

## AIRPROX REPORT No 2011095

Date/Time: 8 Jul 2011 1631Z

Position: 5144N 00120W (9nm SE Brize  
- elev 288ft)

Airspace: Brize CTR (Class: D)

Reporting Ac Reported Ac

Type: C130 EMB500

Operator: HQ Air (Ops) Civ Comm

Alt/FL: 2500ft 2500ft  
QFE (994mb) QNH (1003mb)

Weather: IMC KLWD IMC KLWD

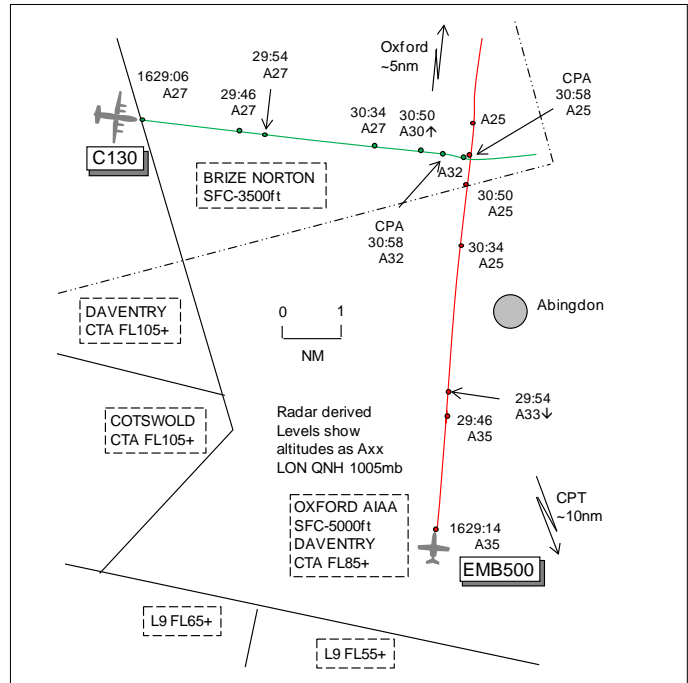
Visibility: 10km 10km

Reported Separation:

'below' V/0.5nm H500ft V/500m H

Recorded Separation:

700ft V/0.4nm H



## PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

**THE C130 PILOT** reports flying a local CT sortie from Brize Norton, IFR and in receipt of a TS from Brize on 124.275MHz, squawking an assigned code with Modes S and C. The flight was IMC approaching the end of the outbound leg of a TACAN procedure heading 100° at 170kt and level at 2500ft QFE 994mb. At BZN 100R 9D, just prior to commencing the inbound turn and associated descent, a TCAS contact appeared on their display at the same height approximately 1nm in front. The controller initiated avoiding action by vectoring the flight to the N at the same time as a TCAS RA climb was commanded. The RA was followed, the climb initiated without changing heading, during which time the ac broke cloud and they became visual with the conflicting ac, a low-wing twin engine type possibly a BE200 or similar type, which was crossing from R to L 0.5nm ahead and just below. The controller subsequently provided vectors to enable the flight to resume the procedure and the sortie was continued without further incident.

**THE EMB500 PILOT** reports inbound to Oxford, IFR and in receipt of a PS from Oxford Approach on 125.325MHz, squawking 3057 with Modes S and C. En-route from just W of CPT to Oxford, London gave descent to 3500ft direct to the OX and to call Oxford as per the usual arrival via CPT. Heading 360° at 180kt they continued descent to 3500ft early in order to try and get VMC. They were bouncing around in the cloud bottoms and it looked as if they would be in VMC if a few hundred feet lower. The PNF called Approach and asked, "If possible can you liaise with Brize for further descent. We are in the cloud bottoms and would appreciate lower to be VMC". Oxford replied, "I can give you 2500" so they continued descent to 2500ft assuming that liaison with Brize had already been arranged. After levelling at 2500ft (now in the Brize CTR) about 12nm S of OX they received proximate traffic on TCAS then a TA on traffic from the W at the same level heading towards them. They became visual with a C130, which climbed to take avoiding action before it passed about 500ft above, and 500m behind. When they received the TA the PNF called Approach to request TI and was advised that Brize CTR had been infringed and that they should leave asap. By now they were within 10nm of OX and they turned R and exited the CTR before turning L to OX for a normal procedural ILS to RW19 starting 2500ft. The PNF spoke to Oxford ATC post flight and the controller felt that the crew wanted to transfer to Brize to request lower for a visual join however the PNF had not mentioned the words "visual" or "transfer". Their request for ATC to liaise with Brize implied that

they were aware of Brize airspace. From their perspective it would have been helpful to hear the words "Remain clear of Brize" when ATC gave the descent to 2500ft. Also, because London took them on heading W of CPT before clearing them direct to OX, the usual CPT-OX track did not apply and so did not keep them clear of the CTR. Approach assumed that they were routeing direct from CPT and therefore to the E of Brize.

**THE EMB500 COMPANY FLIGHT SAFETY OFFICER** reports the following investigation was carried out as a result of an ASR filed by the EMB500 crew and the subsequent MORs raised by Brize Norton ATC and Oxford ATC. The fact that the zone infringement occurred is not in doubt. The focus of this investigation is to establish the reasons why the infringement occurred and to present recommendations that may prevent a future reoccurrence.

#### Sources Available for the Investigation

The sources available for this investigation included:

- 1) the accounts of the crew involved from their initial ASR and subsequent discussions
- 2) the audio tapes held by Oxford ATC that recorded RT transmissions at the time of the incident as well as telephone calls between Oxford ATC and the Brize Norton controller and London Area Control.

The audio tapes and radar traces from Brize Norton were not available to the company to assist in the investigation.

Commander's experience: 2800 hours total flying time

298:35 hours flying Phenom 100

26:40 hours flying Phenom 100 in previous 28 days

11:15 mins rest prior to the day of the incident

First Officers experience: 320 hours total flying time

39:40 hours flying Phenom 100

24:45 hours flying Phenom 100 in previous 28 days

11:15 mins rest prior to the day of the incident

#### Weather at Oxford

At the time of the incident the promulgated weather report was:

Surface wind: 240/8-11 knots

Visibility: 6 km

Precipitation: RA SH

Cloud: FEW 020 SCT026 BKN031

Temperature: +14/+12

QNH: 1003

#### History of the flight

The crew reported in Berlin at 0520z for a 3-sector day. Maximum FDP for the day was 11:30 and the planned FDP was 10:05. The crew had a rest period prior to the day of flying of 11:15 (15min more than the minimum required rest).

