

## **AIRPROX REPORT No 2013038**

**Date/Time:** 15 May 2013 1057Z

**Position:** 5321N 00009W  
(20nm S of OTR VOR)

**Airspace:** London FIR (Class: G)

1st Ac 2nd Ac

**Type:** A320 Typhoon

**Operator:** CAT HQ Air (Ops)

**Alt/FL:** ↓FL60 FL150

**Weather:** VMC CLAC VMC CLAC

**Visibility:** 10km 20km

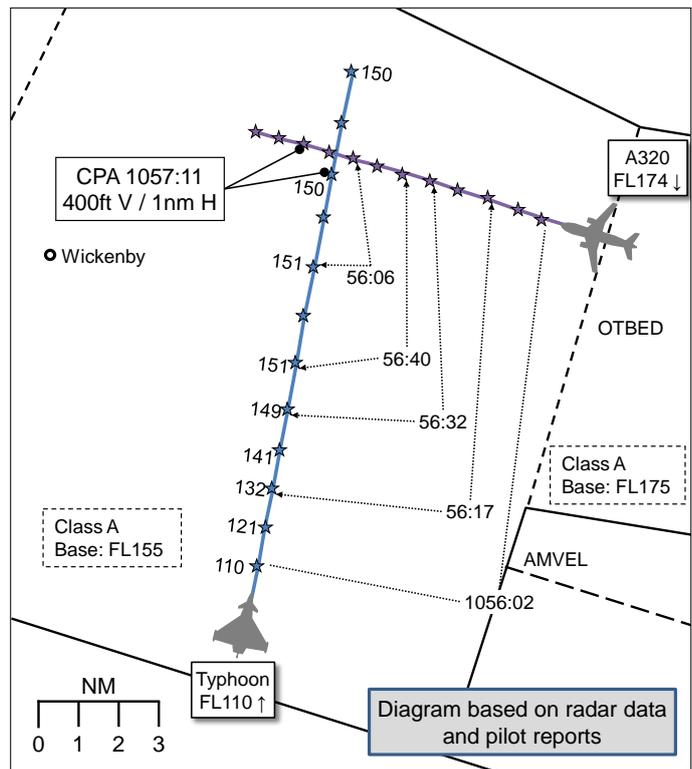
**Reported Separation:**

4-500ft V 6357ft Slant

3-6nm H

**Recorded Separation:**

400ft V/1nm H



## **Controller Reported**

### **PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

**THE APR CONTROLLER** reports that the A320 was released passing OTBED and on initial contact the crew requested a DS to leave CAS early. The APR trainee passed the Doncaster information and instructed the crew to descend to FL130. The OJTI saw the Typhoon climbing through FL80 and instructed to A320 crew to stop descent at FL160 which was read back he thought. APR continued to monitor the A320's progress and informed the crew that they would be remaining within CAS. The OJTI observed the A320 descending past FL160 and made broadcasts to the crew to maintain FL160, but did not receive any response initially. APR saw the Typhoon level at FL150 and the A320 descend to FL153 before climbing back to FL160. APR assessed the CPA as 1.5nm H and 300ft V.

**THE A320 PILOT** reports descending to FL160 under a 'traffic separation' service, he thought, from Doncaster APR and assessed the crew's workload as 'low to medium'. The crew received a further descent clearance to FL130 and shortly afterwards they received a clearance to continue descent to FL60, they thought; the Captain reports that both pilots understood the clearance, a read-back of the clearance to FL60 was transmitted and no correction was received. At around FL155-156 the crew received a TCAS TA indicating the Typhoon at FL150 crossing L to R, at 90° to the A320's track and in their 7-8 o'clock position, approx 3-6nm away and 400-500ft below them. They received, and complied with an instruction from APR to stop their descent immediately. Their lowest level was FL155, they thought.

He assessed the risk of collision as 'Low'.

