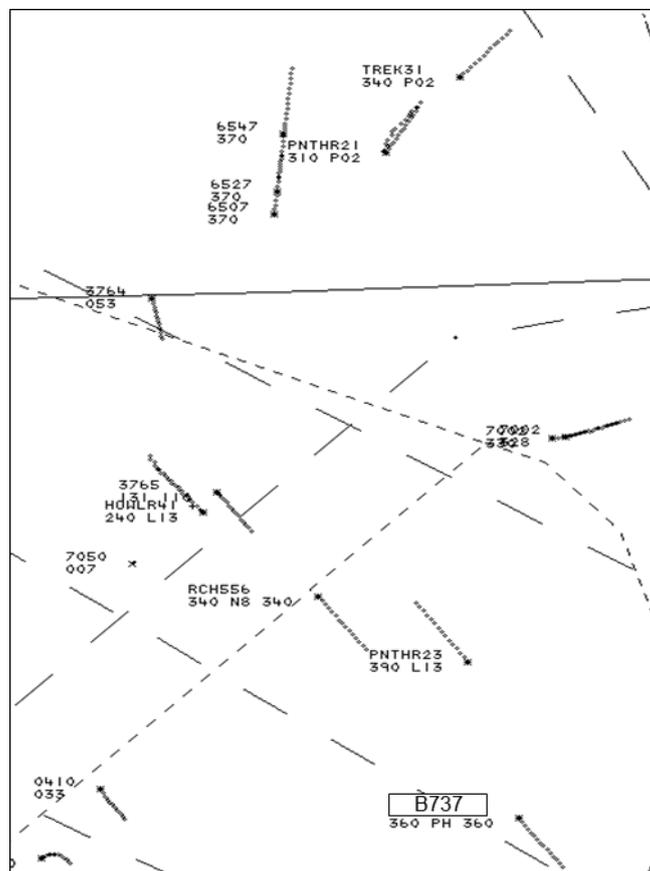


Figure 3: Geometry at 0908:30 as Tac 2 call Montrose for coordination.

0908:39 – **TREK 11's pilot called on frequency 234.50MHz**, no pre-note or handover had been given for this aircraft and therefore was not expected on frequency. It later became apparent that TREK 11 was actually a 3-ship at FL 370 (free-calling aircraft would be expected to utilise the ICF not a specific console frequency). The pilot of TREK 11 passed no additional information at this stage other than the callsign. As co-ordination with Montrose was underway when TREK 11's pilot checked in, Tac 2 did not hear the callsign and believed the call to be from TREK 31 (actually TREK 13). Tac 2 then identified TREK 31 at FL 340 (the level TREK 13 was at) and placed it under a RCS (TREK 13's pilot had not checked in on the frequency at this stage). **TREK 11's pilot did inform Tac 2 that they were at FL 370, however this transmission was distorted by Montrose sector talking on the landlines.**

0908:58 – **The pilot of TREK 11 called again, Tac 2 responded by telling TREK 31's pilot to standby.**

0909:05 – **Tac 2 asked the pilot of TREK 31 to descend to FL 320 for co-ordination.** TREK 13's pilot had still not checked in on frequency at this time. **TREK 11's pilot believed this call to be for him and asked Tac 2 to repeat the instructions.** Tac 2 did not repeat the instructions and was not aware that TREK 11 was in fact a free-calling aircraft at this stage.

0909:23 – **TREK 11's pilot did a radio check, Tac 2 transmitted, "TREK to standby."**

0909:37 – The pilot of BREW 31 checked in at FL 330 on frequency 234.50MHz. The Flight was not acknowledged, identified or placed under a service.

0909:39 – Montrose sector highlighted further north-bound traffic (the B737) which would be a factor to PNTHR 21 Flight and WILD 51. The B737 was descending from FL 370 to FL 260 which made co-ordination less simple. At this stage Tac 2 began to sound less certain on the landlines and Montrose sector control began to take the lead with the co-ordination.

0909:42 – TREK 13's pilot (singleton) checked in on Frequency 234.50MHz. He was not acknowledged, identified or placed under a service. At this stage Tac 2 believed TREK 13 (31) was identified under a RCS; however, the aircraft had not been on frequency up until this point.

0910:06 – Tac 2 asked TREK 31's pilot to descend to FL 320 for co-ordination. The pilot of TREK 11 then asked for confirmation as to whether this instruction was for him or BREW 31. Tac 2 did not respond as they were still in the process of co-ordination with the Montrose sector.

0910:21 – **TREK 11's pilot checked in again, Tac 2 told him to standby.** It is undetermined whether Tac 2 was aware that TREK 11 was a free-calling aircraft at this time or not.