The first flight of the day from Berlin to Oxford was uneventful but was delayed by 25min in Berlin. The ac arrived in Oxford at 0900z.

The ac's departure from Oxford was delayed by 20min due an ATC slot restriction and the ac

departed Oxford at 1120z for a passenger-carrying sector to Zurich. On take-off from Oxford the ac suffered a bird strike shortly after rotation (ASR 080 refers). No problems were encountered with the ac following the birdstrike and the remainder of the flight to Zurich was uneventful.

On engine start for the return flight to Oxford there was an abnormal start event (ASR 081 refers). The subsequent start was uneventful. The abnormal start and subsequent conversation with the Continuing Airworthiness Manager plus a further ATC slot restriction contributed to a delay to the departure from Zurich of around 45min.

The handling pilot for the empty return sector was the First Officer who was undergoing Line Flying under Supervision and was undertaking her 30th sector. The minimum number of sectors of Line Flying under Supervision to be undertaken by a crew member with her experience is 40 prior to line check. This is not felt relevant to the incident.

The ac routed broadly in accordance with the flight plan route until entering UK airspace where the crew received the normal combination of vectors and "own navigation" instructions consistent with a normal arrival towards Oxford.

On reaching the area to the E of the CPT VOR the crew received vectors from London Control that took them past CPT VOR (heading 280° at FL80) to the W before being asked to route to Oxford with a descent to altitude 3500ft amsl.

At this stage the arrival was normal with the expectation of routing to the OX NDB and then outbound for the ILS RW19 procedure at Oxford. The incident occurred during the phase following the initial descent to 3500ft amsl.

Before describing the events surrounding the incident it is necessary to understand the airspace restrictions around Oxford and the normal arrival routes to the airfield.

#### Airspace issues around Oxford

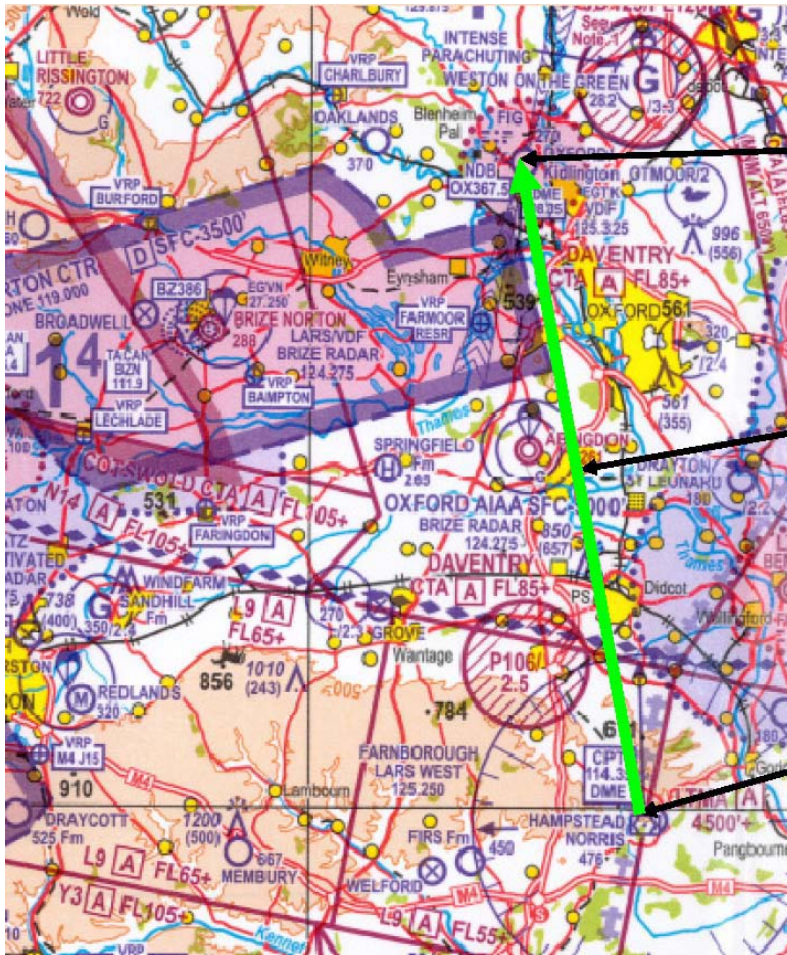
Oxford Airport has an ATZ with radius 2nm centred on the longest runway (01/19). The vertical limit of the ATZ is from the surface to 2000ft aal. The airspace above the ATZ is Class G.

To the SW of the Oxford ATZ lies the Brize Norton CTR with vertical extent from surface to 3500ft amsl (Class D airspace). The area of the Brize Norton CTR that affects operations into and out of Oxford is the stub to the E of Brize Norton aerodrome. This stub lies across the instrument approach to RW01.

To the NE of Oxford are the paradropping areas of Hinton-in-the-Hedges (GND to 2500ft) and Weston-on-the Green (GND to 3300ft). The boundary of the latter area almost touches the Oxford ATZ. To the S and SE lie the paradropping areas of Abingdon and Chalgrove as well as numerous gliding sites.

IFR routes from the S route via L9 at CPT (MEA FL55) and from the N via A34 (MEA FL110) and N859 (MEA FL90).

To the SE of Oxford and on tracks between the CPT VOR and Oxford Airport lies the Benson CTR, the location of which creates funnels between Benson and Abingdon and between Benson and P106.



OX NDB

DIRECT TRACK FROM CPT VOR TO OX NDB REMAINS CLEAR OF THE BRIZE CTR

CPT VOR

The usual arrivals from the S route via CPT followed by a direct track to the OX NDB. The timing of the turn is determined by release from London Control and may be delayed until the ac is W of CPT or may be prior to the ac reaching CPT. It is seldom at CPT as ac are frequently under radar vectors at this point due to the separation requirements for the Heathrow departures via CPT.