**THE LATCC(Mil) NORTH-EAST CONTROLLER (LATCC(Mil) NE)** reports having no ac on frequency but was waiting for the Typhoon, which had been pre-noted for departure from RAF Coningsby to route N to OTA E at FL350. The Typhoon was handed over to LATCC(Mil) NE by Coningsby ATC under a DS, squawking Mode 3/A 6050 and climbing to FL150 to keep the ac clear of CAS. LATCC(Mil) NE saw the A320's radar return and noted that its data-block was indicating that the ac was inbound to Doncaster and had been cleared to descend to FL160, which would keep the ac inside CAS. The LATCC(Mil) NE controller planned to restrict the Typhoon to FL150 until it was N

of Y70. When the Typhoon pilot contacted him, LATCC(Mil) NE identified the ac and agreed a TS. The controller saw the Mode S of the A320 change to FL60 and its Mode C indicated a descent. The LATCC(Mil) NE controller passed TI to the Typhoon pilot when the A320 was 5nm away and 800ft above the Typhoon. The Typhoon pilot reported visual with the A320 and the controller assessed that the ac passed each other around 2nm apart with the A320's mode C indicating FL154. The controller was then informed by the Supervisor that Doncaster ATC were on the landline requesting co-ordination.

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

**THE TYPHOON PILOT** reports departing Coningsby, under a DS initially, and climbing to FL150. Once the ac was level he achieved radar contact with the A320 bearing 030° and range 12nm from his ac indicating 16000ft. He agreed a TS with LATCC(Mil) NE and received TI corresponding to the A320, with which he maintained visual and radar contact throughout the encounter; the minimum slant range separation recorded on the Typhoon's radar was 6357ft.

He assessed the risk of collision as 'Low'.

### **Factual Background**

The A320 was IFR, inbound to Doncaster from the E, in receipt of an RCS from Doncaster APR, and transponding Mode 3/A code 0551. The crew had selected the strobes, navigation lights, anti-collision lights and Modes C and S to on. The ac was flying at 240kts IFR in VMC and was equipped with TCAS2.

APR was providing surveillance services with the use of primary and secondary radar. There were no reported equipment unserviceabilities. APR was manned by a medium-hours trainee and OJTI controller. They had been in position for approximately 5 minutes at the time of the Airprox.

The Typhoon had departed Coningsby en-route to OTA E and the pilot was receiving a TS from LATCC(Mil) NE squawking Mode 3/A 6050. The pilot had selected HISLs, navigation lights and transponder Mode C to on and Mode S to off. The ac was flying at Mach 0.8 and hdg 010°.

### **Analysis**

#### **ATSI reports:**

ATSI had access to the Airprox report from APR, both pilot reports, area surveillance recordings and transcription of Doncaster's frequency, 126.225MHz. Supplementary information was obtained from Prestwick Centre Investigations and the APR telephone lines were also recorded.

The A320 was N-bound on airway UY70 and, at 1049:32 UTC, called Prestwick Centre (PC) E sector as it 'reached FL280'. The A320 pilot reported ready for further descent and was informed that this would be given shortly.

At 1050:27, the PC E Planner called APR for a release level on the A320. FL160 was given, and the A320 was released by PC E to Doncaster Approach passing OTBED.

At 1052:40, PC E descended the A320 to FL180, and this was read back correctly. As the A320 passed FL263, in the descent to FL180, the pilot informed PC E, '*we're ready for deconfliction service*'. The pilot was informed that this would not be required at that time.

At 1054:48, PC E descended the A320 to FL160, which was read back correctly and, as the A320 passed FL207 in the descent to FL160 it was transferred to APR.

The Typhoon became airborne from Coningsby's RW25 at 1054:45. The Typhoon took up a N'ly track, climbed to FL150, and was maintaining FL150 by 1056:40, approximately 11nm N of

Coningsby. Subsequently the pilot reported achieving radar contact with the A320 when the Typhoon levelled. At this time, the A320 was in the Typhoon's 1 o'clock, range 6.4nm, passing through FL164. The Typhoon pilot then acquired the A320 visually.

That part of airway Y70 between OTBED and VEGUS (15.4nm distance) is Class C airspace above FL195; the airspace is Class A below FL195. This section of the airway has a base/lower vertical extent of FL155. Whilst high terrain is not an issue in this case, as notified in the UK AIP, the lowest usable level of an airway will always be at least 500ft above the airway's base<sup>1</sup>.

The A320 called Doncaster APR at 1055:20, "descending flight level 160 on course to VEGUS information Romeo ready for deconfliction service." APR replied, "...vectors I L S approach runway 20 and er descend [1055:40] initially flight level 130." This was read-back correctly. See Figure 1.