0910:34 – TREK 13's pilot checked in again at FL 340, Tac 2 was still discussing co-ordination with Montrose sector so did not respond.

0911:14 – **Tac 2 asked TREK 31's pilot to descend again to FL 320 for co-ordination. TREK 11's pilot asked if this instruction is for him or TREK 21.** Tac 2 then asked the pilot of TREK 21 to descend to FL 320 for co-ordination. This query from TREK 11's pilot caused further confusion as TREK 21 was a callsign not used previously and was not on frequency.

0911:17 – Co-ordination was finalised with Montrose sector and the landline call terminated. The co-ordination was for PNTHR 21 Flight to maintain FL 320 against the over-flight at FL 340 and to turn right 5° to route ahead of the B737 descending to FL 260. TREK 13's pilot was instructed to descend to FL 320 to co-ordinate with the FL340 over-flight and also to turn right 5° to turn ahead of the B737. TREK 13 was at FL 340 and its pilot had not responded to calls given by Tac 2 to descend to FL320 due to the callsign confusion with TREK 31.

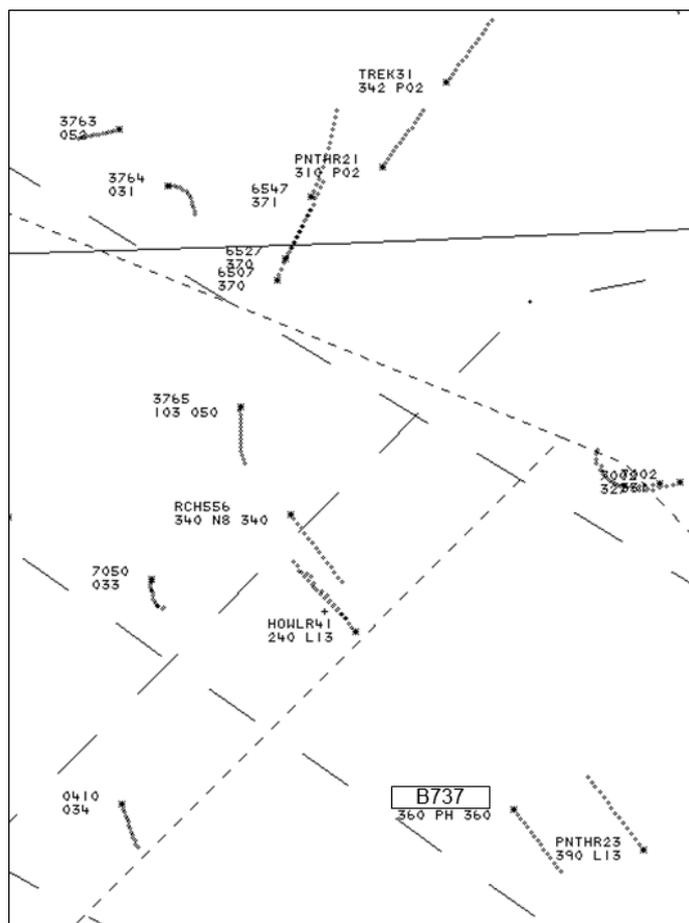


Figure 4: Coordination at 0911:17 for Tac 2 was PNTHR 21 Flight to maintain FL 320, right turn 5° and TREK 31 to descend to FL 320, turn right 5°.

0911:10 – BLACKDOG WC 1 rang Planner 2 asking if they had communication with TREK 13's pilot and to pass him a message to contact TREK 11 Flight on Frequency 361.525MHz. That gave Swanwick Mil the impression that BLACKDOG still had some form of communication with TREK 11 Flight; **TREK 11 Flight had been free-calling Tac 2 frequency 234.50MHz since 0908:39.**

0911:30 – **The pilot of TREK 11 stated that he was a 3-ship. TREK 12 then checked in on the frequency, Tac 2 asked its pilot to pass his details. TREK 12 passed its FL, Tac 2 then issued an incorrect squawk of 2622;** Tac 2 has a range of squawks between 4620 – 4627.

0911:55 – BLACKDOG Fighter Allocator, **"TREK 11 Flight, this is BLACKDOG Allocator on Guard, turn left 150 degrees and come up Frequency 361.525."**

0912:15 – Planner 2 informed Tac 2 that TREK 31 was actually callsign TREK 13. EDDUS had not been updated to reflect this information and the radar screen still displayed TREK 31. **Tac 2 asked TREK 13's pilot to descend to FL 320. TREK 13 and TREK 12 pilots both responded, however, TREK 12 did not descend.** There were 27nm between TREK 13 and the FL340 overflight when TREK 13's pilot started to descend.

