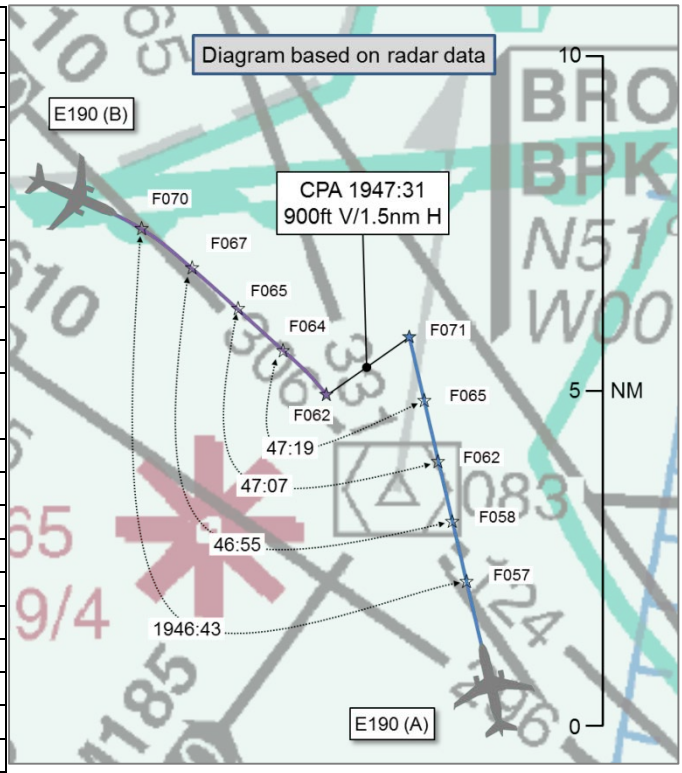
AIRPROX REPORT No 2015178

Date: 1 Oct 2015 Time: 1947Z Position: 5147N 00008W Location: BPK VOR

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	E190(A)	E190(B)
Operator	CAT	CAT
Airspace	London TMA	London TMA
Class	A	A
Rules	IFR	IFR
Service	Radar Control	Radar Control
Provider	NE Deps	NE Deps
Altitude/FL	FL69	FL63
Transponder	A/C/S	A/C/S
Reported		
Colours	Company colours	Company colours
Lighting	NK	Nav, strobes
Conditions	VMC	VMC
Visibility	10km	10km
Altitude/FL	FL50	6000ft
Altimeter	NK	NK
Heading	345°	110°
Speed	250kt	250kt
ACAS/TAS	TCAS II	TCAS II
Alert	TA	TA
Separation		
Reported	400ft V/2nm H	400ft V/5nm H
Recorded	0ft V/2.7nm H 900ft V/1.5nm H (CPA)	



THE EMBRAER E190 (A) PILOT reports that on departure from London City at night they were cleared to climb to FL80 on a radar heading of approximately 345°. Both pilots noticed another aircraft converging on them on TCAS, above their level on a converging heading. A TCAS TA was triggered. The First Officer (FO) slowed the rate of climb. ATC then gave the other pilot an avoiding action heading and asked them to expedite their climb to FL100. No TCAS RA was received, despite both pilots expecting one. They kept visual contact with the other aircraft at all times, and complied with ATC to expedite climb. At its closest the aircraft was just under 2nm and 400ft below their aircraft. ATC were obviously aware of the issue due to their instructions, and due to lack of RA, they felt there was nothing further to report to them. On reflection they felt this incident was worthy of report due to the distance between the aircraft and the avoiding action required to be issued by ATC.

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

THE E190(B) PILOT reports that, inbound to London City at night, whilst descending on heading 110° past BPK VOR from FL80 to 5000ft at approximately 1000ft per minute, TCAS indicated initially no conflict on an aircraft 5nm ahead. This immediately changed to a TA. The descent rate was reduced to 500fpm even though increased rate of descent would have increased separation. ATC called for an immediate right turn heading 155°. The other aircraft passed above and to the left with about 400ft vertical separation at the closest point. All passengers were already secured.