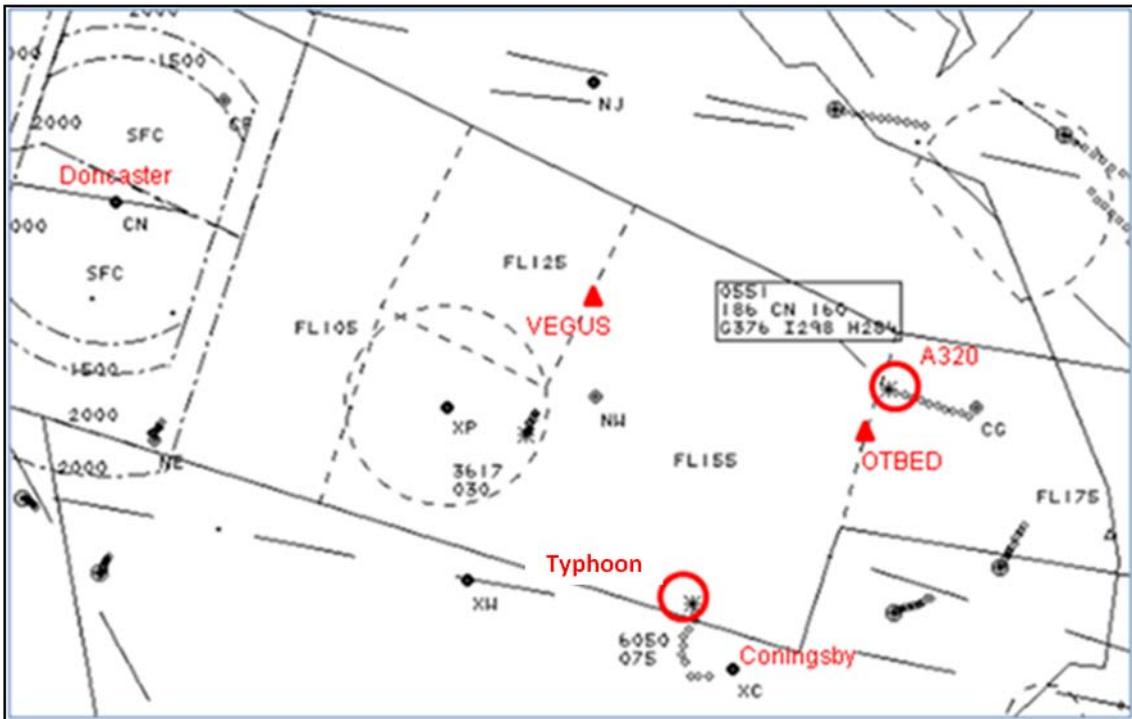


Figure 1: Area Multi Radar Tracking – 1055:40 UTC

The APR OJTI observed the Typhoon climbing-out of Coningsby on a N bound track and, at 1055:54, the APR OJTI took operational control and rapidly instructed the A320, "c/s stop your descent flight level 160." The A320 pilot replied, "Descend flight level six zero c/s".

Ac data transmitted by Mode S is not available to Doncaster's ANSP. At 1056:06, the surveillance replay (St. Annes) showed the A320's Mode S SFL change from 130 to 060. The A320 had approximately 47nm to touchdown.

Doncaster's ANSP utilises SSR data from, amongst others, the St. Annes radar. Therefore St. Annes' SSR data is referred to herein. The radar head has a 4 second update rate.

APR called LATCC(Mil) at 1056:40 to request co-ordination against the Typhoon; however, LATCC(Mil) stated that the ac was not yet working them and the request was disregarded.

At 1056:55 the A320 was in the Typhoon's 12 o'clock range 2.9nm passing FL160 (Figure 2). The A320's rate of descent at this time was 1728fpm.

<sup>1</sup>

UK AIP ENR 1.1-7 paragraph 1.6.1.2 (13 Dec 2012); and CAP493 Manual of Air Traffic Services (MATS) Part 1, Edition 4. Section 1 Chapter 6 paragraph 8.2 (22 November 2007).

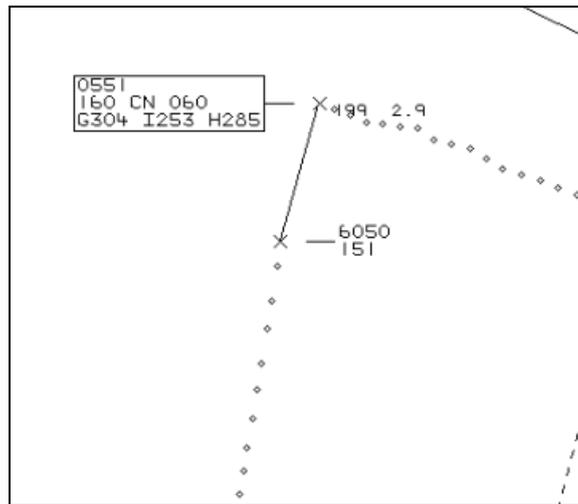


Figure 2: St. Annes – 1056:55 UTC.