0912:31 – **TREK 11's pilot checked in again on frequency. Tac 2 asked him to 'pass their message'.** At this stage TREK 11 Flight were well south of Swanwick Mil N airspace. The first aircraft in the formation was wearing a BLACKDOG Squawk 6507, the second a squawk of 2622 (a squawk Tac 2 had issued) and the third in the formation was alternating between not squawking and a BLACKDOG Squawk 6547. **TREK 11's pilot stated that they were just paralleling Fox 40 South at this stage as well as informing Tac 2 that they were still at FL 370 and a 3-ship. Tac 2 asked them to maintain FL 370;** however, TREK 11 Flight had not been identified or placed under a service.

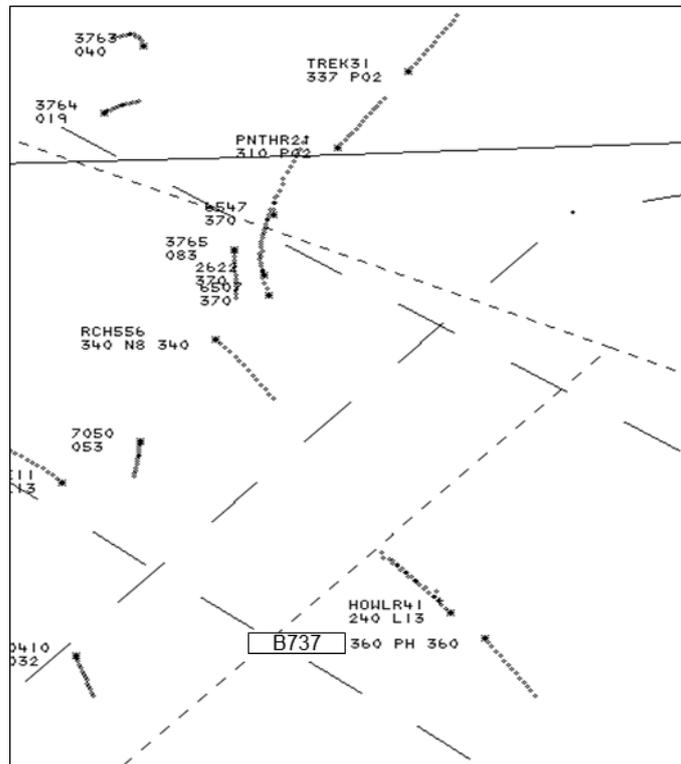


Figure 5: Geometry at 0912:31.

0913:57 - PNTHR 21 Flight began to turn south towards Ottringham (OTR) without instruction from Tac 2. PNTHR had not been instructed to maintain heading or to turn right 5° as per the coordination agreed with Montrose sector.

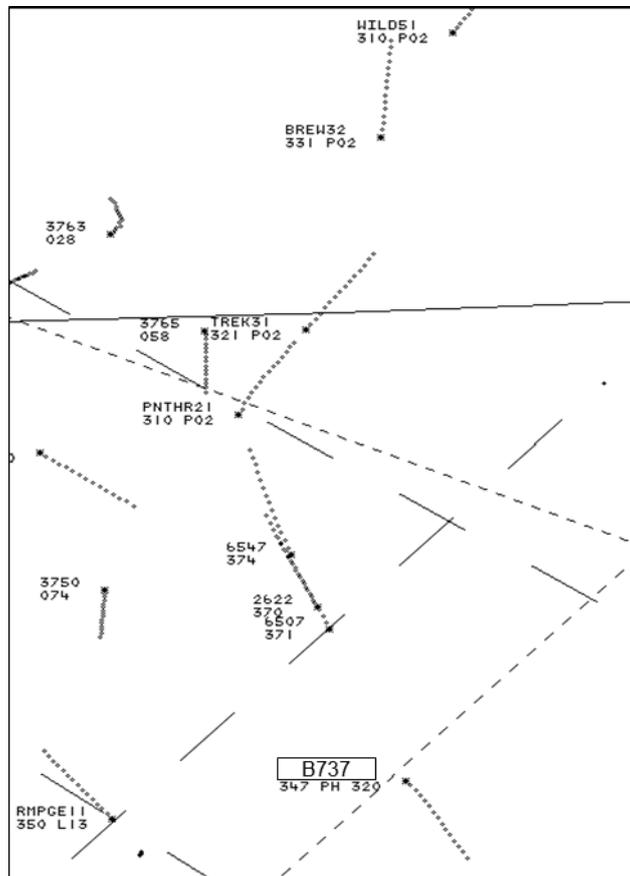


Figure 6: Geometry at 0913:57 as PNTHR 21 Flight turn south.