The timing of the release is important to this investigation since the direct track from the CPT VOR to the OX NDB ensures that the ac remains clear to the E of the Brize Norton CTR. If the turn towards the OX NDB is delayed to any degree and the ac passes the CPT VOR to the W then the direct track towards the OX NDB will overfly the Brize Norton CTR and any descent below 3500ft amsl on track to the OX NDB will require a clearance to enter the Brize Norton CTR.

Arrivals from the S for RW01 will require liaison with Brize to enter the CTR whilst positioning for the NDB approach to RW01. Arrivals from the S for RW19 do not normally require a clearance to enter the Brize CTR as ac will normally not descend below 3500ft amsl on track to the OX NDB.

#### The Incident

The flight in question was planned to route from the CPT VOR to the OX NDB. The vectors from London Control took the ac to the W of CPT prior to being released to fly direct to the OX NDB. As such this track would take the ac over the Brize Norton CTR and the ac was cleared by London to descent altitude 3500ft amsl.

Company crews are well acquainted with the location and vertical extent of the Brize Norton CTR and it was clear to the crew that the track towards the OX NDB would take them over the CTR at 3500ft amsl.

In the initial RT call made by the Commander to Oxford ATC his position was stated as 18nm to the

S of Oxford Airport. It is clear from the ASR that he was aware of his position to the W of CPT prior to the turn to the OX NDB and a bearing of 180°M would place the ac to the W of CPT. However, it is accepted that a bearing of 172°M from the OX NDB would place the ac on a direct track from the CPT VOR and that a reference to "south of the airport" could be interpreted either way by the controller at Oxford.

Oxford Airport does have a VDF capability and the reporter understands that a VDF bearing was recorded at the time of the first transmission by the EMB500 flight.

On reaching the cleared altitude the crew found themselves in the lower level of cloud and in turbulent air. It was perceived that a further descent would take them clear of the cloud and afford them greater visibility in VMC. From the tapes it is clear that the Commander requested that Oxford ATC liaise with Brize to allow further descent below the cleared altitude. Once again this confirms that the crew were aware that they were above the Brize CTR and that any lower altitudes would require a clearance into the zone.

Oxford ATC acknowledged the request and stated that the lowest altitude they could offer would be 2500ft amsl (MSA). This was followed by a clearance to descend to altitude 2500ft amsl. Crucially this was NOT followed by an instruction to remain clear of CAS.

The ac descended in accordance with the new clearance. The Commander contacted Oxford ATC when he became aware of a TCAS contact at approximately the same level to the W. This exchange with Oxford ATC was interrupted by a telephone call to Oxford ATC from Brize advising them that the EMB500 had infringed the Brize zone and that a departing ac (believed to be a Hercules) had taken avoiding action. Oxford ATC was advised to instruct the EMB500 flight to leave CAS immediately and this was passed to the crew.

On receiving the RT call from Oxford ATC advising them of the infringement the Commander queried the initial descent clearance prior to instigating a 30° R turn. Due to the proximity of the ac to the edge of the Brize zone, and the short distance required to exit the zone, this was shortly followed by a L turn back towards the OX NDB. The Brize controller perceived this as being no attempt to leave the zone but this is challenged by the crew. The radar traces will provide further evidence but for a short turn to the R followed by a turn to the L the interval between radar images may mean that the turns were not visible to the approach controller.

The ac continued to the OX NDB and landed without further incident.

## Investigation

The crew filed an ASR immediately after the arrival at Oxford. The Commander also spoke to Oxford ATC.

The information from the crew (via the ASR) was supplemented by information from conversations with the crew. Oxford ATC also made the tapes available for the RT exchanges between the EMB500 flight and Oxford ATC, and also for the telephone conversations between Oxford ATC and London Area Control and with the Brize Norton controller.

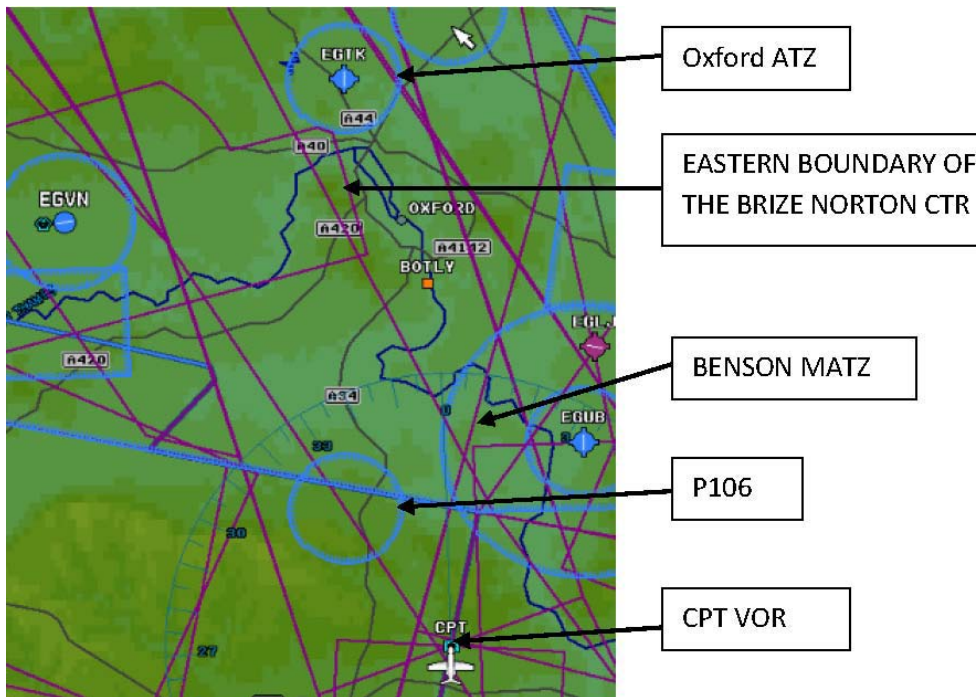
The information extracted from the taped conversations was consistent with the events in the ASR except that the Brize controller claimed that the crew made no attempt to exit the Brize zone. This is addressed in the section above.