NOTE: The Mode S data (SFL, IAS etc. was not available to APR)

At 1056:59 St Annes SSR showed the A320's Mode C as FL158. CAP493 states that 'Controllers may consider an ac to be at an assigned level provided that the Mode C readout indicates 200 feet or less from that level'<sup>2</sup>.

At 1057:00 the APR trainee informed the A320 that it would be kept inside CAS due to activity below the base of CAS and that further descent would be given shortly.

Mode C information from the St. Anne's Radar showed the A320's level at 1057:03 and 1057:07 as FL157 and FL156 respectively. The ac's rate of descent at this time was in excess of 1900fpm.

Immediately after the APR trainee had advised the A320 of the need to keep the ac inside CAS, at 1057:10, the APR OJTI resumed operational control and rapidly transmitted, "c/s confirm maintaining flight level 160".

There was no response and 7 seconds later the OJTI transmitted, "c/s you were instructed to maintain flight level 160":

- A320: "Confirm flight level 160 not six zero c/s"
- OJTI: "No you confirmed er you were told to stop [1057:30] your descent flight level 160"
- A320: "We understood we are cleared for flight level six zero c/s"
- OJTI: "Negative you were st- stop your descent flight level 160"
- A320: "Maintaining one six zero c/s".

During the above exchange, the incident was observed by the PC NE Planner, who placed a call to LATCC(Mil) and informed them that the A320 was with APR should the incident be mentioned by the Typhoon.

At 1057:11 the A320 passed FL154, leaving CAS, still descending as the Typhoon, maintaining FL150, flew behind it from left to right at a range of 1.1nm (Figure 3). This was the closest radar-derived point of approach: 6695ft ac to ac distance. [UKAB Note 1: The Claxby Radar indicates a CPA of 1nm/400ft V.] The Typhoon subsequently reported a minimum slant range of 6357ft.

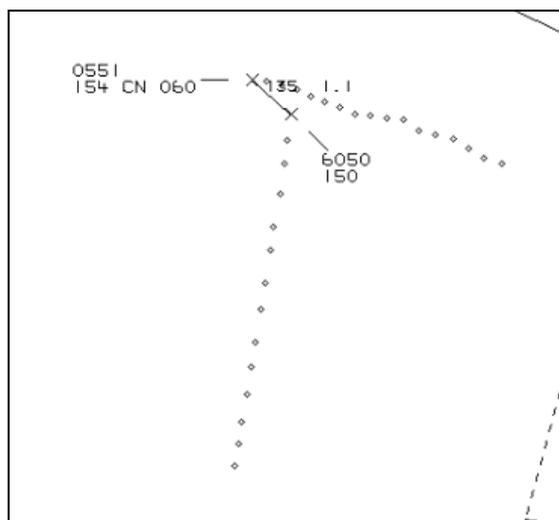


Figure 3: St Annes – 1057:11 UTC

The A320 pilot subsequently reported receiving a TCAS TA. The A320's Mode C showed that the ac levelled at FL153 for 22 seconds as its inertia changed from a rate of descent of 1696fpm to a rate of climb of approximately 500ft. The A320 resumed a slow climb and Mode C indicated that FL160 was not re-attained.

At 1058:22 as the A320 passed VEGUS the APR trainee resumed operational control and issued the A320 with descent to FL130. The A320 pilot replied, "confirm flight level one two zero." This was corrected by the trainee, "c/s it's er one tree zero". A correct read-back was then received.

At 1107:30 LATCC(Mil) called APR to discuss the incident stating that TI had been passed to the Typhoon and the pilot had seen the A320.

#### Comment

The UK AIP states that pilots of turbojet ac inbound to Doncaster are expected to apply continuous descent, low power, low drag approach techniques at all times<sup>3</sup>. Additionally, inbound ac are to maintain as high an altitude as practical. These expectations are presented in the context of Doncaster Airport and its notified airspace. It is noted that no Standard Terminal Arrival Routes (STARs) are published for traffic from the E inbound to Doncaster.

