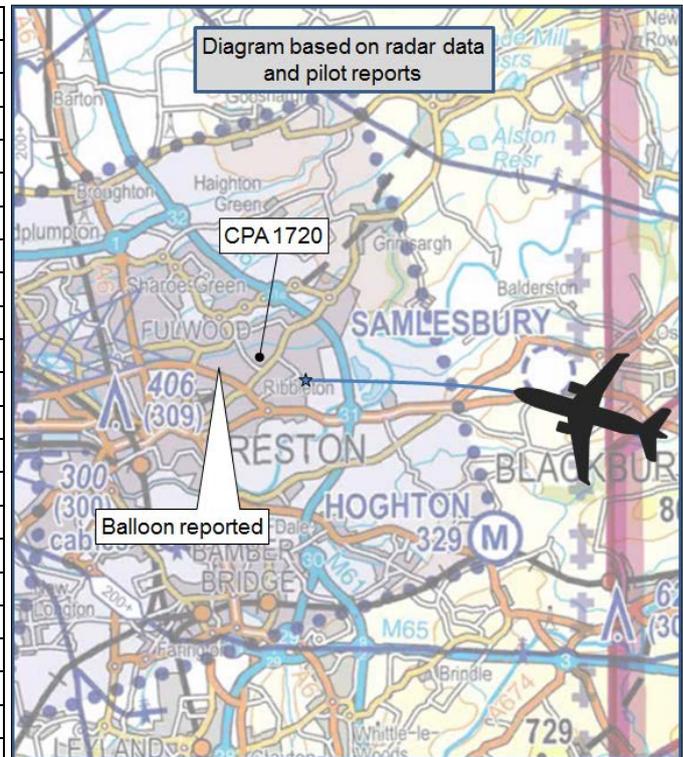


AIRPROX REPORT No 2016206

Date: 20 Sep 2016 Time: 1720Z Position: 5346N 00240W Location: Preston

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	EMB135	Hot Air Balloon
Operator	Civ Comm	Civ Comm
Airspace	London FIR	London FIR
Class	G	G
Rules	IFR	VFR
Service	Deconfliction	None
Provider	Warton	
Altitude/FL		
Transponder	A, C, S	Not Fitted
Reported		
Colours	Company	Black, Gold
Lighting		Nil
Conditions	NK	VMC
Visibility		30km
Altitude/FL	2600ft	2000ft
Altimeter	QNH (1019hPa)	1020hPa
Heading	250°	Stationary
Speed	200kt	0kt
ACAS/TAS	TCAS II	Not fitted
Alert	Unknown	N/A
Separation		
Reported	600ft V/1.5nm H	1nm H
Recorded	NK	



THE EMB135 PILOT reports that during vectors for an ILS RW25 at Warton, multiple hot-air balloons were spotted in his 12 o'clock. Warton advised that they would not be above 1000ft but, as he got closer, it became obviously that one was much higher, in the region of 2000ft. He was descending to 2600ft and felt uncomfortable with this proximity, so made a left turn to avoid.

THE HOT-AIR BALLOON PILOT reports that he took off from his launch site (a football pitch) and continued to climb for the forecast southerly flow at 2000ft. On passing 2000ft, he noticed an aircraft approaching from the east. The aircraft turned left and passed to the south of him. He believed that both aircraft were VFR in the FIR and he considered that to be the correct procedure and continued with his flight. After landing and speaking on the phone with Warton ATC, it was agreed that, in future, if he was operating from that position, he would telephone them before take-off or call on their frequency.

He assessed the risk of collision as 'Low'.

THE WARTON CONTROLLER reports that as the duty Radar Approach controller he was vectoring the EMB135 towards the ILS RW25. The aircraft had been released from airways 20nm east of Warton in the descent to 4000ft, was placed under a Deconfliction Service and given further descent to 3500ft. When on a closing track towards the ILS, with about 17nm to run, an unknown aircraft squawking 7000 and indicating 2000ft turned towards the final approach and into potential conflict with the EMB135. He gave the EMB135 avoiding action onto a heading of 250° and a further descent to 2700ft, and explained that he would turn it back onto a closing heading for the ILS once clear of the unknown traffic. At the same time the ADC informed him via the intercom that he could see a hot-air balloon in the vicinity of Preston Cathedral, which appeared to be at about 1000ft. This was acknowledged, but nothing was seen on the radar display. He turned his attention back to the conflicting traffic, which had turned away from the final approach and gave the EMB135 a turn onto a

heading of 300° to close to the localiser from the south. The pilot asked to confirm whether the vector was for the localiser, and asked whether the controller was aware of a hot-air balloon in the vicinity. He replied that he believed it to be at 1000ft, and the pilot replied that this one was considerably higher and that he would be manoeuvring around it. The rest of the approach was continued without incident. He asked another pilot on frequency whether he could see the balloon, he called and described it as black and gold and was able to read the name of the company on it.

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

THE WARTON SUPERVISOR reports that it was brought to his attention that a visiting EMB135 had avoided a hot-air balloon and was intending to report an Airprox. The next day he was able to call the balloon company and speak to the pilot to advise on the Airprox. A discussion followed in which the balloon pilot said he was surprised to see an aircraft approach from that direction and the Supervisor advised that they were always happy to take calls from pilots in the area, even if only giving advice about position, heading and direction. The balloon pilot thought that his hand-held radio might not be able to reach Warton, but agreed that it would be possible to telephone prior to getting airborne.

Factual Background

The weather at Warton was recorded as follows:

EGNO 201720Z VRB02KT 9999 FEW037 16/09 Q1019=

Analysis and Investigation

CAA ATSI

At 1715:00 the inbound EMB135 called Warton LARS on its own navigation to the centre-fix for the ILS approach to RW25 at Warton. A Deconfliction Service was agreed and the aircraft was instructed to descend to 3500ft.

