

AIRPROX REPORT No 2012156

Date/Time: 6 Oct 2012 1536Z (Saturday)

Position: 5131N 00028E
(8nm SW Southend)

Airspace: Lon FIR (Class: G)

Reporter: Southend Approach

Type: 1st Ac 2nd Ac
ATR 42 A109

Operator: CAT Civ Comm

Alt/FL: 1500ft 1500ft
(QNH NK) (NK)

Weather: VMC CLBC VMC NK

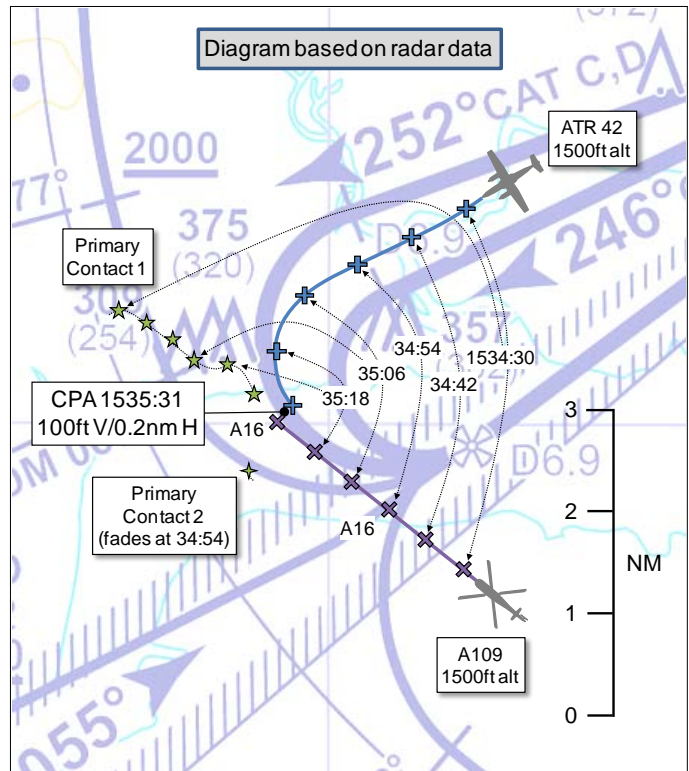
Visibility: 10km NK

Reported Separation:

200ft V/200ft H 2-3nm

Recorded Separation:

100ft V/0.2nm H



CONTROLLER REPORTED

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE SOUTHEND APPROACH CONTROLLER reports that at approximately 1533 an ATR 42 pilot, under a PS due to radar unserviceability, reported coming 'quite close' to 2 ac whilst in the base turn of the ILS procedure for RW06. Neither of the conflicting ac were on frequency; however, one secondary contact was observed on the A/D Traffic Monitor (ATM) displaying a London Information squawk. The controller contacted London Information and requested control of the contact ac but was informed it had just left their frequency. TI was passed to the ATR 42 pilot who reported 2 ac in sight, one of which he believed to be a M/L. The ATR 42 pilot subsequently reported receiving a TCAS RA; however, he elected to continue with the traffic in sight.

THE ATR 42 PILOT reports carrying out a procedural ILS approach to Southend RW06, operating under IFR in VMC with a PS from Southend APP [130.775MHz]. He was PNF in the L seat, and the First Officer was PF in the R seat. The white ac had strobes and navigation lights selected on. The SSR transponder was selected on with Modes A, C and S and the ac was fitted with an ACAS, also selected on. The PF was turning L through 200° at 150kt and altitude 1500ft [QNH NR], inbound to intercept the RW06 LOC, when they both saw a helicopter in the R 2 o'clock position, slightly high, at a range of approximately 300ft. Immediately afterwards the TCAS alerted with a RA. The PF disconnected the autopilot and started to follow the TCAS RA, which was demanding a 1000fpm descent. However, they were both aware of the proximity of chimney stacks with significant vertical extent so the PF 'continued a high bank turn to the left'. As the helicopter passed behind them the TCAS RA discontinued. They then saw a M/L, as the PF turned to intercept the RW06 ILS, which was also very close.

He stated that if the TCAS RA had not been initially followed he was sure this would have been a much more serious incident, as they probably only had separation of about 200ft from both ac. However, if the TCAS had continued to demand the rate of decent, the ac would have become dangerously close to the structures below.

