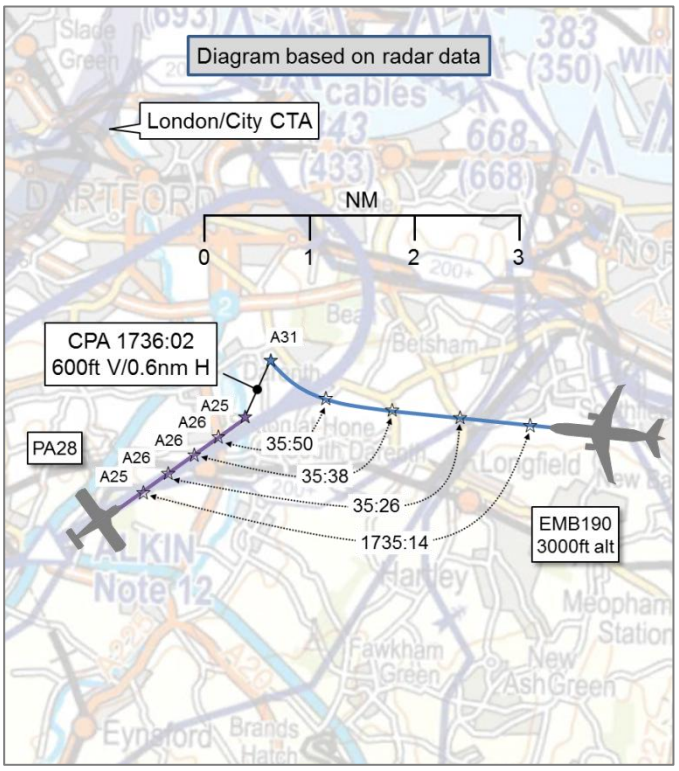
AIRPROX REPORT No 2014171

Date/Time: 7 Sep 2014 1740Z (Sunday)

Position: 5125N 00015E (5nm S London/City Airport)

Airspace: London TMA/FIR (*Class*: A/G)

	Aircraft 1	*Aircraft 2*
Type:	EMB190	PA28
Operator:	CAT	Civ Club
Alt/FL:	3000ft QNH (1016hPa)	2300ft QNH
Conditions:	VMC	VMC
Visibility:	10km	>10km
Reported Separation:	200ft V/0nm H	NK
Recorded Separation:	600ft V/0.6nm H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE EMBRAER EMB190 PILOT reports that he was inbound to London City Airport (LCY) under IFR in VMC. He did not report the aircraft's lighting state; TCAS I was fitted. While flying under radar vectors on a downwind position to the airport, ATC advised them of an aircraft that was outside Controlled Airspace (CAS). It was first seen on his TCAS at 5nm. They continued to monitor the aircraft and noticed that it appeared to continue to climb into CAS with the vertical separation decreasing at a high rate. ATC issued an avoiding action turn, which was commenced. TCAS announced an RA 'monitor vertical speed' instruction but, due to the closing speed, the First Officer (FO) said "I think we should climb"; he did not disagree with the FO. The aircraft was climbed 200ft which maintained 200ft separation from the other aircraft. Once the RA warning cancelled, they announced to ATC that they were returning to their assigned altitude. Although the visibility was given as greater than 5km, they never managed to acquire the aircraft visually because they were flying into the sun and in very hazy conditions.

He assessed the risk of collision as 'High'.

The Aviation Communication and Surveillance Systems (ACCSS) report requested by the EMB190's operating company has been provided to UKAB.

'A Traffic Advisory (TA) was first issued while own aircraft was maintaining an altitude of 2900ft. The intruder aircraft at this time was increasing in altitude and was at 2498ft (402ft Relative Separation). Range to the intruder aircraft was at 2.36nm with a relative bearing of 337° from own aircraft.

A Resolution Advisory (RA) command was issued 12 seconds later while own aircraft was still maintaining an altitude of 2900ft. The intruder aircraft at this time continued to climb and was now at an altitude of 2518ft (382ft relative altitude separation). Range to the intruder aircraft was at 1.54nm with a relative bearing of 334° from own aircraft.

The Resolution Advisory (RA) continued for another 14 seconds as own aircraft was maintaining an altitude of 2900ft and then 2 seconds increased in altitude to 2954ft. The intruder aircraft at this time was maintaining an altitude of 2500ft (454ft relative altitude separation). Range of the intruder aircraft was at 0.72nm with a relative bearing of 318°.