He assessed the risk of collision as 'Medium'.

THE SWANWICK NE DEPARTURES RADAR CONTROLLER reports that he made a judgement error while climbing E190 (A) against E190 (B). When he realised that separation was going to be

lost he issued avoiding action to the pilot of E190 (B), but it was too late to prevent a loss of separation.

Factual Background

The weather at London City was recorded as follows:

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EGLC 011920Z 05008KT 9999 FEW024 14/09 Q1030=
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Sunset time (London) was 1838.

Analysis and Investigation

CAA ATSI

ATSI had access to reports from the controller, both pilot reports, the area radar recordings and a copy of the RTF frequency. Screenshots produced in the report are provided using the area radar recordings.

At 1943:01, the E190 (A) (squawk 4231) pilot called the NE Departures Controller climbing to 3000ft on the BPK5U Standard Instrument Departure. The controller instructed the pilot to climb to 5000ft. At 1945:02, the E190 (B) (squawk 5427) pilot called the same controller descending to FL70 on a heading of 105°. At 1945:40, the E190 (A) pilot was turned right 10° and climbed to FL80. (Figure 1).

At 1946:18, the controller instructed the E190 (B) pilot to descend to 6000ft and to turn right heading 120°. At 1946:44, the controller instructed the E190 (A) pilot to climb to FL100 and to expedite the climb. The two aircraft were 7.9nm apart at this time. (Figure 2).

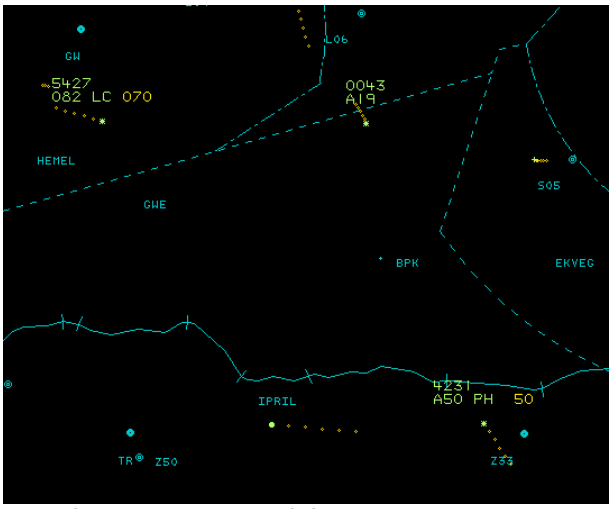

Figure 1 – Swanwick MRT at 1945:40.

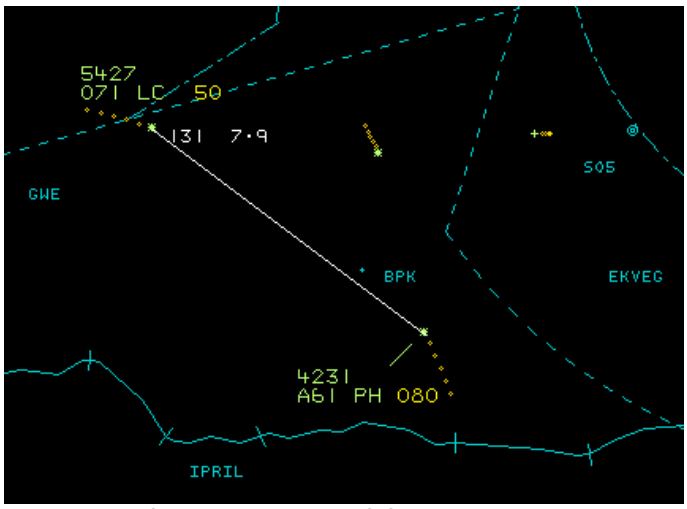

Figure 2 – Swanwick MRT at 1946:44.