0914:28 – Planner 2 attempted to handover PNTHR 21 Flight to Swanwick Mil NE who informed them of the PNTHR 21 Flight's turn towards the B737. NE suggested they descend PNTHR 21 Flight and would call them back after co-ordinating with Montrose.

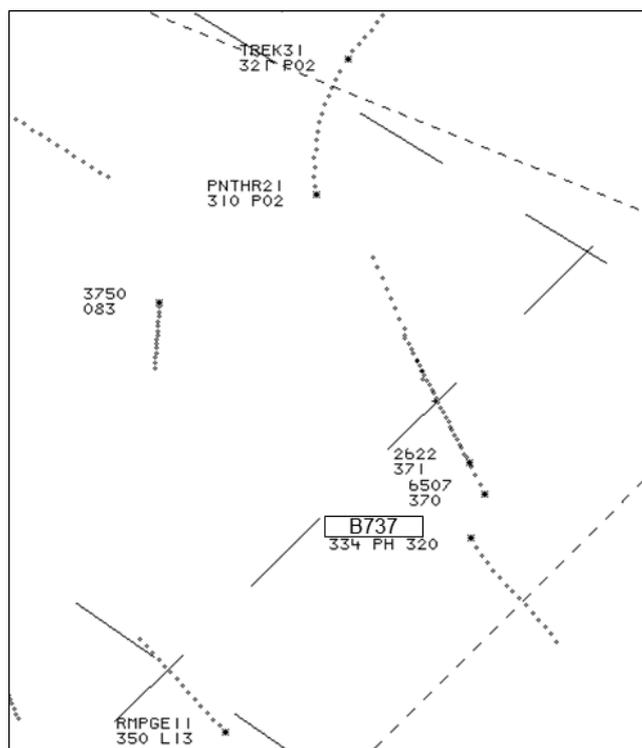


Figure 7: Geometry at 0914:38.

0914:40 – Montrose had already initiated an avoiding action descent with the B737 against traffic believed to be TREK 11 Flight (squawks 6507 and 2622). Montrose then issued an avoiding action turn against PNTHR 21 Flight and TREK 13. The pilot of the B737 was given a right turn into 323D which was active. As a result the B737's pilot was instructed to Squawk 7700.

0914:50 – Planner 2 informs Tac 2 of PNTHR 21 Flight's turn towards conflicting traffic and suggested a descent to FL 300 as per Swanwick Mil NE instructions. Tac 2 initiated a descent for PNTHR 21 Flight and then asked them to maintain level before giving them an immediate right turn heading 210°. TREK 13's pilot was also then asked to turn right heading 210°.

0914:46 – CPA between the B737 at FL331 and 6507 (TREK 11) at FL370, lateral separation 1.6nm.

0915:06 – CPA between the B737 at FL322 and 6547 (TREK 14) at FL370, lateral separation 0.7nm.

0919:13 – **TREK 11 Flight were told to free-call Swanwick Mil NE.**

Military ATM Analysis

An Airprox was filed by the Montrose sector controller between squawks 6507/6547 (TREK 11 and TREK 14) and a B737. From occurrence reports, it is evident that the Tac 2 controller had a great deal of confusion and was struggling to pass control instructions. No coordination detail or right turn 5 degrees was passed to PNTHR 21 Flight or TREK 13; however, Figure 7 demonstrates that PNTHR 21 Flt and TREK 13 were passing ahead of the B737 and that TREK 13 had got the message to descend to FL320, as per coordination. PNTHR 21 Flight turned left on the UAR and the Tac 2 controller did not notice until the Planner was attempting to hand the formation over to Swanwick(Mil) NE. TREK 11, 12 and 14 had numerous communication issues but they continued to route southbound without a positive clearance at FL370, and the Montrose controller attempted

to descend 5000ft below them. The descent from Montrose had effectively broken coordination with PNTHR 21 and TREK 13, and an avoiding action turn towards the active Danger Area provided lateral separation. The Montrose avoiding action with the B737 achieved 3900ft separation with TREK 11; 4800ft with TREK 14; and 7.6nm lateral separation with PNTHR 21 Flight.