The Resolution Advisory (RA) was discontinued 4 seconds later as own aircraft was increasing in altitude to 2972ft. The intruder aircraft at this time was decreasing in altitude to 2438ft (534ft relative altitude separation). Range of the intruder aircraft was at 0.63 NM with a relative bearing of 0°.

The crew reacted to ATC instructions just before a TCAS monitor RA was issued. From the Safety report the crew reports the intruder aircraft got to 200ft below and still climbing.

The closest point of approach occurred when the intruder aircraft increased in altitude to 2500ft (400ft relative altitude separation from own aircraft) at a range of 0.72 NM from own aircraft with a relative bearing of 321°. Own aircraft at this time was maintaining an altitude of 2900ft.'

THE PA28 PILOT reports that he was on a VFR cross-country flight in VMC. Navigation lights and a rotating beacon were illuminated; SSR Modes C and S were selected. ACAS was not fitted. The first he heard about the Airprox was an email dated 21st September (two weeks after the event). He said that he completed the Airprox form with what he could recollect, bearing in mind that the incident occurred two weeks before the email and, consequently, some replies were from memory. He was in receipt of a Basic Service from Biggin Hill. He transited overhead Biggin Hill at 2300ft QNH on the squawk provided by Biggin. His heading was 060°. After passing Swanley, Biggin transferred him to Southend Approach who instructed him to squawk 4575 (he thought). He recalled that he routed southeast of Swanley and east of Dartford Bridge maintaining heading and altitude. He did not sight the EMB190.

THE LCY DIRECTOR reports that he was mentoring a new trainee on the sector. At approximately 1736 he noticed a 7000 squawk northeast bound in the vicinity of ALKIN, indicating 2500ft. Controlled Airspace Infringement Tool (CAIT) was not indicating an entry into CAS by this unknown aircraft. The EMB190 was to the east of this contact, at 3000ft, tracking westbound. He passed Traffic Information to the pilot of the EMB190 on the unknown, stating that it was outside CAS. As the EMB190 came within 4nm of the 7000, the 7000 aircraft appeared to climb to 2600ft indicated and activated CAIT [its squawk would be seen coloured magenta]. He immediately issued the EMB190's pilot with an avoiding action turn onto north and updated the Traffic Information. He shouted over to the Thames Co-ordinator to stop departures. Shortly after the avoiding action, the pilot of the EMB190 reported a TCAS RA climb. The aircraft squawking 7000 was then seen to descend to 2400ft and put on a Southend Approach squawk. Southend were contacted by the Group Supervisor and the aircraft's details were obtained, together with verification of the Mode C. The Southend QNH 1015hPa was passed for the validation of Mode C.

Factual Background

The LCY weather was:

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EGLC 071720Z 04004KT 010V070 9999 FEW040 20/11 Q1015=
EGLC 071750Z 02004KT 350V050 9999 SCT040 20/10 Q1016=
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Analysis and Investigation

CAA ATSI

ATSI had access to reports from both pilots and the LTC controller together with area radar recordings and RTF and transcripts of the City Director and Southend Radar frequencies.

An Airprox was reported between an EMB190 and a PA28 in the London TMA (Class A airspace), 8nm southeast of LCY when the Mode C of the PA28 indicated 2600ft as the EMB190 was maintaining 3000ft tracking westbound towards the PA28. The EMB190 pilot was operating under IFR on a flight inbound to LCY and was in receipt of a Radar Control Service from the LTC City Director. The PA28 pilot was operating under VFR on a cross-country flight to Southend and was in receipt of a Basic Service from Biggin Hill.

At 1734:25, the EMB190 pilot contacted City Director, maintaining 3000ft on a westerly track. The PA28 was 7.5nm west-southwest of the EMB190, squawking 7000 and indicating 2400ft (unverified) (Figure 1). The City Director informed the EMB190 pilot that he was number three in traffic with 28nm to run.

Figure 1

At 1735:00, the PA28 pilot reported to Southend that he was at 2400ft on 1016hPa. The area radar recordings showed the PA28 indicating 2500ft. At 1735:10, the City Director informed the EMB190 pilot of "*traffic eleven o'clock range three and a half miles crossing er left to right indicating altitude two thousand five hundred feet, he is outside controlled airspace*." (Figure 2). This was acknowledged by the crew of the EMB190.

Figure 2

At 1735:32, the City Director gave avoiding action to the EMB190 pilot as "[EMB190 C/S] *avoiding action turn right immediately heading three six zero degrees, that traffic's entered controlled airspace showing two thousand six hundred feet, southwest of you by two miles*." (Figure 3). The EMB190 pilot reported being in the turn.