It is clear that the crew were aware of their proximity to the Brize Norton CTR, both vertically and laterally, and requested that Oxford liaise with Brize Norton for the required descent. It also appears the Oxford controller was not completely aware of the position of the EMB500 and mistakenly assumed it to be clear to the E of the Brize CTR. This position would have been consistent with a direct route from the CPT VOR to the OX NDB. However, the EMB500 had been vectored to the W

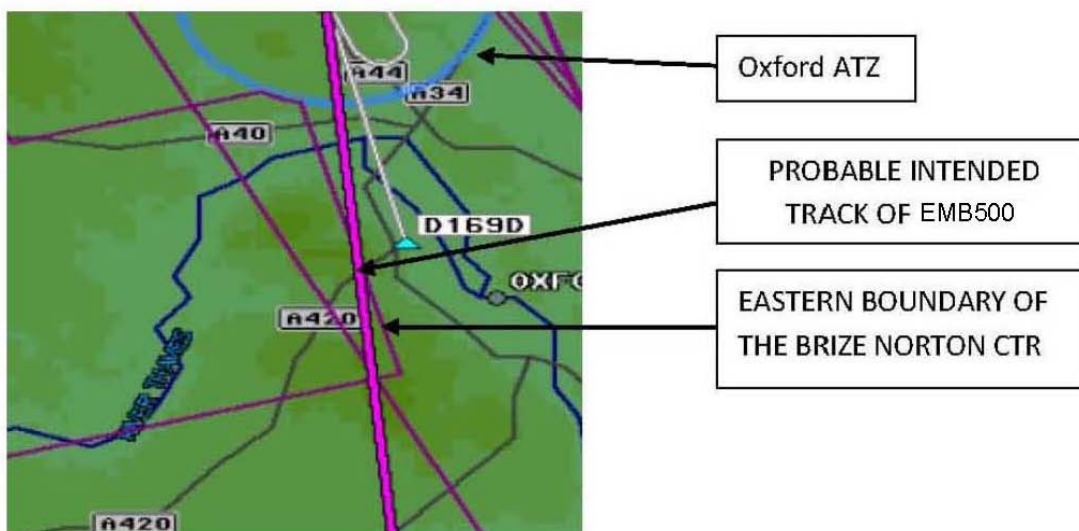
of CPT and the revised track took the ac over the stub of the Brize CTR.

Oxford ATC is able to use VDF to establish the direction from which traffic is approaching Oxford. It is not clear why the use of VDF did not show that the track of the EMB500 presented a potential issue with respect to the Brize zone. The EMB500 flight transmitted at least 4 times prior to the zone infringement.

The EMB500 (Phenom) fleet are equipped with integrated electronic navigation systems. The MFD display (example shown below) available to the crew shows very clearly the location of the Brize Norton CTR and this display was in use by the crew at the time of the incident. It supports the position that the crew were completely aware of their position with respect to the zone. It may also explain why the turn to the R to exit the zone was not noted by the Brize controller as the crew would see exactly when they had turned sufficiently to exit the zone prior to resuming their track to the OX NDB.



The above display is in an expanded view. When operating closer to Oxford the depiction is scalable and the proximity of any CAS is very clear.



When issued with the requested descent clearance the crew assumed that liaison with Brize had taken place. Had the descent clearance been followed by an instruction to remain clear of the Brize zone then the crew would have adjusted their track by heading to the E of the present track until clear of the zone and then descended to the new cleared level.

## Causal factors

### Primary causal factors

- 1) There appears to have been uncertainty from the perspective of the Oxford controller as to the position of the EMB500 with respect to the Brize Norton CTR. An assumption was made that the ac was on a direct track between CPT VOR and the OX NDB, a track that would have kept the ac clear of the Brize zone. This was not the case as the delayed release from London had resulted in the ac being to the W the direct track between CPT and OX NDB. This led to a descent clearance being issued without an instruction to remain clear of the Brize zone.
- 2) The crew departed from the Company standard arrival procedures in order to exit the turbulent lower levels of cloud and to benefit from improved visibility below the cloud. Had the ac remained at 3500ft amsl then the incident would not have occurred.

### Secondary causal factors

- 1) The EMB500 crew had experienced a few unusual events on the day of the incident: a bird strike on departure from Oxford, an abnormal start in Zurich and a temporary TCAS FAIL in the cruise. Although the duty period was not long these events will have had an effect on the workload and fatigue of the crew.
- 2) Due to the delays encountered during the day the crew were within 5min of maximum FDP on arrival at Oxford. This may have contributed to the overall fatigue experienced by the crew.

NB It should be noted, however, that the crew did not refer to fatigue or to the events earlier in day as a factor in this incident.

## Recommendations

### Standard Operating Procedures

- 1) Position Reporting

As uncertainty regarding the position of the ac with respect to the direct track from CPT VOR to OX NDB was a primary causal factor, the initial radio contact with Oxford could include information on the actual track towards the OX NDB. This contact could include phrases such as "our current track will ensure that we remain E of the Brize zone" or "our current track will route over the Brize zone".

- 2) Routings into and out of Oxford Airport

The hazards associated with operations at Oxford Airport are documented in the Company SMS under HRF002. This HRF is permanently under review.

The following is extracted from the mitigations section of HRF 002. The underlined sentences are pertinent to the incident under investigation.

#### 'Arrivals

The direct track between CPT VOR and Oxford Airport is identified as an area of significant risk

during daylight hours. There is coordination between London Area Control, Brize Norton, Benson and Oxford that seeks to provide either procedural separation (by Oxford) or radar separation (by Benson and/or Brize Norton). However, there are potential risks associated with transiting this area due to traffic that is not subject to procedural separation or is not visible to secondary radar.

The lack of a standard procedure is an issue that counters our potential mitigation. In trying to provide more direct routings London Control are actually contributing to the problem.

### Approaches

Although the published hold for Oxford Airport at the OX NDB lies outside of controlled airspace it is considered best practice to route towards the OX NDB and to enter the instrument procedure from overhead the airfield. This practice provides a prescribed and repeatable track to the overhead and throughout the procedure. It also allows ATC at Oxford to provide procedural separation from other IFR traffic and to advise VFR traffic of the likely position of the inbound aircraft. Additionally, this practice reduces the risk of encounters with low level VFR traffic and offers protection against CFIT.