He assessed the risk of collision as 'High'.

THE A109 PILOT reports transiting from outside the UK FIR to Luton Airport, routing via the Isle of Grain and Thurrock. He was operating under VFR in VMC 'with ATC London', heading NW at 120kt at 1500ft [Pressure setting NR]. The grey helicopter had the SSR transponder selected on with Modes A, C and S. The ac lighting and ACAS fit were not reported. He informed ATC of hang-glider traffic crossing from L to R at 1700ft.

He assessed that he crossed 2-3nm behind the ATR 42 and that there was no risk of collision.

[UKAB Note (1): Despite extensive tracing action, regrettably it has not been possible to establish the identity of any M/L pilots operating in the area at the time and date of the Airprox.]

ATSI reports that the Airprox occurred at 1535:31UTC, 8.5nm SW of Southend Airport, within Class G airspace, between an Avions De Transport Regional ATR 42-300 (ATR 42) and an AgustaWestland AW109 SP 'Grand New' helicopter (A109).

The ATR 42 was inbound to Southend Airport on an IFR flight from Dublin Airport and was in receipt of a PS from Southend APP [130.775MHz]. The A109 was operating on a VFR flight from Le Touquet to Luton Airport and had been in receipt of a BS from London Information before being transferred to Farnborough LARS(E). The A109 pilot was in the process of changing frequency when the Airprox occurred.

Southend were providing a split A/D and Approach Control Service without the aid of surveillance equipment. Radar services had been withdrawn due to the unserviceability of the primary radar equipment. The ATM was showing SSR information only.

CAA ATSI had access to RTF recordings for Southend Approach and London FIS, together with area radar recordings and written reports from the Approach controller and the two pilots concerned.

The Southend and Stansted weathers were recorded as follows:
METAR EGMC 061520Z 05004KT 9999 FEW031 13/06 Q1014=
METAR EGSS 061520Z VRB03KT CAVOK 14/07 Q1014=
METAR EGSS 061550Z VRB02KT 9999 FEW031 14/07 Q1014=

The Chatham RPS was recorded as 1009hPa.

Factual History

At 1513:20 the A109 pilot contacted London FIS and reported crossing mid-channel 'at 1500ft'. The pilot was instructed to squawk 1177 with Mode C and a BS was agreed. He was then instructed to report crossing the coast at Dover. Radar showed the A109 had crossed the coastline to the NE of Dover at 1517:06 but no call was received by London FIS. A crossed/broken transmission was received at 1520:20 which may have been from the A109 pilot.

At 1521:42, the ATR 42 pilot contacted Southend APP, squawking 6207 and descending to altitude 4000ft (QNH 1014hPa). He was advised that he was number two in the traffic sequence; the number one aircraft was a Diamond Twin Star DA42 approaching the beacon ahead of the ATR 42 at 3000ft. A PS was agreed and the pilot was instructed to report entering the hold. The controller advised the ATR 42 pilot that, at 4000ft, he would be holding inside CAS (above Southend, Class A CAS, LTMA-3, extends from an altitude of 3500ft to FL195).

At 1522:18, the DA42 pilot reported beacon outbound and leaving 3000ft in the descent. At 1524:50, the ATR 42 pilot reported entering the hold. At 1527:49, the ATR 42 pilot was cleared to commence the reversal procedure and descend to 3000ft prior to going beacon outbound for the ILS procedure approach for RW06. This required the ATR 42 to leave the NDB on a northerly track followed by a R turn, returning to the NDB for the procedure as shown in Figure 1 below.