Doncaster's ANSP reported to ATSI that inbounds from the E very often request to leave CAS and accept a DS to allow for a more direct routing onto left or right base for RW20 or RW02 respectively. It was also reported that APR do not routinely allow traffic to leave CAS during the day time because of the increased possibility of military and VFR movements in the area, particularly traffic departing from Coningsby routing to the N. Similar requests during the evenings or at night would normally be accommodated and appropriate co-ordination made with neighbouring Humberside ATC.

The A320 passed abeam OTBED at FL186. The Figure 4, annotated with a nominal 3% continuous descent from OTBED (50nm from touchdown), shows that the A320 would have needed a shallower rate of descent to remain inside CAS until VEGUS. The blue arrows on Figure 4 illustrate the descent profile required to remain inside CAS; it can be seen that, for a straight-in approach (with no extending vectors), the base of CAS only reduces from FL105 to altitude 2000ft at approximately 16nm from touchdown.

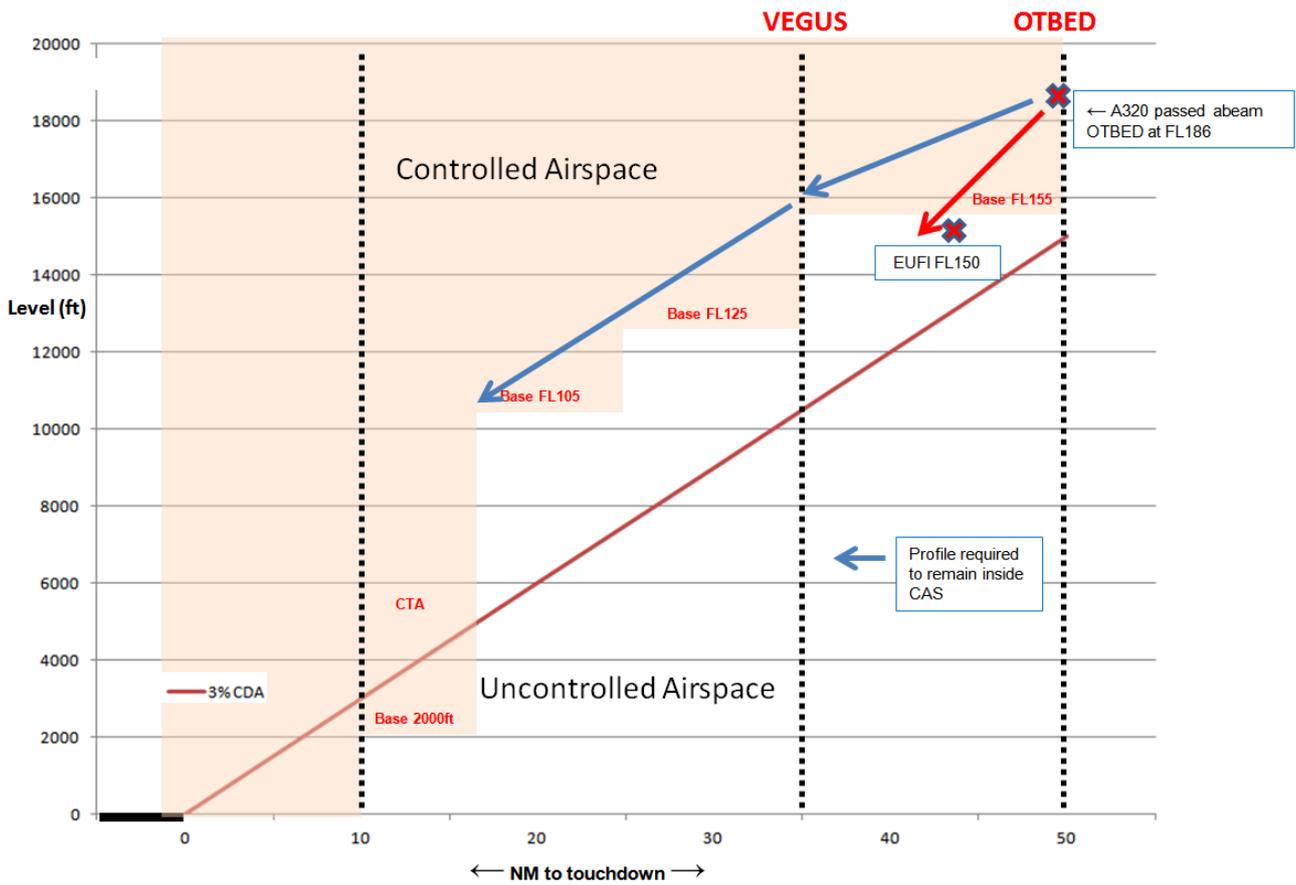


Figure 4: Descent Profiles

Prior to the establishment of CAS in the vicinity of Doncaster Airport in 2008 the pre-existing airways structure was as shown below in Figure 5. It can be seen that the bases of airway Y70 were, as they are now, from N to E: FL85, FL105, FL125, FL155. This facilitated climbs and descents for Manchester TMA and Leeds-Bradford traffic. When the Doncaster's CTAs were introduced there was no similar allowance made in airspace design.