The Swanwick(Mil) North control team could not adhere to agreed coordination and there are many factors that help explain this. The Tac 2 and Planner 2 were North Bank controllers and were current in their positions. Whilst current in their control positions, the controllers reported that they were also D&D controllers (an additional validation to the North Bank validation) and they felt that they were not current enough for such a high-workload situation due to the low traffic levels experienced at D&D. The control position was normally a protected position⁵, with a non-ICF frequency and allocation of aircraft from the Primary Planner. The lack of pre-notes and issues of EDDUS inputs exacerbated a situation that went quickly from low- to high-workload; applying the substitution test, it is evident that most controllers would have struggled with the complexity. To add more context, several factors added to the capacity-sapping situation including aircraft calling on a non-ICF frequency (with similar callsigns); aircraft turning in the upper air without controller consent; a geographical split of traffic; and a prolonged landline conversation with civil for coordination. The Planner felt pressure to keep accepting the un-pre-noted handovers and, despite assistance from the trainee and OJTI Supervisor, the situation had built to a point that was not easily recoverable, as witnessed when the Planner 2 transmitted on the Tac 2 frequency to hand over traffic to ease the geographical split. The Planner had accepted handovers, as numerous callsigns were entering the North Bank airspace, but the Primary Planner was not on the landline, and was not aware of the extent of the traffic allocation; without a robust F15 recovery plan from BLACKDOG, the Primary Planner and Supervisor were uncertain of what was being handed over. As a result, the Tac 2 had the following aircraft on frequency: TPKNT 11 Traffic Service; PNTHR 21 Flight Radar Control; WILD 51 Radar Control; TREK 13 Radar Control; BREW 31 Radar Control; and TREK 11, 12, 14 freecalling and not under a service. Swanwick(Mil) have conducted a thorough and detailed investigation of the incident, resulting in several recommendations.

The Swanwick(Mil) trainee Supervisor tried to assist, encouraged use of the 'Stop' light, tried to reduce the traffic load and help with coordination; however, once the threshold had been reached by Tac 2 and Planner 2, it was difficult to work effectively and re-gain traffic awareness. In this instance, the Supervisory planning was in place but various external factors impacted on it that required closer monitoring. There were many external factors that compounded the situation and led to a loss of situational awareness, such as BLACKDOG radio failure, use of the non-ICF, non-pre-noted aircraft, incorrect pre-noting of callsigns, and not correcting the readback of a wrong callsign. A more coordinated recovery plan from BLACKDOG would have aided Swanwick(Mil) in allocation of aircraft. From an internal planning perspective, the control team were not used to higher intensity sessions and would require close supervision and tighter control of aircraft allocation; team composition and matching manning to workload has to be conducted with the manning available to a Supervisor. Ultimately, Tac 2 got overloaded with coordination and the Planner got pre-occupied with handovers and EDDUS; as a result, the traffic situation and positive control was lost.

PNTHR 21 Flight turned on an airway without ATC approval and TREK 11, 12 and 14 called on a non-ICF freq whilst continuing south, through UARs, without effectively receiving a service. All agencies were working together to communicate with TREK following the loss of the BLACKDOG radio. The captain of PNTHR formation was under the impression that the BLACKDOG instruction was 'own navigation remaining clear of D323 complex'; this explains PNTHR's turn in the upper air, once clear of D323. The BLACKDOG transcript shows that the 'own navigation' instruction was only passed to TREK 13. However, once again, callsign confusions, radio issues, busy frequencies, blocked Guard frequencies and uncertainty over clearances, add context to actions. The details of coordination were not passed to the crews, although their initial headings were

⁵ A protected position is one where traffic is only received by handover or pre-notification, not from free-calls.

keeping them clear of the civil traffic. Despite the confusion, TREK 13 had managed to descend to the agreed coordination level of FL 320. TREK 11, 12 & 14 flight were not getting instructions through BLACKDOG or Guard; when they tried a known Swanwick(Mil) North frequency, they did get a degree of acknowledgement, incoherent control instructions and a squawk change - this would have encouraged TREK to remain on the Tac 2 frequency to get a service. Amongst the confusion and radio issues, TREK 11, 12 & 14 had tried known frequencies and all formations were routing to avoid the D323 complex.

The normal barriers to an Airprox, such as lookout and ACAS are less prevalent with aircraft in Class C airspace because the separation minima imposed under a RCS should allow controllers to safely separate aircraft long before TCAS or lookout provide warnings. In this instance the coordination required for separation was not maintained and the procedures designed to separate aircraft in Class C airspace were also lacking.

Comments

HQ Air Command

A very complex situation, in which communications-failure resulted in a very high workload across multiple ATC agencies, and an Airprox with a civilian airliner. The F15 Flight Lead adhered to the instruction to avoid the various '323' Danger Areas and tried unsuccessfully to recover RT contact with ATC.