At 1946:53, the Short Term Conflict Alert (STCA) started to flash on the controller's radar display. (Figure 3).

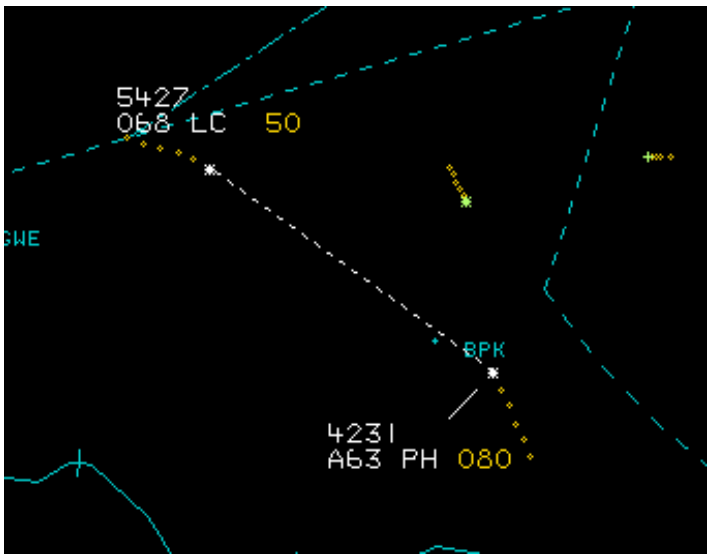

Figure 3 – Swanwick MRT at 1946:53.

At 1947:02, the controller instructed the E190 (B) pilot to turn right onto heading 140°. This was not acknowledged on first transmission so a second transmission was made. During this second transmission the controller made a correction and gave an avoiding action turn onto heading 155°. CPA occurred at 1947:26 with 1.6nm lateral and 600ft vertical displacement (Figure 4).

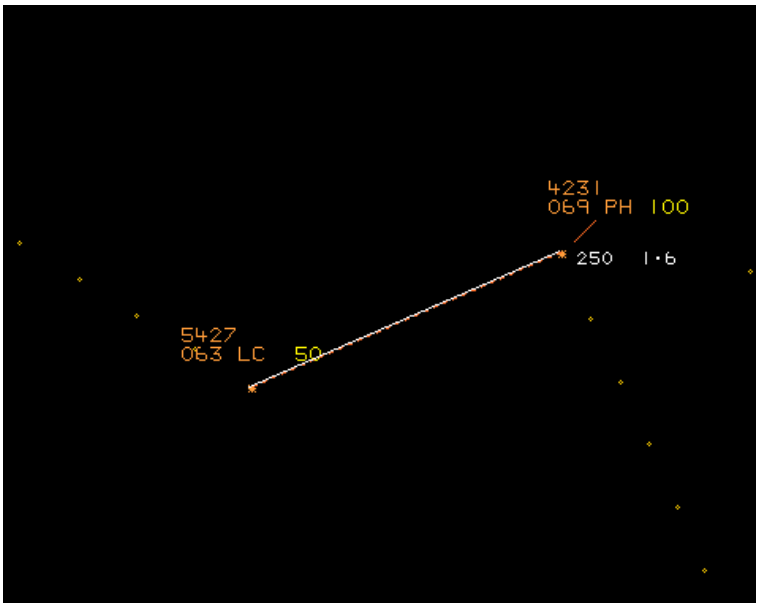

Figure 4 – Swanwick MRT at 1947:26 (CPA)

Although both pilot reports indicated an awareness of the other aircraft by TCAS TA reports (and continued visual sighting by one pilot), neither pilot received a TCAS RA. The controller's RT workload was moderate and there were no reports of any unusual weather, non-standard traffic or equipment unserviceability.