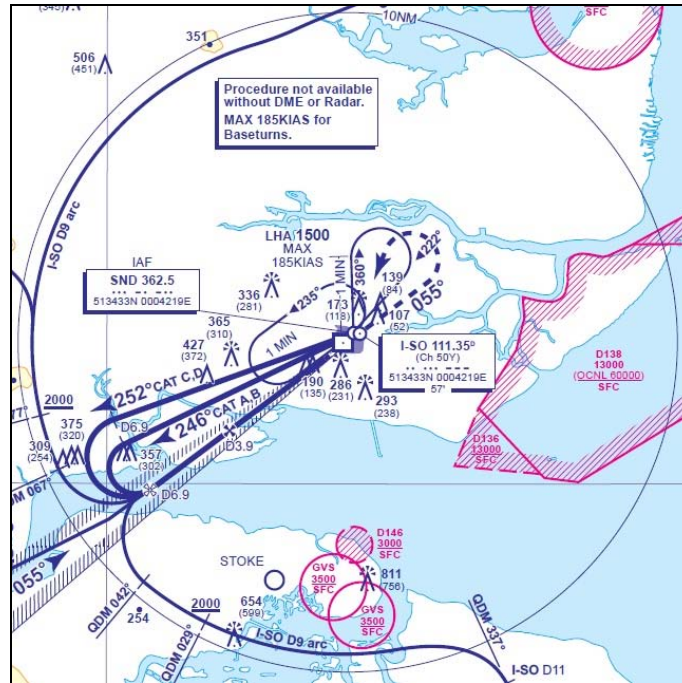


Figure 1 – extract from UK AIP page AD2-EGMC-8-1 dated 8 Mar 12

At 1532:20, as the ATR 42 crossed the beacon to go outbound, the A109 was shown tracking NW at 1500ft, 8.8nm to the SSW of the ATR 42. At 1532:42, London FIS instructed the A109 pilot to squawk 7000 and free-call Farnborough Radar on frequency 123.225MHz.

At 1533:29, the ATR 42 was outbound and level at 1500ft in accordance with the procedure, with the A109 in the ATR 42's 10 o'clock position at a range of 5.7nm and altitude 1500ft. The Southend controller's written report indicated that unknown traffic [the subject A109] squawking 1177 (a London FIS squawk) was observed on the ATM to be tracking towards the final approach area for RW06.

At 1533:35 Southend contacted London FIS in order to ask for the aircraft to be transferred to Southend APP. At the same time the A109 squawk changed to 7000 and London FIS reported that the A109 pilot had just changed frequency to Farnborough Radar. Farnborough reported that the A109 had not yet contacted them.

At 1533:39, the Southend controller passed limited TI, "[ATR 42 C/S] *there is er traffic er just observed on er the ATM only tracking northwest bound er to cross the final approach shortly at one thousand five hundred feet.*". This was acknowledged by the ATR 42 pilot. Radar showed the two ac converging at a range of 5.2nm.

At 1534:33, the controller updated the TI, "[ATR 42 C/S] *that previously mentioned er traffic believe will pass eight miles er to the southwest of the field northwest bound.*". The pilot replied, "Roger thanks [ATR 42 C/S]". The range between the aircraft was 3.2nm.

At 1534:42 the area radar recording showed the A109 squawking 7000, 2.7nm S of the ATR 42 squawking 6207 (see figure 2 below). Also shown was another slow moving primary contact (P1) in the ATR 42's 12 o'clock position at a range of 2.5nm tracking SE together with an intermittent second primary contact (P2) tracking NW, 2.6nm SW of the ATR 42. Contact P2 faded from radar.