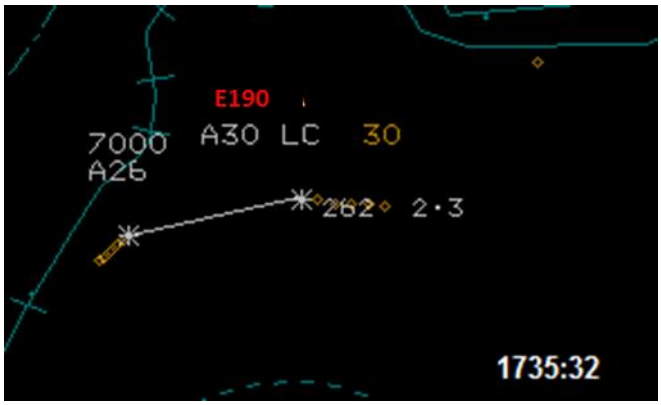

Figure 3

At 1735:53, the EMB190 pilot reported a TCAS RA. (Figure 4).

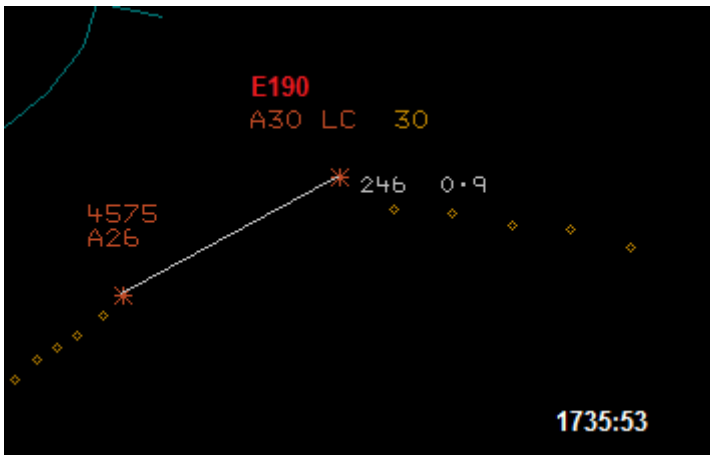

Figure 4

CPA occurred at 1736:00, when the aircraft were 0.6nm apart horizontally; the EMB190 at 3100ft and the PA28 indicating 2500ft. (Figure 5).

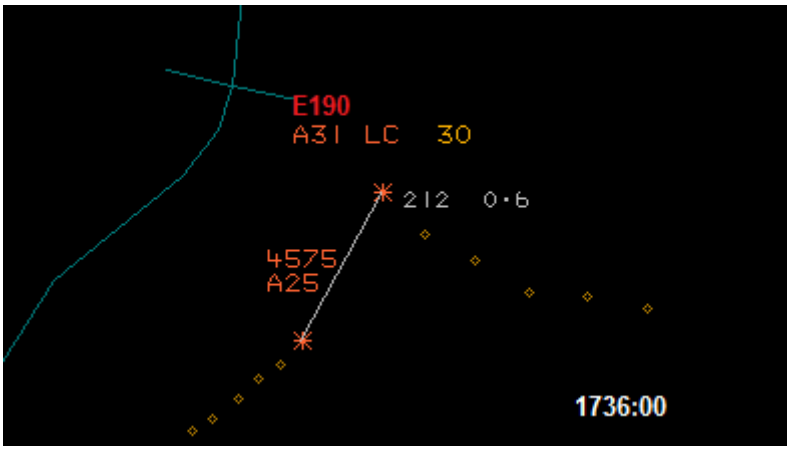

Figure 5

The EMB190 pilot reported clear of conflict and descending to 3000ft at 1736:12. The Mode C of the PA28 was not verified until 1736:35 after Southend requested a level report from the pilot of the PA28.

An aircraft can be considered to be at an assigned level when the Mode C readout indicates 200ft or less from that level. When the Mode C of the PA28 was 2600ft it was unverified. The PA28 pilot had previously reported at 2400ft to Southend. The accuracy of transmission of Mode C information is dependent on various issues which the 200ft tolerance is designed to account for. It is therefore difficult to know if the PA28 infringed CAS but the pilot reported being at 2400ft shortly before the incident. The City Director could not be certain whether or not the PA28 was infringing CAS and took appropriate avoiding action with the EMB190.