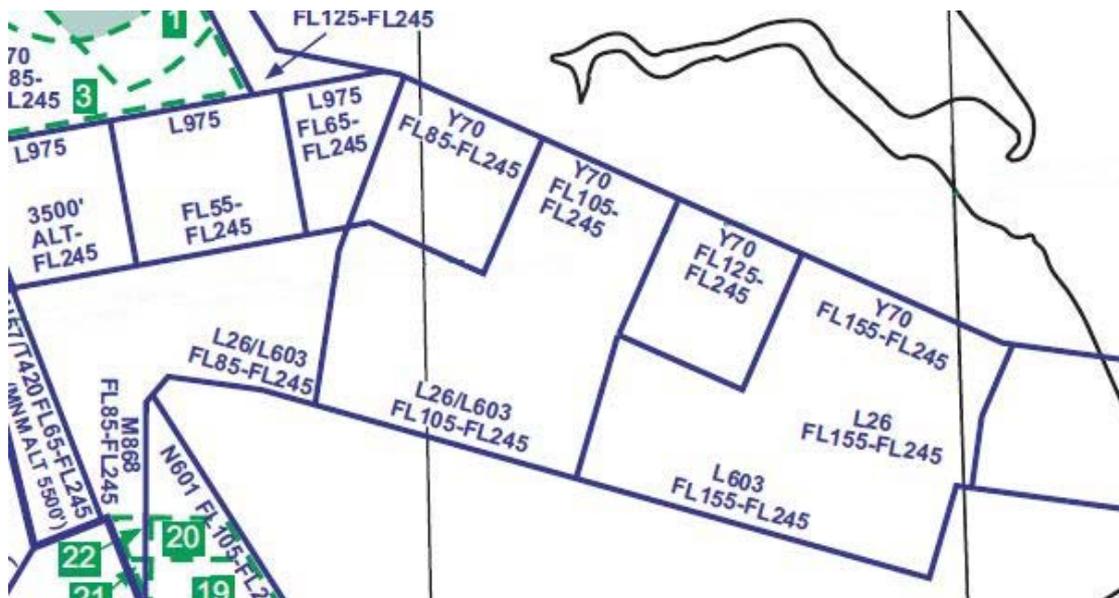


Figure 5: UK AIP ENR 6.1 AIRAC 08/2008

The A320 pilot informed ATC twice that they were ready for a DS. This very likely indicated an awareness of the nature of the A320's preferred descent profile, i.e. outside CAS, and an implication that the crew knew they were above their ideal level.

The APR trainee instructed the A320 to descend to FL130 when the ac was passing FL186 with 15nm still to run until the base of CAS lowered to FL125. There was no mention in the clearance of leaving CAS. Whether or not this was based on a judgement about the A320's flight profile, the APR OJTI spotted the presence of the Typhoon and took action to amend the trainee's instruction.

The delivery of the OJTI's stop instruction to the A320 was deemed by ATSI to have been delivered in a rapid manner. This may have compounded the crew's non-assimilation that they had been instructed both to stop descent and that the stop level was above that for which they had already been cleared.

Both the APR trainee and OJTI did not detect that an incorrect read-back had been received. It is possible that their attention may have been drawn to co-ordinating a possible radar solution with LATCC(Mil).

The APR OJTI was alert to the A320's level as it passed ahead of the Typhoon. This is supported by the OJTI's quick challenge to the A320 regarding its level once it had passed FL158.

The A320's reluctance to re-establish at FL160 may also support the statements above regarding the A320 being above its ideal profile and a preparedness to continue descent.

**BM SAFETY POLICY AND ASSURANCE** reports that the LATCC(Mil) NE Tac described their workload as low, providing ATS to only the Typhoon, and the task complexity as 'very easy'. The Typhoon pilot reported VMC, with 20km visibility and flying between layers of cloud with SCT at 5000ft. (All heights/altitudes quoted are based upon SSR Mode C from the radar replay unless otherwise stated.)