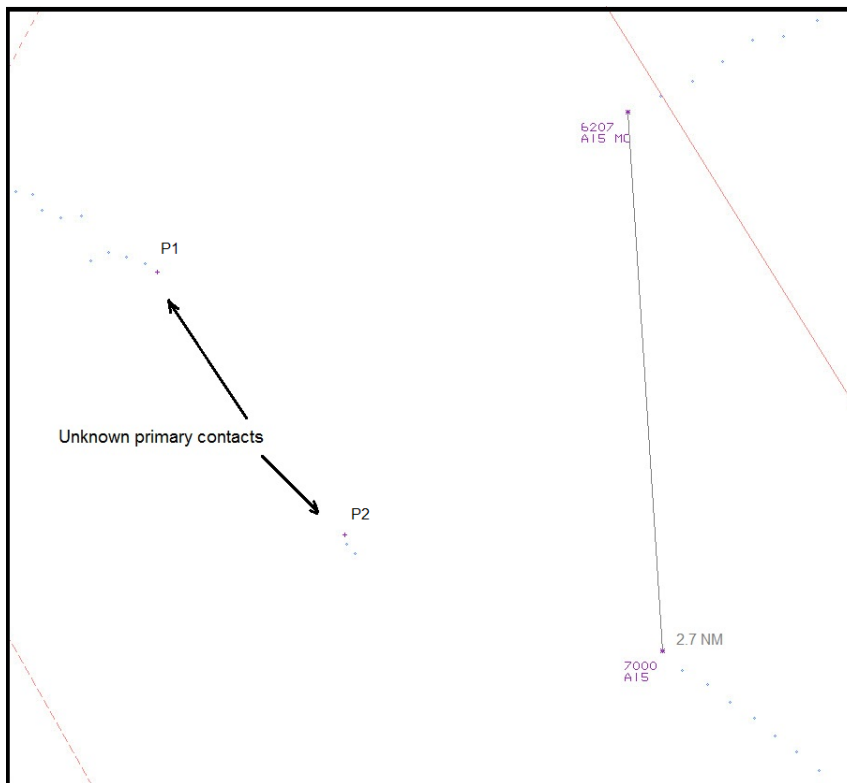


Figure 2 – area radar at 1534:42

At 1535:10, the A109 was in the ATR 42's 10 o'clock position at a range of 1.5nm and the controller asked, "[ATR 42 C/S] are you visual with that traffic believed maybe on your left hand side." The ATR 42 pilot responded, "Affirm [ATR 42 C/S]" and the controller replied, "Sorry was that affirm?" The ATR 42 pilot confirmed, "Visual with the traffic [ATR 42 C/S]". The other unknown primary contact (P1) was in the ATR 42's 12 o'clock position at a range of 0.9nm. At this point the ATR 42 was shown to commence the LH base turn (see Figure 3).

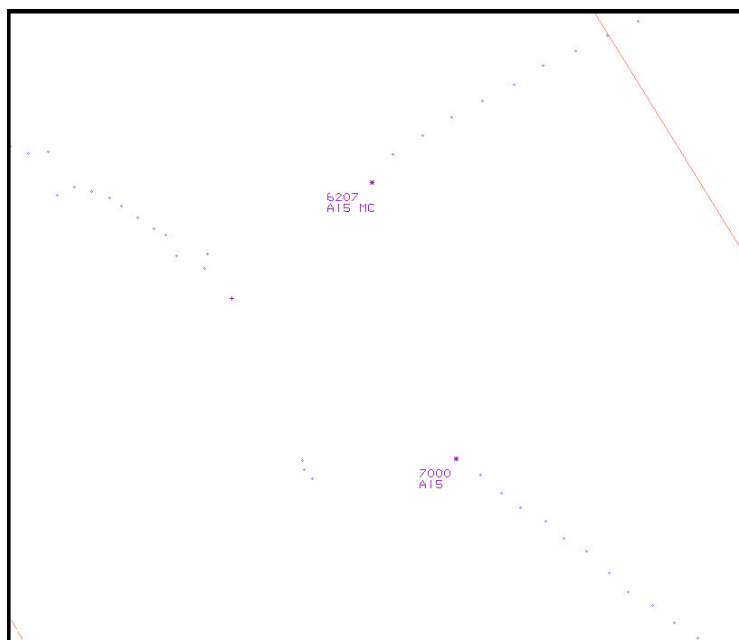


Figure 3 – area radar at 1535:10

At 1535:20, the ATR 42 was in a L turn with the unknown primary contact (P1) 0.4nm SW and the A109 1nm S. As the primary radar was out of service, the Southend ATM would only have shown

the two SSR returns and not the two primary contacts. It was not clear which aircraft the ATR 42 pilot had reported in sight.

At 1535:29, the unknown primary contact (P1) is shown 0.5nm W of the ATR 42 and turning away. The A109 is 0.5nm S of the ATR 42 at the same level. The ATR 42 continued in the L turn and at 1535:31 (CPA), the A109, at 1600ft, was shown passing 0.2nm SW of the ATR 42 at 1500ft (see Figure 4).