UKAB Secretariat

CAP 493 (Manual of Air Traffic Services Part 1) Section 1, Chapter 6, Page 17 and Chapter 7, Page 5 state:

> 'A position symbol which cannot be associated with an aircraft known by the controller to be operating within the airspace concerned shall be considered to represent an unknown aircraft.
>
> The action to be taken by controllers when they observe an unknown aircraft, which they consider to be in unsafe proximity to traffic under their control, in various types of airspace is as follows:

Class A: 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.

When avoiding action is issued to an IFR aircraft under a Radar Control Service, controllers must seek to achieve the required minima and pilots must comply with the instructions given. It is recognised that it may not always be possible for controllers to achieve the required separation minima against unknown traffic infringing controlled airspace due to the potential for their sudden appearance and/or unpredictable manoeuvres; however, controllers shall apply all reasonable endeavours.

Except when aircraft are leaving controlled airspace by descent, controllers should not normally allocate a level to an aircraft which provides less than 500 feet vertical separation above the base of a control area or airway. This will provide some vertical separation from aircraft operating beneath the base of controlled airspace.'

Summary

The Airprox was reported by the EMB190 pilot, who was inside Class A airspace at 3000ft (base 2500ft), against a PA28 that was operating outside CAS reportedly at 2400ft but whose SSR height readout displayed 2600ft. The City Director complied with CAP 493 procedures by issuing an avoiding action turn to the EMB190 pilot when he observed the Mode C of the PA28 indicate 2600ft. The EMB190 pilot subsequently received a TCAS RA for a short period.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

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

The Board commended the actions of the London City Director. They noted that he had been appropriately aware of a possible infringement of CAS by an unknown aircraft (the PA28) and had issued timely Traffic Information to the EMB190 pilot. When his radar display indicated that the PA28 had climbed into the Class A airspace of the London TMA, he immediately issued the EMB190 pilot with Traffic Information and an avoiding action turn away from the PA28. This complied with the action stated in CAP 493 regarding radar derived information indicating that an aircraft has made an unauthorised penetration of Class A airspace.

The Board then discussed the actions of the EMB190 pilot. It was noted that after ATC had issued an avoiding action turn the pilot received a TCAS RA to 'monitor vertical speed'. Due to the closing rate with the other aircraft the pilot reported that he climbed 200ft above his cleared altitude. Airline Pilot members were surprised that the pilot had decided to climb having received a 'monitor vertical speed' RA when, in their opinion, Standard Operating Procedures would not have allowed this action[1]. Civil Area ATC members also commented that any climb above a cleared level within the busy airspace of the London TMA could lead to a domino effect on other traffic. Radar recordings show that the EMB190 climbed 100ft above its cleared altitude.

The Board noted the comments made in the ATSI report concerning the 200ft tolerance of an SSR Mode C readout. The PA28's SSR return showed 2600ft (unverified) just after the pilot had reported at 2400ft. They agreed that it was therefore not possible to positively ascertain whether or not the PA28 did enter CAS. Notwithstanding, on the assumption that the PA28 pilot did not enter CAS, they opined that this served as a salutary reminder to pilots flying VFR under controlled airspace that they should apply a margin of at least 200ft height separation if possible in order to avoid such

[1] A Eurocontrol Safety Reminder Message, dated 25th May 2007 (modified on 19th September 2010) titled 'Misinterpretation of TCAS RA Aural Annunciation Messages' stated that: 'Monitor Vertical Speed' RAs always require the pilot to avoid the vertical speeds prohibited on the RA display. Typically, a 'Monitor Vertical Speed' RA does not require a change in vertical speed.

circumstances where their SSR height readouts might cause controllers or TCAS-equipped aircraft to react to erroneously indicated penetrations of CAS.
The Board considered that the cause of the Airprox and the associated ATC avoiding action turn and TCAS RA manoeuvre was due to the SSR Mode C returns indicating that the PA28 had entered CAS and also impinging on the TCAS alerting envelope. Such indications and TCAS RAs were highly undesirable, but the Board considered that the actual separation of 600ft and 0.6nm were within normal safety standards and parameters for VFR traffic. Whilst acknowledging the undesirability of a TCAS RA and avoiding action turns when conducting IFR flight in the vicinity of VFR traffic, the Board considered that the cause of the Airprox was a TCAS/SSR sighting report with a collision risk assessment of Category E.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: A TCAS/SSR sighting report.

Degree of Risk: E.

ERC Score[2]: 2.

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