USAFE

The events that took place between the TREK Flight and the B737 were a matter of communication breakdown between the controllers and TREK Flight. The communication problems seemed to emanate from the BLACKDOG FM position and the possible jamming in the D323 exercise. TREK was a flight of 3 F-15Es from/to RAF Lakenheath which landed at 0943. They were initially seen on the radar recordings working CRC Scampton over the NE Coast. As they transited south near RIKUD at FL 370 the B737 passed down their right side at approximately FL 330 descending. TREK 14, having lost its SSR return, was, subsequently, confirmed as being at the same level as the other TREK aircraft.

Summary

The Airprox occurred within Class C airspace. The pilots of the three F15s lost ATC communication whilst at FL370 and, consequently, were not in receipt of an ATC service. They made several calls on the Swanwick Mil frequency which were not answered due to high controller workload. Because the aircraft were non-RVSM approved, and coordination had not been effected, the minimum separation required from the B737 was 5nm horizontal and/or 5000ft vertical. This was not achieved with any of the F15s. The turn given by the Montrose controller, when avoiding other traffic, decreased the lateral spacing between the B737 and the F15s, and the B737 subsequently entered an active Danger Area. The radar recording showed the CPA between the B737 and the third F15 (TREK14) was 0.7nm horizontal; its Mode C was not displayed. It was subsequently reported that TREK 14 was maintaining FL370, 4800ft above the B737. The CPAs from the other two aircraft were respectively 1.6nm/3900ft and 1.4nm/4100ft.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of the aircraft concerned, transcripts of the relevant RTF frequencies, radar recordings, reports from the controllers concerned and reports from the appropriate ATC and operating authorities.

This was a complex Airprox with numerous aspects that resulted in a lengthy and involved discussion as the Board tried to make sense of the sequence of events, the level of understanding and confusion, and who had been told to do what, by whom.

The Board first discussed the actions of the B737 pilot. It was noted that the pilot had initially been given a left turn heading 315°, which was followed shortly afterwards with an avoiding action, immediate right turn, heading 090°. The pilot queried the revised heading which was then confirmed by the Montrose controller. The Board could understand the pilot's uncertainty in being given such a large change of heading, especially as he had been given a turn in the opposite direction just previously, but were very concerned that the pilot had thought to question the 'immediate' call to turn rather than initiate the turn and then seek confirmation afterwards. Some members believed that the avoiding action phraseology could be improved by either repeating the callsign of the addressed aircraft twice, or reiterating the term 'avoiding action' again in the message in order to further highlight its significance to pilots: this, they thought, might ensure that the pilot knew straight away that the transmitted message was to him, and that he would immediately be aware of its composition without having to request confirmation. However, this suggestion did not gain majority support amongst the Board members because of concerns that this would lengthen the avoiding action transmission with no guarantee that it would improve the situation. In summary, the Board noted that although the B737 pilot had complied with all instructions, he had reportedly taken about a minute to respond to the avoiding action call (although further investigation by a review of the B737's SSR Mode S returns revealed that the right turn was commenced 37 seconds after the first avoiding action instruction was made). Members believed that the delay was probably due to the pilot's uncertainty about the avoiding action message, the extent of the reversal of turn, and his subsequent decision to question the turn rather than initiate an 'immediate' turn first and ask questions afterwards.

Turning to the military Air Surveillance and Control System (ASACS) aspects of the event, the Board members were informed that it had been an untimely double transmitter failure at BLACKDOG that had resulted in the loss of communication with TREK 11 Flight as they departed their exercise area, and which had precipitated the events which subsequently unfolded. The Board wondered why BLACKDOG had experienced such untoward communication problems. It was explained that two transmitter sites had ceased operating, and that this malfunction had not occurred previously; however, no explanation was forthcoming as to why this might have happened. The Board concluded that the ASACS radio failures were a fundamental contributory factor to the Airprox.

As for the F-15 crews, the Board were concerned that TREK 11 Flight had continued operating in Class C airspace for 18mins or so without established two-way communication with ATC; the Board wondered what clearance, if any, they had received, or thought they had been given. The transcript of the ASACS CRC Scampton 'BLACKDOG' frequency revealed that, before communications were lost, TREK 11 Flight was instructed to "clear out on a southerly heading, Radar Control above FL245". The pilots of the three aircraft were issued individual squawks, and were advised to remain clear of Danger Areas 323 A/B/C. Discussion then took place regarding the actions the crews could have taken in these circumstances. The majority of Members agreed that once the crews had established that they had lost communications with any ATC agencies the pilots should have selected squawk 7600 (loss of communication), which would then have immediately alerted both civil and military controllers to the situation. Rather than then attempting to establish contact with Swanwick Mil by free-calling arbitrary frequencies that they happened to be familiar with, it was also considered that they should then have contacted the Initial Communication Frequency (ICF) to regain ATC contact. It was confirmed by the USAF advisor that the pilots would have been aware of the ICF frequency, but some Members opined that they had probably not used it because they had either previously been using the Swanwick Mil Tac 2's frequency or they were aware that other pilots had been transferred to it by BLACKDOG. Military ATC members commented that this was not an