The incident sequence commenced with the handover of the Typhoon from Coningsby ATC to NE Tac, which occurred between 1056:16 and 1056:45. Immediately prior to the handover, at 1056:07, the Mode S 'selected level' data for the A320 changed to indicate that the pilot had selected FL60; Figure 6 depicts the incident geometry at this point, with the Typhoon climbing to FL150.



Figure 6: Incident Geometry at 1056:07.

NE Tac reported that they had sighted the A320 on their surveillance display, with a Doncaster inbound designator, and believed that it was indicating a Mode S of FL160 and that 'there was no requirement to ask Coningsby to call the [A320 during the handover]...as the [A320] was inside CAS and not indicating a further descent'. NE Tac also reported that they observed that the Mode S

'selected level' changed after the Typhoon had reported on their freq. Analysis of the radar replay and transcript demonstrated that NE Tac had either incorrectly recalled the sequence of events in compiling their report – a not un-usual occurrence due to the fragility of human memory – or, more likely, had made an error in interpreting the selected level data – probably due to the similarity of the 2 selected levels, FL60 and FL160 – possibly aided by expectation bias that the ac would remain within CAS. This notwithstanding, this error was neither causal nor contributory to this Airprox.

LATCC(Mil) UOB Section 3 Order 01.08 states that Doncaster Sheffield 'traffic squawking **6175, 6 and 7** will be joining or leaving Airway Y70 at ROGAG/OTBED'. Thus LATCC(Mil) controllers should expect that other Doncaster Sheffield inbound traffic with an assigned ORCAM SSR 3A code will remain within CAS. Although the A320's SSR 3A code was code callsign converted, the 3A code was 0551.

MMATM Ch 35 Para 18 states that 'Selected Levels display intent-based information only and **should not** be used for the purposes of separation'. Para 19 states that 'there are occasions where whilst the flight crew have correctly interpreted the ATC instruction, the Selected Level will be at variance. These situations will vary according to ac type, ac operator, and mode of operation, but may include...SID/STARs with vertical restrictions, where pilots may select the final cleared level, and utilise the ac flight management system to achieve the vertical constraints'. On that basis, it is reasonable to argue that the A320 could display a selected level of FL60, whilst remaining within the confines of CAS and posing no risk of conflict to the Typhoon at FL150.

The guidance material to CAP 774 Chapter 3 Para 5 states that 'Traffic is normally considered to be relevant when, in the judgement of the controller, the conflicting aircraft's observed flight profile indicates that it will pass within 3nm and, where level information is available, 3,000 ft of the aircraft in receipt of the Traffic Service...Controllers shall aim to pass information on relevant traffic before the conflicting aircraft is within 5nm, in order to give the pilot sufficient time to meet his collision avoidance responsibilities and to allow for an update in traffic information if considered necessary'.

At 1056:53, the Typhoon made initial contact with NE Tac who replied immediately "[Typhoon c/s] London Mil, identified FL150 Traffic Service. Traffic 12 o'clock, 3 miles, crossing right-left, indicating 800ft above, descending inbound to Doncaster." The Typhoon's pilot replied that they were "visual", later reporting that they had acquired the A320 on AI radar at 12nm and visually acquired it at 10nms. Figure 7 depicts the incident geometry at the time of the Typhoon's initial call to NE Tac.



Figure 7: Incident Geometry at 1056:53.

At 1057:03, the A320 indicated descent through FL157. Based upon the report of the A320 pilot, there may have been some confusion between the A320 and the Doncaster Sheffield controller over the A320's cleared level, which appears to have resulted in the A320 descending beneath the Base of CAS. The CPA occurred at 1057:10 as the Typhoon passed 1nm ESE of the A320; Figure 8 depicts the incident geometry at this point.



Figure 8: Incident Geometry at 1057:10

Given that the Typhoon pilot had acquired the A320 on AI radar at 12nms and visually acquired it at 10nms, the provision of TI inside 5nms by NE Tac was not a contributory factor to this Airprox. Given that the A320 descended through FL160 7sec prior to the CPA, and that this would have been the first point at which the NE Tac became aware of a potential problem, they were not in a position to affect the outcome of the incident. The E Bank Supervisor has stated that Doncaster Sheffield contacted them, rather than the NE Sector, to attempt to agree co-ordination but that they arrived at the console as NE Tac was providing TI at 1056:53 and thus too late to effect co-ordination.