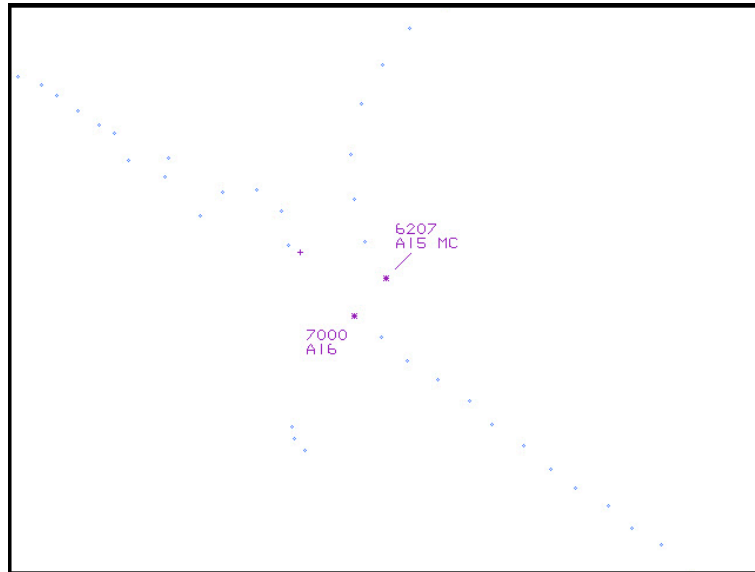


Figure 4 – area radar at 1535:31

The ATR 42 pilot's written report indicated that, as the ATR 42 turned in from the outbound leg, the helicopter was sighted and they immediately received a TCAS RA.

At 1535:57, Farnborough radar contacted Southend and advised that the A109 pilot had just called them. In response the Southend controller reported that the ATR 42 pilot had sighted the A109 and that Farnborough could retain the A109 on their frequency.

At 1536:45, the ATR 42 pilot reported localiser established.

The ATR 42 pilot subsequently reported to ATC that he had sighted two ac tracking NW. The area radar showed that the two ac were the A109 and the primary contact P2, which had faded from radar.

Analysis

The ATR 42 pilot was in receipt of a PS from Southend APP. CAP774 (UK Flight Information Services), Chapter 5, paragraph 1, states:

'A Procedural Service is an ATS where, in addition to the provisions of a Basic Service, the controller provides restrictions, instructions, and approach clearances, which if complied with, shall achieve deconfliction minima against other aircraft participating in the Procedural Service. Neither traffic information nor deconfliction advice can be passed with respect to unknown traffic.

A Procedural Service does not require information derived from an ATS surveillance system. Therefore, due to the ability for autonomous flight in Class F/G airspace, pilots in receipt of a Procedural Service should be aware of the high likelihood of encountering conflicting traffic without warnings being provided by ATC.

Pilots flying in the vicinity of aerodromes, ATS routes, or navigational aids where it is known that a Procedural Service is provided, are strongly encouraged to attempt to establish RTF contact with the notified ATS provider.'

The A109 pilot was between frequencies and not in receipt of an ATS in the period prior to the Airprox. Using the limited radar derived information provided by the ATM, the Southend controller became aware of the presence of a threat. The controller discharged his duty of care by passing a warning and limited information on the unknown traffic [the subject A109] until the ATR 42 pilot reported that he had an aircraft in sight.

The ATM only showed SSR data due to the primary radar being out of service. The Southend controller was therefore not aware of the other primary contacts. It was not clear which aircraft the ATR 42 pilot first sighted. As the ATR 42 pilot started the L turn the primary contact P1 was in his 12 o'clock position at a range of 0.9nm. The ATR 42 pilot's written report subsequently indicated the sighting of two ac tracking NW. It was believed that one of these was the A109 and the other may have been the primary contact P2, which was tracking NW before it faded from the area radar recordings. The ATR 42 pilot indicated receiving a TCAS RA at the same time as sighting a helicopter, believed to be the subject A109.

CAP774, Chapter 1, Page1, Paragraph 2, states:

'Within Class F and G airspace, regardless of the service being provided, pilots are ultimately responsible for collision avoidance and terrain clearance, and they should consider service provision to be constrained by the unpredictable nature of this environment.'

Conclusions

The Airprox occurred when the ATR 42 pilot, in receipt of a PS, and the A109 pilot, who was not in receipt of an ATS, flew into close proximity with each other whilst operating in Class G uncontrolled airspace to the SW of Southend Airport.