appropriate frequency to free-call on because it should only be used by pre-noted aircraft; they considered that this led to the Tac 2 position becoming overloaded. In the event, because of the high Tac 2 workload, TREK 11 was told to standby a number of times although its pilot continued to make several calls to try and establish communication. Some members reasoned that these calls meant that communication had been established, or that the F-15 crews had been seduced into thinking it had been established despite the fact that their calls were not specifically answered. In summary, the Board considered that the fact that the F-15 crews did not use the ICF was a contributory factor to the Airprox because it both delayed the possibility of establishing positive control, and the resulting free-call to a protected ATC frequency added to the confusion and overloading of the Tac 2 controller.

Having not been able to establish effective communication with ATC, members wondered whether the F-15 crews should either have then descended out of the Upper Air into Class G airspace or diverted to a suitable airfield in the vicinity rather than fly through Class C airspace without coordination. Military Members commented that after their military exercise they would have been returning to their home airfield with little excess fuel and would probably not have wanted to start descending early because this would mean that they would not have sufficient fuel to reach their planned destination. The USAF advisor, with knowledge of the F-15s' procedures, commented that it was not usual for the F-15 flights to divert unless they were experiencing a significant specific emergency. Other Members considered that their actions in continuing on their southerly track at FL370, as per their last instructions (no matter how vague), were appropriate; they reasoned that, by following a constant and fairly predictable course of action, ATC would probably be able to accommodate them until two-way communication was established. The Board was thus split over whether the F-15s should have avoided controlled airspace altogether (and if necessary diverted) rather than maintain their southerly progress and fly through controlled airspace for 18mins without positive control as they tried to contact various agencies.

With this latter aspect in mind, Members wondered whether there had been sufficient pre-planning and liaison between the F-15s and BLACKDOG to organise the F-15's return to base after their exercise; especially regarding contingency plans such as if a loss of communication occurred. The USAF advisor explained that the F15s usually operate in Danger Areas closer to their base within Lower Airspace. Therefore, any loss of contact was not as critical as losing it within Class C airspace (especially within an Upper Air Route) and so this aspect may not have been uppermost in their minds when they planned this longer-range exercise. Additionally, the advisor commented that when operating in the closer Danger Areas, fuel reserves were not usually as critical because they were nearer to their home airfield and there was therefore more scope for organising an *ad hoc* recovery plan when airborne. The Board noted that, on this occasion, the flights had become fragmented; had all exited the danger area at once; were recovering as singletons, 2s and 3s; were expecting to transit through controlled airspace at the same time; and had seemingly not devised a robust plan for doing so (even without the ensuing communications problems). The apparent lack of a robust recovery plan for the F-15s returning to base after their exercise, with contingency considerations and fuel reserves included, was considered to be a contributory factor to the Airprox.

The Board then discussed the ATC aspects, starting with Swanwick Mil. It was noted first that both of the controllers involved, the Tactical and Planner 2, reported that they were not used to high intensity sessions because they were usually D&D controllers where lower traffic intensity is experienced. However, a Military ATC member confirmed that both controllers were fully qualified and current to operate in these positions, and added that even controllers who were more experienced have commented that they would have struggled with the complexity of the situation. Notwithstanding, the Board noted that there appeared to be a disparity between what the controller and planner reported as their own perceived levels of currency, capacity and capability versus what the military regulations permitted. The Board noted that, at the time, the workload had already increased from low to high in a short period, (to the extent that the 'stop' light had been selected which meant that the Tac 2 Controller could not accept any more traffic) and opined that the Supervisor had needed to be proactive and step in when the Tac 2 controller and her planner were taken by surprise when TREK 11 Flight free-called on their frequency.