For landing on runway 19 the full procedure represents the best option for maintaining procedural separation from IFR traffic.'

The procedures above are covered in crew line flying under supervision. It is felt that, when followed, the above procedures provide adequate mitigation against hazards and also against inadvertent penetration of the Brize zone.

It is strongly recommended that standard routings are identified and utilised for both departures and arrivals at Oxford Airport. There are currently no official, published departures to the S of Oxford nor any published arrivals from the S of Oxford. This should be addressed with some urgency.

### Crew Awareness

It is felt that the Company crews are sufficiently aware of the lateral and vertical boundaries of the Brize Norton CTR. This understanding is greatly enhanced by the abundance of situation awareness afforded by the integrated electronic navigation system on the Phenom 100.

However, further information should be circulated to ensure that crews remain aware of the effect of small changes in track when routing from the S. They should further be reminded of the vertical extent of the Brize Norton CTR and the issues that face the Oxford controllers in trying to establish the position of incoming ac.

**THE BRIZE RADAR CONTROLLER** reports he was bandboxing Zone, DIR and Radar. He had 1 flight on the DIR frequency and 2 on Zone. The C130 was conducting a procedural TACAN approach and was downwind in the radar pattern for RW26 at height 2500ft QFE 994mb. He cleared the C130 for the full procedure and was in the process of dealing with a flight on Zone frequency, AC3, which had requested a CTR transit and needed to descend to maintain VMC. When the C130 was late downwind he noticed an ac, the EMB500, 3nm outside the CTR but looking like it was going to infringe the Zone. He immediately called the EMB500 to the C130 flight, believing he stated the unknown ac was going to infringe CAS and gave an avoiding action turn onto N. By this time the EMB500 was 0.5nm and approximately 200ft from the C130 having entered the CTR without permission. The C130 did not leave the CTR and was about 2nm from the S edge to the CTR. Previously he had noticed the EMB500 when it was about 15nm S of Brize but had no reason to believe it would enter CAS. The EMB500 was code c/s converted and was indicating inbound to Oxford. The other controller, who was on a break, came into the ACR and was able to telephone Oxford and ask for TI, informing them that the EMB500 had entered the Brize CTR. The Oxford controller stated she would get the flight to exit the CTR straight away; however, it appeared that the EMB500 continued straight ahead towards Oxford without turning to exit. After he had issued



avoiding action to the C130 the crew informed him that they had a TCAS RA, which he acknowledged. The C130 crew told him that they had climbed to 3000ft QFE and he thought he updated the TI on the EMB500 and gave TI on another radar track as the C130 had exited CAS at the E edge before it turned inbound, repositioned for the TACAN approach and re-entered CAS.

**THE BRIZE SUPERVISOR** reports working as the ADC in the VCR monitoring the Tower, Ground and Management frequencies. The only part of the incident he saw was when he glanced at the Hi-Brite display and saw the C130 squawk in a late outbound radial position for RW26 within 0.5-1nm of the EMB500 squawk which appeared to be on a straight-in approach to RW01 at Oxford. The Mode C of each squawk indicated that they were within only a few hundred feet of each other which caused him concern. By this time the incident was effectively already at a point where he considered it too late to do anything. Unit workload was light to medium with 2 radar controllers on duty, which was normal for operations outside 0900-1700L Mon-Fri.

**THE OXFORD APPROACH CONTROLLER** reports the EMB500 was pre-noted from London leaving CAS at CPT. The flight checked in on frequency and was given onward descent to 3500ft and told to continue to the OX NDB and expect ILS RW19 no delay. The pilot reported flying in the cloud base and requested to talk to Brize for further descent. She informed the flight that she could do that procedurally and cleared the flight to descend to 2500ft. A short while later the pilot questioned a TCAS contact in his 11 o'clock whilst simultaneously the Brize telephone line rang. Brize reported that the EMB500 was inside the Brize CTR and in conflict with a C130 that was being vectored inbound. Brize instructed her to tell the EMB500 flight to leave the Zone immediately, which she did. It would appear the EMB500 actually left CAS in the vicinity of KENET, a direct track to Oxford would route through/over the Brize CTR, whereas leaving from CPT remains clear to the E.

**BM SAFETY MANAGEMENT** reports that this Airprox occurred between a C130 operating IFR in IMC in receipt of an ATS from Brize APP within the BZN CTR and an EMB500 operating IFR in IMC inbound to Oxford Kidlington and in receipt of a PS from Oxford APP.

All heights stated are based upon SSR Mode C from the radar replay unless otherwise stated.

The incident occurred relatively late on a Friday afternoon when BZN were operating with reduced manning; 2 radar controllers monitoring APP/Zone and DIR respectively and ADC. APP reported their workload as medium to low and the task complexity as medium.

At 1620:45, Oxford called BZN DIR passing TI on the EMB500 as "*leaving CPT...*" and "*is going to descend to 3500ft.*" Given the range scale on which BZN controllers operate their surveillance display, the EMB500 would not have been displayed as it was approximately 40nm SE of BZN, in the vicinity of LHR. No mention was made by Oxford of the CPT estimate, nor the pressure datum for the EMB500's descent, nor did BZN DIR seek this information. Oxford asked DIR whether BZN required to work the traffic and, after liaison between APP and DIR that was un-recorded on the audio-tape, DIR stated that BZN did not wish to work the traffic. The conversation ended at 1621:27.

Based upon subsequent discussion with BZN personnel, following this landline conversation DIR left the ACR on a short break, with APP operating bandboxed on APP, DIR and Zone. At 1623:09, another flight, AC3, called Zone 38nms NE of BZN, requesting a transit through the BZN O/H towards Lyneham and was placed under a TS. In addition, APP was providing an ATS to the reporting C130 in the RTC on DIR's freq and an unrelated ac approaching the CTR from the SE for a VFR crossing also on the Zone freq; the EMB500 was 31.4nm SE of BZN, descending through FL127.

Between 1626:39 and 1627:08 APP carried out liaison with AC3 to deconflict its route through the O/H from the C130; however, the ac needed to maintain VMC and was unable to accept a climb. This liaison did not achieve a course of action.