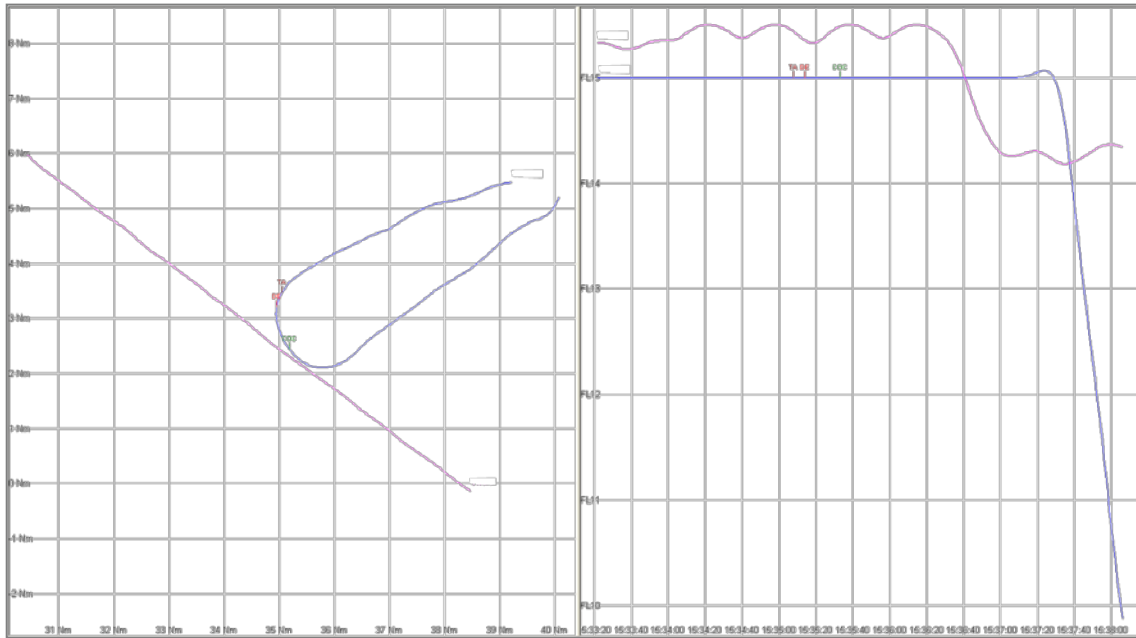
The Southend controller passed a warning and limited TI to the ATR 42 pilot, which probably alerted him to the presence of unknown traffic in the vicinity.

NATS SAFETY INVESTIGATIONS kindly provided a TCAS performance assessment using the InCAS simulation tool and Eurocontrol's Automatic Safety Monitoring Tool (ASMT).

Eurocontrol's automatic safety monitoring tool (ASMT) recorded (via Mode S downlink) a single RA relating to this encounter, a '*descend*' issued to the ATR 42 pilot within the 4 seconds prior to 15:35:18. The encounter was simulated in InCAS using the 25ft altitude reports available from the A109 Mode S. The simulated RA time of 15:35:14 is within the 4 second window that the actual RA would have been issued, based on the time the downlinked message was received by the radars. This suggests a good correlation between the simulation and the actual incident.

The A109 was known to be Mode S equipped because the Mode S address of the transponder corresponding to [the A109 registration] was included in the RA downlink message. Setting the A109 to be TCAS-II equipped in the simulation causes it to receive a '*climb*' RA at the same time as the ATR 42 receives a '*descend*' RA. As no downlinked RA data was received from the A109 it may be assumed that this aircraft was not TCAS-II equipped.