For her part, the Board noted that the Tac 2 Planner felt under pressure to accept handovers from BLACKDOG on a number of aircraft that had not been pre-noted. As a result, and no doubt exacerbated by the stress of multiple, short-notice handovers during BLACKDOG's loss of radio communications, a degree of confusion was evident at the time. ATC advisors explained that, normally, there is a 2-3 minute delay between passing a pre-note and requesting a handover; however, because of the lack of pre-notes, the Planner had had to enter aircraft details on EDDUS straight away. By her own admission, because she was not used to using this equipment, it was a slow process, and this was compounded by the callsign confusion at handover wherein she input TREK 13 as TREK 31 which, subsequently, led to confusion as this callsign appeared on the radar screen. Although realising the error, it was not possible to rectify this problem on EDDUS; ATC advisors pointed out that EDDUS is not a 'useful system' and it was explained that new equipment should rectify this issue after a move into a new operations room in November 2014. The Board opined that, with hindsight, the Planner should have restricted the number of handovers she accepted because of the already high workload and the fact that the stop light had been selected.

As for the Tac 2 controller, the Board had significant sympathy for the situation in which she found herself. Amongst a sea of confusion with callsigns, short-notice handovers and protracted attempts to achieve coordination with Montrose, the unexpected free-call by TREK 11 Flight, on the 'protected' frequency, tipped her over the edge as she quickly became overloaded and ended up simply reacting to events whilst attempting to gain understanding and situational awareness. As a result, the pilot of PNTHR 21 was not in the end given any instruction that would ensure the required separation was attained with the B737 and, although avoiding action was later issued to PNTHR 21 after the pilot had turned towards the B737, no response was received or subsequently sought. The Board considered that it was this turn by PNTHR 21 that was instrumental in the Montrose controller ordering an immediate turn into the danger area by the B737 which simultaneously decreased its lateral separation with TREK 11 Flight. The Swanwick TAC 2 Controller's saturation due to multiple free-call traffic, incorrect callsign usage and lack of coordination was considered to be a contributory factor to the Airprox.

Finally, the actions of the Montrose sector controllers were also discussed. The Board noted that initially the sector was manned by a trainee combined Tactical and Planner controller with an OJTI in attendance. Subsequently, because the controller was not sure that coordination was being achieved with the numerous military tracks, a Planner was requested to split the position and assist; the Board considered this to be an appropriate action. The Board noted that the controller then overheard the Planner's telephone conversation with Swanwick Mil about the F-15s tracking south at FL370, not in communication with ATC, and the Board discussed whether his actions were appropriate after he overheard this information. The Board commended his decision to instruct the pilot of the B737 to expedite his descent to FL320 to try and achieve the required separation (5000ft vertically) from the F-15s, and the fact that he then became aware that PNTHR 21 had turned towards the B737 without apparent coordination. In collusion with the OJTI, the trainee then issued the right-hand avoiding action turn to the B737's pilot, and the ATC Board members agreed that this was the only practical option given that there was other potentially conflicting military traffic west of the aircraft's track. Notwithstanding, some members wondered whether it was prudent for the controller to have vectored the B737 towards traffic which was at an unknown level (TREK 14's SSR had occulted at the time) and without 5000ft separation. Civil ATC members believed that this had still been the best course of action because avoiding action was being provided against known opposite direction traffic at a similar level (PNTHR 21), and that it was reasonable to assume that TREK 14 was maintaining FL370 because other aircraft in the formation were at FL370 and its SSR Mode C had shown it to be at FL370 previously. Summing up they believed it was better to separate the B737 from a known confliction rather than from traffic which to all intents was probably well above the B737's level. In the event, because of the controller's actions, the B737 was well separated from PNTHR 21 and, although he did not achieve 5000ft vertical separation from the F-15s, the minimum vertical separation recorded was 3900ft (against TREK 11).

Having spent considerable time debating the facts of the event, the Board then conducted a further lengthy discussion concerning the cause of the Airprox. The Board considered that a number of issues were pertinent as possible causes, including the loss of communication with BLACKDOG; lack

of a robust recovery plan by the F15s; their continued track southbound in Class C airspace without a clearance; their use of the incorrect frequency; and the saturation of the Swanwick Mil Tac 2 controller. However, in the end, these were all determined as contributory factors and that the nub of the issue could be described as there having been a loss of positive control and coordination in the upper airspace between the F-15s and the B737.

As to the degree of risk; although the potential for a very serious incident had been present, it was considered that effective and timely actions, albeit only by the Montrose controller, had been taken to prevent the aircraft colliding.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The F15s and the B737 came into proximity following a loss of positive control and coordination in the upper airspace.

Contributory Factors:

1. ASACS radio failures.
2. The F15 formation did not have a robust recovery plan.
3. The F15 formation did not use Swanwick ICF.
4. Swanwick Military controller saturation due to multiple free-calling traffic, incorrect callsign usage and lack of coordination.

Degree of Risk: C.

ERC: 502