When both pilots initially called the controller, they were proceeding to levels that would maintain vertical separation. In the knowledge that the two aircraft would need to be climbed/descended through each other's level (a level swap), and conscious that a conflict would exist, the controller issued tactical headings to both pilots in order to provide positive control. In executing the plan to climb/descend the respective aircraft, the controller monitored the progress of the two aircraft. As the situation developed it became apparent that the headings chosen and the relative climb/descent rates of the aircraft were not achieving the desired outcome and so further heading changes were made. When the STCA activated, the controller attempted to turn the E190 (B) pilot

but this took two attempts. This could have been caused by the controller attaching the incorrect prefix to the aircraft's callsign (on both attempts), although, with the added emphasis of the term 'avoiding action' the pilot acknowledged the second call and complied with the instruction.

Although the controller gave an avoiding action turn the heading was not sufficient and the instruction was not made early enough to prevent a loss of separation.

UKAB Secretariat

In Class A airspace it is the controller's responsibility to separate aircraft[1]. The required separation was 3nm horizontally or 1000ft vertically.

Summary

An Airprox was reported when two E190s flew into proximity at 1947 on Thursday 1st October 2015. Both pilots were operating under IFR in VMC at night, in receipt of a Radar Control Service from the Swanwick NE Departures Radar controller. The controller was carrying out a level swap between the two aircraft but, due to a misjudgement, he did not achieve standard separation between them. He issued an avoiding action turn to the E190 (B) pilot, but did not use the correct prefix, which caused a delay in him taking up the instruction. The E190 (A) pilot was instructed to expedite climb.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

The Board commended the TC NE Departures controller for his frank and honest report regarding his misjudgement of the dynamic separation between the two E190s and quickly agreed that this was the root cause of the incident. In discussing the potential human factors behind this incident, it was noted that he had been presented with a situation where he had had to carry out a level swap between E190 (A), which was outbound from London City Airport and E190 (B), which was inbound to the same airport. A Civil ATC Terminal member, who has experience of the sector, explained that the TMA airspace around BPK can be very busy, and the NE sector's airspace is also restricted by Luton's and Heathrow's area of operation. He added that the controller in question was a very experienced TC controller and that this type of level swap was not unusual - it can occur up to 30 times during a shift. As a possible explanation, he thought that the relatively high atmospheric pressure at the time may have been a factor. The London QNH was 1030hPa; this is equivalent to an approximate difference of 460ft from the standard pressure of 1013hPa. This meant that an aircraft indicating FL60 on 1013hPa would actually be at 6460ft; conversely, an aircraft indicating 6460ft altitude would then indicate FL60 when the standard setting was applied. On this occasion, the level of E190 (B) was showing on the radar display as a FL and, just prior to the Airprox, E190 (A)'s level was showing as an altitude. The ATC member opined that this display of altitude may have lulled the controller into thinking that E190 (A) was relatively higher than it was in relation to E190 (B) and that vertical separation would be more likely to be achieved as it climbed through E190(B)s level. The radar recording timed at 1946:56 shows the aircraft were 5.2nm apart and that E190 (A)'s Mode C label changed from altitude 6300ft to FL60, an apparent loss of 300ft; at the time E109 (B)'s Mode C was showing FL67 and so what had appeared to be an almost co-altitude situation (with height separation about to increase) now became more obviously a situation where the climbing aircraft was 400ft or so below the other aircraft and height separation was still decreasing. Potentially exacerbating this misperception of altitude, the Civil ATC member added that the controller had only been on the NE Departures sector for about 15 minutes prior to the Airprox and had previously been working on a sector where he had been controlling aircraft all using standard pressure setting FLs; as a result, the ATC member thought that it may have been possible that the controller in question had not assimilated the fact that the QNH pressure setting was high and,

[1] CAP 493, Manual of Air Traffic Services Part 1, Section 1, Chapter 2.

therefore, its significance with respect to aircraft that were operating with mixed settings as they crossed the Transition Level.