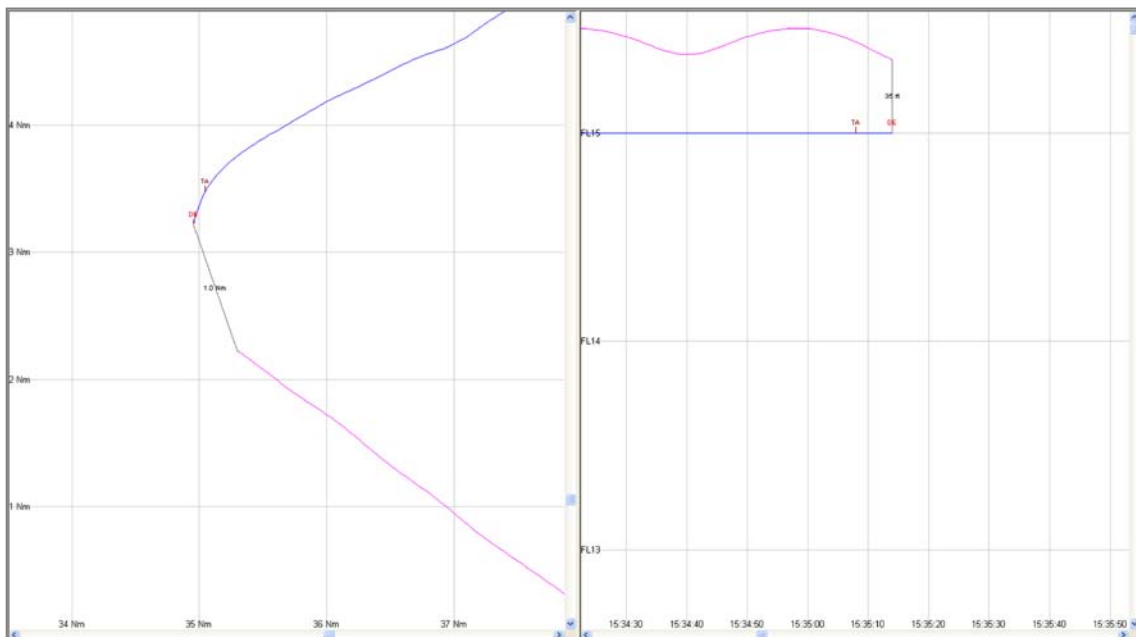
The Mode C data suggest that the ATR 42 pilot took no action in response to the RA. The A109 Mode C changes between 1525 and 1550 during the period when it is in approximately level flight. The InCAS simulation produces a smoothed trajectory based on these data, the effect of which is shown in the figure below. A different interpolation would not change the RA time or type.



Encounter Diagram Based on Heathrow Single Source Radar Data

Note that the small upturn in the vertical trajectory of the ATR 42 prior to descent is an artefact of the interpolation of radar data applied by the simulation; the Mode C data do not show a climb, only a descent.

Alert Time	Alert Description	Altitude (FL)	Intruder Range (Nm)	Vertical Sep. (ft)
15:35:08	TRAFFIC ALERT	15	1.45	50
15:35:14	DESCEND	15	1.05	33
15:35:33	CLEAR OF CONFLICT	15	0.37	50



Encounter Diagram Showing The Aircraft Positions at the time of the RA

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar photographs/video recordings, an ATC Unit investigation report from Southend ATC and reports from the appropriate ATC authorities.

[Post-Meeting Note: Although the Southend primary radar had been declared out of service due to poor radar performance it was still on and providing 'patchy primary returns'. The NATS feed from Debden, which included processed primary radar, was being displayed on the ATM but the Debden primary returns were only displayed when associated with a secondary return. The controller's original report stated ATM was displaying an SSR feed and ATSI's subsequent discussion with Southend indicated that the ATM showed only SSR labels. However, it may have been the case that primary radar returns from the malfunctioning Southend radar were also displayed on the ATM. Nevertheless, it was apparent during further discussion with the controller that he had used the observed SSR returns to form the basis of his traffic warnings and did not recall observing any PSR returns.

The controller was not radar qualified and, notwithstanding the MATS Part 1 requirement that an ATM 'must not be used as an ATS surveillance system to provide an Approach Radar Service' the controller used the limited available information to provide a warning to the ATR 42 pilot.]

Members first considered the actions of Southend APP and his use of the ATM. It was confirmed that primary surveillance was temporarily U/S and that Southend did not have regulatory approval to use SSR only. In these circumstances the highest level of service available was a PS. Members questioned the rationale behind not allowing Southend to use SSR-only information. The CAA SRG Advisor pointed out that there is a process for ANSPs to apply for approval to use SSR-only data; this process and the subsequent approval are required before allowing use of SSR-only data in order to ensure its proper use by suitably qualified personnel. The ad-hoc use of SSR data could result in non-qualified or inexperienced personnel using the facility as if it were a radar, with a consequent increase in risk. Whilst this was clear, Members agreed that limiting service provision to a PS was not making the best use of available resources. Controller Members with experience of developing safety cases for regulatory approval of SSR-only surveillance reported that it could be an extended process that consumed significant resource with no guarantee of success. Since there were also implications for ac operators when they are unable to mitigate the risks of flying in Class G airspace by using radar-derived ATS, Members questioned whether regulations could be framed to facilitate the use of SSR-only data for the provision of ATSOAS in the strictly limited circumstances of a temporary loss of primary surveillance. Members therefore recommended that the CAA review the regulations, processes and approvals encompassing the provision and use of SSR-only data when primary radar data is temporarily unavailable. Returning to the specific circumstances of this Airprox, the Board noted that the Southend APP provided multiple traffic warnings to the ATR 42 pilot based on his observation of the ATM and sought to have the A109 transferred to his frequency. His proactive, conscientious and professional balance between the provisions of a PS and making the best use of available resources was commended by the Board.