APP states in their report that they first sighted the EMB500 when it was approximately 15nm S of BZN, this being at 1628:03 with the EMB500 descending through FL053. At this point the C130 crew

reported, "*beacon outbound*" as they routed through the BZN O/H to the ESE, on the TACAN approach to RW26, indicating 3000ft.

Between 1629:07 and 1629:57, APP was engaged in a further exchange of RT with AC3 to deconflict its transit through the BZN O/H, including the passing of the BZN Wx from 1629:14 to 1629:34, with an agreement reached for AC3 to operate at 2500ft. During this exchange, at 1629:14 the EMB500 levelled at 3500ft and then, at 1629:54 recommenced descent into Oxford; at this point, the EMB500 was 5.5nm SE of the C130. At 1629:58, APP amended the C130 flight's climb-out instructions to vertically deconflict it from AC3 following its approach.

At 1630:17, AC3 flight stated that they were level at 2500ft which was acknowledged by APP at 1630:22. At 1630:32 APP stated, "*(C130 c/s) traffic right two o'clock, two miles, crossing right left, indicating similar altitude. I think it's about to infringe control zone, if not sighted avoiding action turn north immediately, traffic was south-east, one mile, tracking north, indicating two hundred feet below.*" Whilst APP reports that they issued the avoiding action when the EMB500 was 3nm outside the CTR boundary, the radar replay shows it to have been 1.1nm to the S indicating 2600ft, with the C130 indicating 2700ft. The EMB500 subsequently levelled at 2500ft at 1630:34. The C130 pilot replied at 1630:50, "*visual, TCAS RA, (C130 c/s)*" which is coincident with the point at which the EMB500 entered the BZN CTR without authorisation.

MMATM Chapter 11 Annex B contains the ATC Procedures in Class D Airspace and states that avoiding action should be passed to IFR flights if a particular unknown ac is lost and should achieve standard lateral separation of 5nm whenever possible.

The CPA occurred at 1630:58 with 0.4nm lateral and 700ft vertical separation existing as the EMB500 passed through the C130's 12 o'clock, with the C130 indicating 3200ft having followed the TCAS RA.

The key causal event within this incident is the unauthorised penetration of the BZN CTR by the EMB500 which is addressed within the operator's investigative report. However, in considering EMB500 company's assessment that the infringement was caused by a delayed turn at CPT, caused in turn by vectoring imposed by LACC, when the EMB500's turn is evident on radar at 1626:02, they travel 5.7nm laterally to turn through 90° of heading: this appears to be a relatively slow rate of turn. This notwithstanding, the ATM aspects of this incident warrant further examination.

Understandably given the Unit manning and the fact that had the EMB500 not infringed the CTR then there would have been no confliction with Brize traffic, Brize did not wish to work the EMB500 inbound to Oxford. Moreover, until the EMB500 recommenced their descent at 1629:54, APP had no reason to suspect that the EMB500 posed a threat as they could deem the ac as remaining outside the CTR. Furthermore, although their taskload was relatively low, APP was involved in deconflicting AC3 and the C130 until approximately 1630:10, which would have acted as a distraction, given AC3's position to the NE of the CTR and N of the CPA. Moreover, subsequent to completing their report, APP stated that their assessment of a moderate task complexity was directly linked to their work to deconflict AC3 and C130 as they were cognisant of the poor Wx in the area.

At 1630:10, the EMB500 was 2.5nm from the CTR boundary and 4.2nm from the C130 and it is reasonable to argue that the impending infringement and associated confliction are evident. However, Brize have stated that their personnel are frequently faced with situations where ac are flown along similar profiles to that used in this incident sequence to within close proximity of the CTR boundary before turning away. In order to avoid nugatory deconfliction instructions to IFR ac within the CTR, Brize personnel will have understandably adapted their behaviour to accommodate this experience. In this instance, although APP's actions were explicable, this adaptation delayed the point of action and arguably aggravated the severity of the occurrence; however, it should also be born in mind that regulation does not stipulate lateral separation requirements for IFR ac within Class D airspace against ac operating outside the CTR in Class G airspace.

Based upon their report, although APP had sighted the EMB500 previously, they did not perceive the confliction until immediately prior to 1630:32, at which point 2.2nm lateral separation existed. Moreover, in analysing their transmission at 1630:32, it appears reasonable to argue that they realised during that transmission that the EMB500 would infringe the CTR, thus correctly providing deconfliction instructions. However, whilst there is no specific regulation governing the provision of TI to ac operating within Class D airspace, it is reasonable to suggest that the principles within CAP774 would apply in terms of the applicability and timeliness of that information against ac remaining outside the CTR.

SATCO Brize has stated that following this incident and in light of other issues, a meeting was held between Oxford, NATS, SRG, DAP and Brize. The purpose of the meeting was to determine a course of action to assist Oxford inbound and outbound ac, whilst reducing the potential for mid-air collisions. Brize agreed to take on an additional task effective from Sep 11, where all Oxford ac route inbound via KENET (released at FL80) – DILAX – BAMBO – OX and outbound (climbing to FL70) via BAMBO – DILAX – KENET. Whilst causing a significant increase in the Brize workload, this has reduced the risk of mid-air collision within the Oxfordshire AIAA. It is planned for Brize to maintain this task until Oxford is able to provide organic surveillance based services.

**ATSI** reports that the Airprox occurred at 1631:00, 6.3nm to the SSW of Oxford Airport, within the Brize Norton CTR Class D airspace, which lies to the S and SW of Oxford airport and extends from the surface to an altitude of 3500ft.

The EMB500 was an IFR flight inbound to Oxford from Zurich, leaving CAS at CPT and routeing to the OX(NDB) at Oxford.

The C130 was operating within the Brize Norton CTR, in the radar pattern for an approach to Brize Norton RW26. Brize Norton LARS is promulgated as being available in summer from 0800 UTC to 1600 UTC.

The Oxford controller was operating combined Aerodrome and Approach Control positions, without the aid of surveillance equipment. All equipment was reported as serviceable. APP reported workload as light with no distractions.

CAA ATSI had access to RT and radar recordings, together with written reports from the controller and 2 pilots.