The Board then went on to discuss how the actions of the pilots of both aircraft had affected the occurrence. It was noted from the pilot reports that they had both changed their respective rates of climb/descent after receiving TCAS TAs. A lengthy discussion took place about whether it was appropriate to take action relative to a TA. Civil Airline Pilot members commented that they could understand the temptation of doing so in certain circumstances, i.e. when TCAS displays showed unfolding conflicts of which ATC might not be aware, and where early action might prevent an unnecessary RA. However, this incident highlighted the potential pitfalls of acting on TAs rather than using them as a precursor warning to prepare to act on receipt of an RA. In this incident, the descending E190 pilot shallowed his descent due to reacting to the TA against the E190 climbing from below. For his part, the climbing E190 pilot shallowed his rate of climb due to reacting to the TA against the descending E190 from above. Counter-intuitively, the geometry was such that the pilots should have instead increased their rates of climb and descent to increase the separation. In a similar vein, one Airline Pilot member recalled a previous Airprox[2] that had occurred where an RA reverse level change had been necessary after a pilot had reacted to a TA by reducing his climb rate. In short, pilots should be confident that the TCAS RA will allow them time to react to a conflict if necessary and should not manoeuvre on TCAS TAs. This is especially true when considering that TCAS RAs allow for 5sec reaction time; by preparing to immediately manoeuvre when a TCAS RA is generated, this 5sec effectively becomes an additional manoeuvre margin. ICAO PANS-OPS Doc 8168 is explicit in respect of manoeuvring on receipt of TCAS TAs as follows:

> 'The indications generated by ACAS shall be used by pilots in conformity with the following safety considerations:
>
> a) pilots shall not manoeuvre their aircraft in response to traffic advisories (TAs) only;
>
> Note 1. — TAs are intended to alert pilots to the possibility of a resolution advisory (RA), to enhance situational awareness, and to assist in visual acquisition of conflicting traffic. However, visually acquired traffic may not be the same traffic causing a TA. Visual perception of an encounter may be misleading, particularly at night.
>
> Note 2. — The above restriction in the use of TAs is due to the limited bearing accuracy and to the difficulty in interpreting altitude rate from displayed traffic information.
>
> b) on receipt of a TA, pilots shall use all available information to prepare for appropriate action if an RA occurs;' [3]

Notwithstanding their shallowing of climb and descent, the Board noted that both pilots had still complied with the minimum rates of climb and descent as stated in the UK AIP[4]:

> 'In order to ensure that controllers can accurately predict flight profiles to maintain standard vertical separation between aircraft, pilots of aircraft commencing a climb or descent in accordance with an ATC Clearance should inform the controller if they anticipate that their rate of climb or descent during the level change will be less than 500 ft per minute, or if at any time during such a climb or descent their vertical speed is, in fact, less than 500 ft per minute.'

The Board then turned its attention to the risk in this incident. The Board noted that at 1.5nm at CPA, the required standard separation had been only half that required. Notwithstanding, they also noted that as soon as the controller had realised that separation had not been assured, he had issued the E190(B) pilot with an avoiding action turn, albeit the response had been delayed because he had used an incorrect callsign prefix. Taking all of this into account, the Board considered that, overall,

[2] Airprox 2011007, an E170 outbound from London City and an A319 inbound to Heathrow.
[3] ICAO PANS-OPS, DOC 8168, Appendix, Volume I (Flight Procedures), Part VIII (Secondary Surveillance Radar (SSR) Transponder Operating Procedures), Chapter 3 (Operation of ACAS Equipment), paragraph 3.2 (Use of ACAS Indications).
[4] Page ENR 1.1-12, Paragraph 3.2.2.4.1.

timely and effective action had been taken to prevent the possibility of a collision and that the incident should be classified as a risk Category C.

During a post assessment summary discussion, the Board were heartened to hear from a Civil ATC TC member that, following a recent change to London TMA procedures, the scenario that had led to this event had been removed by the adoption of different routeing procedures for London City traffic.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The NE Departures controller misjudged his resolution of the confliction.

Degree of Risk: C.