Members then turned to the actions of the pilots. It was apparent from the pilot reports and the radar and TCAS simulation data that there was a degree of confusion over the chronology of events. The ATR 42 crew received generic traffic warnings referenced to the airfield and the final approach track before being asked specifically if they were visual with traffic on their L. The crew answered that they were 'visual with traffic'. Given the subsequent flight path of the ATR 42, the Board surmised that the traffic in sight was the primary only contact 0.9nm ahead. It is reasonable to assume that the A109 would have been displayed on the ATR 42's TCAS before the TA and the ATR 42 crew were correct in not manoeuvring on the basis of the azimuth display or on the generation of a TA. It did appear, however, that the ATR 42 crew erroneously correlated the traffic warning and their TCAS TA indications with the primary only contact they had seen on their nose and continued their 'high bank turn to the left' in the belief that they already had the conflicting traffic in sight and that the L turn would resolve the conflict. The TCAS RA occurred 6sec after the TA, some 17sec before CPA and 19sec before 'clear of conflict'. The ATR 42 pilot reports the PF initially followed the RA by

disengaging the A/P and following the TCAS RA 'Descend'. The radar replay Mode C indication does not reflect a change in ac altitude. CAT pilot Members understood the captain's concern over the proximity of chimneys below; however, complying fully with the RA command, in the 17sec before CPA, would have increased the mis-distance. It was also pointed out that TCAS II progressively inhibits RAs depending on rad alt output, as follows:

'Increase Descent' RAs are inhibited below 1,450 ft rad alt (± 100 ft).

'Descend' RAs are inhibited below 1,100 ft rad alt (± 100 ft).

All RAs are inhibited below 1,000 ft rad alt (± 100 ft).

Both pilots were operating in class G airspace and were equally responsible for 'see and avoid'; the ATR 42 pilot had right of way over the A109 pilot, until shortly before the CPA. The A109 pilot did not submit a comprehensive report but, from the information available, appeared to be in the process of changing frequency from London Information to Farnborough LARS(E) at the time of the Airprox. Members opined that it was poor airmanship for the A109 pilot to cross the Southend RW06 extended C/L at a range of 8nm without contacting Southend APP. He reported sighting the ATR 42 'crossing 2-3nm behind'; given the recorded mis-distance, it was probable that the A109 pilot did not see the ATR 42 until well after CPA and that this was part of the Cause of the Airprox. The ATR 42 crew reported first seeing the A109 in their 2 o'clock at a distance estimated to be 300ft, shortly before the RA. Since the RA occurred at a range of 1.05nm it seems likely that their sighting was after the RA. Either way, a sighting in the 2 o'clock was too late to take avoiding action and constituted, effectively, a non-sighting and the other part of the Cause.

Whilst the Cause of the Airprox could be established with confidence, the Board was divided on the degree of Risk. On the one hand, although the ac had passed each other at undesirably close quarters, they remained separated by 0.2nm. Conversely, the ATR 42's Mode C did not reflect a change of altitude in response to the TCAS RA 'Descend' and neither the ATR 42 crew nor the A109 pilot saw the other ac in time to take avoiding action. Consequently, by a small majority, the Board judged that there had been a collision risk.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: An apparent non-sighting by the A109 pilot and effectively a non-sighting by the ATR 42 crew.

Degree of Risk: A.

Recommendation: The CAA is recommended to review the regulations, processes and approvals encompassing the provision and use of ATSS employing SSR-only during periods of temporary loss of primary radar.