The weather for Brize Norton was:

METAR EGVN 081550Z 24004KT 9999 –SHRA SCT028CB BKN035 BKN050 14/13 Q1003 RERA  
BLU TEMPO 4000 TSRA GRN=  
METAR EGVN 081641Z 21004KT 3700 SHRA SCT025CB BKN035 BKN050 15/13 Q1004 GRN  
TEMPO TSRA GRN=

After the event the Oxford controller indicated that London Control (TC SW) had coordinated the arrival of the EMB500 leaving CAS at CPT and routeing to the OX(NDB). The controller indicated that 3500ft had been allocated at the OX NDB and Brize Norton had been passed TI regarding the EMB500 leaving CAS at CPT descending to an altitude of 3500ft.

At 1625:06 the radar recording shows the EMB500 tracking W'bound on the S side of airway L9 and a B767 on the N side. Both ac are established on parallel tracks with the EMB500 descending and the B767 climbing. In addition a GLF5 is shown inbound towards CPT from the N descending to FL80.

At 1626:50 the radar recording shows the EMB500 passing FL70 in the descent and no longer in conflict with the GLF5 approaching CPT from the N. At this point the EMB500 commences a R turn towards Oxford. At 1627:27 the radar recording shows the EMB500 passing 5.6nm W of CPT on a N'y track.

At 1627:27, the EMB500 flight established contact with Oxford approach and reported, "*Oxford hello this is (EMB500 c/s) passing five thousand seven hundred feet er direct to the Oscar Xray we are coming from the south with eighteen and a half miles to run information Kilo Q N H one zero zero three two P O B.*" The controller responded, confirming a PS and descent to 3500ft on track 'OX'. The pilot was instructed to report passing 4500ft in the descent. The controller couldn't recall the exact D/F bearing of the EMB500, but considered that it was consistent with the expected inbound routeing from CPT.

The EMB500 pilot was advised to expect the ILS approach RW19. This was acknowledged and the pilot requested cloud base and visibility. The controller passed, "*...few at two thousand six hundred broken three thousand six hundred and we've got decreasing visibility to the north and west down to about five thousand metres as a hefty rain shower moves through*".

At 1628:37, the EMB500 flight reported passing 4500ft and the controller instructed the pilot, "*(EMB500 c/s) many thanks report reaching three thousand five hundred feet with five miles to run for onward clearance.*" The controller added that no delay was expected.

At 1629:12, the EMB500 pilot requested, "*er (EMB500 c/s) we're three thousand five hundred feet now at twelve miles er is it possible to talk to Brize to get us lower down to MSA we're just in the bottom of er er clouds at the moment bumping around.*" The controller responded, "*(EMB500 c/s) roger I can I can give you descent down to two thousand five hundred feet procedurally but no lower than that would that help you at all.*" The pilot replied, "*er we'd like to try er (EMB500 c/s)*" and the controller responded, "*Roger then descend to altitude two thousand five hundred feet one zero zero three to report reaching and with your intentions.*" The radar recording shows the EMB500, 13nm S of Oxford.

The controller was asked if D/F bearings had given any indication that the EMB500 was likely to infringe the Brize Norton CTR. The controller couldn't remember the bearing or looking at the D/F at this point. The controller was asked if pilot's were normally advised about the proximity of the Brize Norton. The controller indicated that only visiting pilots were normally advised and added that the EMB500 was locally based and was familiar with the airspace and local procedures. The controller was asked if perhaps the pilot was aware of the proximity of Brize Norton CTR and had asked the controller to talk to Brize. The controller indicated that the pilot wanted descent due to bumping around in the cloud base and the controller had not at the time considered that a clearance to enter controlled airspace was being requested.

At 1629:45, the EMB500 pilot acknowledged, "*er so we are now descending two thousand five hundred feet one zero zero three towards the Oscar Xray er and we would like Procedural Service for ILS Runway one nine.*" The controller advised, "*and (EMB500 c/s) upon reaching the Oscar Xray you are cleared for the ILS Runway one nine report beacon outbound.*" This was acknowledged correctly by the EMB500 pilot. The radar recording shows the EMB500 11nm S of Oxford, with the C130 tracking E-bound within the Brize Norton CTR indicating an altitude of 2700ft.

At 1630:33, the EMB500 pilot reported, "*(EMB500 c/s) at two thousand five hundred feet we've got traffic in our eleven o'clock on TCAS er at about our level do you have any info.*" The controller replied, "*(EMB500 c/s) nothing on this frequency standby though Brize are on the line.*" The radar recording shows the EMB500 1nm S of the Brize Norton CTR boundary, indicating an altitude of 2500ft. The C130 is in the EMB500's 1030 position at a range of 2.4nm. The C130 is indicating an altitude of 2700ft and tracking E.

At 1630:48, the pilot advised, "*Traffic in sight passing overhead er looks like Brize Traffic (EMB500 c/s).*" The radar recording shows the EMB500 entering CAS. At 1630:50, the Brize Radar controller rang Oxford, reporting that the EMB500 had infringed CAS and that avoiding action had been taken.

At 1630:58, the radar recording shows the EMB500 has crossed the C130 from R to L, at a range of 0.4nm, with the C130 tracking to pass behind. The EMB500 is indicating an altitude of 2500ft and the C130 is indicating an altitude of 3200ft.

At 1631:00, the controller transmitted, *“and (EMB500 c/s) Brize just advised you have infringed controlled airspace er into their zone and that was their traffic they’ve taken avoiding action against you and if you could get out of the zone as quickly as you can please.”* The pilot responded, *“er (EMB500 c/s) sorry I thought we were cleared down to two thousand five hundred feet.”* The controller replied, *“Yeah affirm you were cleared down to two thousand five hundred feet but er it is to remain clear of the Brize Control Zone at all times.”* The pilot advised, *“Okay roger misunderstood erm okay we’ll make a right turn to clear the zone (EMB500 c/s).”*

At 1631:28, the controller asked the EMB500 flight to report either field in sight or outbound on the ILS. The pilot acknowledged and continued without further incident.

The controller was asked how a similar situation might be prevented. The controller recognised that better use of D/F may have given an indication of the EMB500’s position. The controller recognised that the pilot may have misunderstood the descent clearance and that advising the pilot to remain clear of the Brize Norton CTR would have raised the pilot’s awareness. The controller added that revised procedures are to be introduced that will establish routeings which would keep traffic away from the area N of CPT.