BM SPA has highlighted to OC LATCC(Mil) the potential misunderstanding on the part of NE Tac, regarding their responsibilities for the provision of TI on ac within CAS to ac outside CAS.

LATCC(Mil) has agreed to BM SPA's request to liaise with Doncaster Sheffield to ensure that they have appropriate contact details for LATCC(Mil) sectors.

**HQ Air(Ops)** comment that the causal factors in this case related to the incorrect assimilation of the level instruction and the lack of detection of the incorrect readback of the instruction. In the event there was no risk as the Typhoon was well aware of the A320's presence through their service from LATCC(Mil) and their onboard systems. The ATSI citing of 'aggravating factors' is potentially misleading in that this normally indicates something that made the outcome of the occurrence worse. At best, those cited are contributory in that they made the event more likely. HQ Air contest the ATSI analysis that the airspace design was a factor in this event; the Airprox could have occurred even if the airspace was CAS and the Typhoon was there on a crossing service. Aircraft descending into Doncaster must be aware of the fact that a CDA profile will require flight outside CAS and prepare accordingly, or have a non-CDA option if they expect to remain in CAS throughout. Had the A320 been on a CDA before the incident there would have been no Airprox as the A320 would have been 2000 ft below the Typhoon.

## **PART B: SUMMARY OF THE BOARD'S DISCUSSIONS**

Information available to the Board consisted of the reports from the Typhoon pilot, A320 crew and air traffic controllers as well as RT transcripts and radar recordings.

The Board considered the issue of airspace design and whether it was common for CAT ac to leave CAS in this area. The Airline pilot members explained that, whilst a continuous descent profile would be preferred by most operators, and that this would likely require them to leave CAS under such a profile, they would be comfortable accepting a different profile in order to stay inside CAS, especially if there was any conflicting traffic. Whilst the Board agreed that CAT pilots should think carefully before leaving the protection of CAS when optimising their approaches, they concluded that the airspace design was not a significant influence on this Airprox.

The Board agreed that the root of the occurrence was that, having been cleared to FL130 previously, the A320 crew had not heard the revised clearance to FL160 correctly, and that the Doncaster APR controllers had subsequently not detected their incorrect read-back of FL60. Several members noted that mishearing and uncorrected readback had been a cause or contributing factor in a number of recent Airprox. Some ATC members opined that APR could have used the prefix phrase 'avoiding action', and passed TI in order to emphasise the new level to the A320 crew and change their mental model (which was probably to expect a further descent and which may have predisposed them to hear FL60 rather than FL160); The Board agreed that such a prefix would have been a helpful course of action. The Members wondered whether communication of flight levels below FL100 might be better enunciated as FL 0-6-0, for example, rather than FL 6-0 in order to provide another opportunity to cue pilots and controllers correctly, but it was felt that there would be potential for headings and flight levels to be confused so the Board decided not to make a recommendation in this area.

The Board noted that the LATCC(Mil) controller and the Typhoon pilot had acted as expected, and that the Typhoon pilot, having maintained both radar and visual contact with the A320 throughout, would have been able to take effective avoiding action if the conflict required it.

Overall, the Board agreed that, whilst there had been a serious reduction in normal safety margins, APR had reacted quickly when the A320 passed FL160, and that the Typhoon pilot had been in a good position to take further avoiding action if it had been necessary. Therefore the Board concluded that effective and timely actions had been taken, resulting in a Risk Grading of C.

The Board considered that the safety barriers pertinent to this Airprox were: 'ATC rules and procedures', 'controller action', 'controller action prompted by technology', 'aircrew rules and procedures', 'visual sighting', 'aircrew action', 'situational awareness gained from RT', 'situational awareness gained from on-board systems', 'situational awareness gained from ACAS' and 'compliance with a TCAS RA'. Of these, the Board concluded that 'ATC rules and procedures', 'controller action', 'aircrew rules and procedures' and 'situational awareness gained from RT' had produced limited or minimal effect, but that all of the other barriers, including those which still remained in reserve, had been effective: overall the Board graded the barriers as effective and the Airprox was allocated an Event Risk Classification score of 50.

## **PART C: ASSESSMENT OF CAUSE AND RISK**

Cause: The A320 pilot descended into conflict with the Typhoon following a misheard clearance and uncorrected read-back error.

Degree of Risk: C.

ERC Score: 50.