After extensive consultation with all of the stakeholders, Oxford ATSU promulgated a MATS Part 2, Supplementary Instruction 08/11, effective from 22 September 2011, together with a change to the UK AIP, Page AD 2-EGTK-1-6 (20 Oct 11). This introduced new procedures for the management of Oxford inbounds and outbounds from the S, which will be to route ac away from the busy area N of CPT. Oxford Airport are also installing a primary and secondary (Mode-S, MSSR) surveillance radar system with an estimated completion date of May 2012.

The EMB500 was not routed via CPT to OX, in accordance with release details passed by TC SW. Due to the traffic configuration on airway L9 the EMB500 was released 5-6nm W of CPT. This resulted in routing that on a direct track to the OX NDB, would require the EMB500 to pass O/H the Brize Norton CTR.

The Oxford controller was not advised or aware of the amended routeing and did not detect the D/F indications that may have alerted the controller to the EMB500 routeing, which was further W than expected. The EMB500 pilot on the initial contact with Oxford stated, *“...we are coming from the south...”*, but this was not considered to be sufficient to have alerted the controller to the more W’ly route.

A misunderstanding occurred, when the EMB500 pilot requested further descent, due to turbulence in the base of cloud. The EMB500 pilot’s requested, *“...is it possible to talk to Brize to get us lower down to MSA we’re just in the bottom of er er clouds at the moment bumping around.”* However the pilot’s written report did not indicate whether the pilot regarded his request, included, or implied a clearance to transit the CTR. Consequently, the controller gave descent to an altitude of 2500ft in the expectation that the EMB500 would pass E of the Brize Norton CTR. The controller also considered that pilot was locally based and familiar with local and CAS restrictions. The Oxford Manual of Air Traffic Services, Part 2, Page 4-4, Paragraph 3.2, states:

*‘Aircraft who do not require to hold will, when appropriate, be cleared direct outbound from altitude 2500ft. This is subject to the aircraft being able to level at altitude 2500ft before it reaches 5min flying time from the ‘OX’ and associated holding pattern.’*

This resulted in the EMB500 entering the Brize Norton CTR without a clearance and into conflict with the C130 in the radar pattern. The UK AIP Page, ENR 2-1-19 (20 Oct 11) states:

*‘Brize Norton Control Zone:*

*Pilots wishing to enter the Control Zone must observe the normal procedure for joining Controlled Airspace and should make their request for entry when 15nm or 5 minutes flying*

time (whichever is earlier) from the Control Zone Boundary. Pilots should make their request for Control Zone entry to BRIZE ZONE.'

A misunderstanding caused the EMB500 to enter the Brize Norton CTR without first obtaining a clearance. A number of factors were considered to have been contributory:

The EMB500 did not leave CAS at CPT in accordance with normal procedures and this was not communicated to the Oxford Approach controller.

The Oxford controller was not aware of the change in routing and did not detect the pilot's report of being to the S, or the D/F bearings that may have indicated the EMB500 was routing further W than planned.

The pilot was required to obtain a clearance before entering the Brize Norton CTR. The pilot asked Oxford to speak to Brize Norton in order to obtain further descent but no specific request was made regarding a crossing clearance. It was not clear to CAA ATSI, if the pilot had intended Oxford to obtain a crossing clearance.

The controller gave the EMB500 flight descent to an altitude of 2500ft and had an expectation that the ac was descending in Class G airspace to the E of the Brize Norton CTR.

The pilot entered the Brize Norton CTR without first obtaining a clearance and into conflict with the C130.

## **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 video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

It appeared to Members that there were differing expectations on the EMB500 flightdeck and within Oxford ATC. The transmission made by the EMB500 flight asking, "*...is it possible to talk to Brize to get us lower down to MSA...*" was made with the intent that Oxford coordinate with Brize for clearance into the CTR whereas the Oxford APP took this to mean that the crew wanted to leave the frequency to speak to Brize for further descent to MSA which she could give, believing the flight was routing E of the CTR. Controller Members noted that the VDF should have alerted the APP to the EMB500's bearing from Oxford and the possibility that a descent would put it into CAS. However, Members agreed that the subsequent executive instruction given to the EMB500 flight by Oxford APP under the PS to descend to 2500ft had led to it entering the CTR without clearance and into conflict with the C130, which was the cause of the Airprox. With hindsight, had the crew stated that their request for descent to a lower altitude was a request to enter the CTR it would have been clear to the APP what the crew intended. She had not instructed the crew to remain outside CAS at the time and the EMB500 crew did not query whether they were cleared to enter the CTR during the descent. A salutary lesson to aircrew is to ensure that a positive clearance is received before entering CAS. The Brize controller had been pre-noted by Oxford about the EMB500 and had declined to work the flight as it was, at the time, only descending to 3500ft. It was when he was dealing with AC3 that the EMB500 had descended below 3500ft; this was noticed shortly afterwards as it entered the CTR and avoiding action was given. The C130 crew followed the TCAS RA guidance and climbed and as they did so they saw the EMB500 crossing ahead from R to L and below. The EMB500 crew saw the C130 as proximate traffic on TCAS before a TA was generated as it converged from the W. The PNF queried the C130's presence and was informed of the CTR infringement during which time they visually acquired the C130, climbing, before it passed above and behind. These elements, when combined allowed the Board to conclude that the risk of collision had been quickly and effectively removed.

Although the operating company's report listed the unusual events and the crew being within 5min of their maximum FDP as secondary causal factors, an experienced pilot Member opined that there were other factors. The crew had been close to the minimum rest period before the current duty period and had an early start from an airfield that wasn't their base; in addition the Captain had relatively few flying hours and was training a very inexperienced co-pilot. All of these elements would be likely to increase the crew's tiredness during this last portion of the flight.

Members were pleased to see that new procedures had been introduced for ATM of Oxford inbound and outbound flights as well as the introduction of radar during 2012.

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

Cause: Oxford APP descended the EMB500 to 2500ft which put it into CAS without clearance and into conflict with the C130.

Degree of Risk: C.