The radar controller subsequently issued headings to the EMB135 as tactical avoiding action from unknown traffic which may have potentially affected the planned tracking for the ILS. This unknown (transpondering) traffic turned away, and the controller was able to vector the aircraft back towards the centreline. As the EMB135 settled on heading the pilot reported a balloon in sight. The Warton radar controller had received information from the Tower controller at Warton about a balloon which had been sighted from the VCR and was estimated to be in the vicinity of Preston Cathedral at approximately 1000ft. No R/T contact with either Warton Radar or Warton Tower had been received from the balloon. At 1718:58 (Figure 1) the EMB135 pilot reported commencing a left turn to avoid the balloon. During this avoidance the pilot reported the height of the balloon to be approximately 2600ft.



Figure 1 –1718:58 (Prestwick Area Radar)

Once clear of the balloon the pilot accepted further vectors for the ILS approach. Figure 2 (1720:02), shows the Warton Radar picture with a faint primary return (in blue) which may have been the balloon just to the north of the EMB135. The controller reported that there had been no previous evidence of the balloon on the radar, and the Prestwick Area radar that ATSI have reviewed, also had no evidence. In Figure 2 the position of Preston Cathedral can be seen on the Warton Radar image.

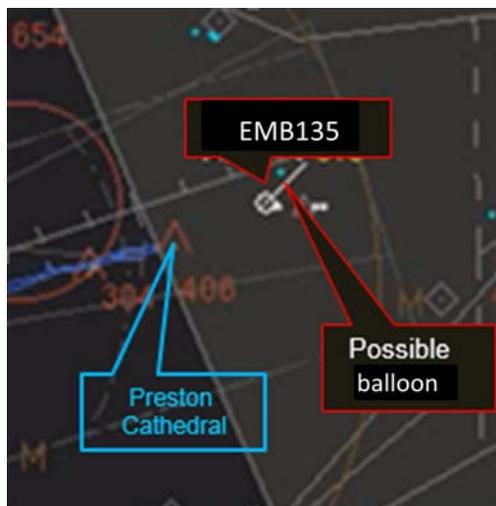


Figure 2 1720:02 Warton Radar image

In the Warton Unit ATC Investigation, the radar controller reported being distracted by the earlier unknown aircraft and had intended to pass Traffic Information about the balloon to the EMB135 once it was heading back towards the final approach track. When the controller had actioned the turn back towards final approach, the pilot reported the balloon. Based on the sighting report from the ADC [that the hot-air balloon was overhead Preston Cathedral], the controller had expected to have more time to pass the Traffic Information as the range of the balloon from the EMB135 was thought to be greater.

A Deconfliction Service relies on the controller using surveillance equipment and endeavouring to provide a deconfliction minima on unknown traffic observed on the radar screen. Ultimately, collision avoidance remains the pilots responsibility¹.

UKAB Secretariat

The EMB135 pilot was required to give way to the balloon², which he did.

Occurrence Investigation

The Warton Unit ATC Investigation made a number of recommendations, including better liaison between Warton ATC and the balloon operator, and noted that, since the Airprox, this operator had subsequently made calls to Warton notifying his intention to fly.

Summary

¹ CAP774 Ch4 4.1 A Deconfliction Service is a surveillance based ATS where, in addition to the provisions of a Basic Service, the controller provides specific surveillance-derived traffic information and issues headings and/or levels aimed at achieving planned deconfliction minima, or for positioning and/ or sequencing. However, the avoidance of other traffic is ultimately the pilot's responsibility.

² SERA.3210 Right-of-way (c)(2) Converging.

An Airprox was reported when an EMB135 and a hot air balloon flew into proximity at 1720 on Tuesday 20th September 2016. The EMB135 was operating under IFR in VMC, and in receipt of a Deconfliction Service from Warton and the hot-air balloon pilot was VFR in VMC and not in receipt of an ATS.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from the pilots of both aircraft, transcripts of the relevant RT frequencies, radar photographs/video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

The Board first looked at the actions of the Warton controller. Although he was given information on the balloon by the ADC, he was rightly more concerned about the conflicting aircraft that he could see on his radar than a hot-air balloon reported at 1000ft some distance away from the EMB135. Once he had given avoiding action on this unknown traffic and turned the EMB135 back on track, he had intended to pass the balloon information on to the pilot, but the pilot spotted the balloon before he had to chance to enact his plan. Notwithstanding that the controller was required to pass advice and guidance to the pilot to assist with collision avoidance, without being able to see the balloon on his radar the controller was unable to give more accurate information on this occasion.

For his part, the EMB135 pilot saw the hot-air balloon whilst in the radar pattern and was concerned by its presence. Although under a Deconfliction Service, the EMB135 was still operating in Class G airspace and, as such, the pilot was responsible for his own collision avoidance; commenting that he was 'uncomfortable' with the separation, he therefore correctly took his own avoiding action to prevent a collision situation developing.

Turning to the hot-air balloon pilot, the Board recognised his entitlement to fly within the Class G Warton MATZ, and noted his intention to route south away from the centreline using the prevailing wind at 2000ft. Nevertheless, members were surprised that he hadn't thought to telephone Warton before getting airborne given that he was doing so near to their extended centreline and was therefore highly likely to encounter their radar traffic. In that respect, and noting that the incident took place in the early evening, they wondered whether the balloon pilot had assumed Warton would be closed (in fact Warton's published opening hours are until 1900hrs Mon-Thurs). Ultimately, the EMB135 pilot had seen the balloon at an early stage and the situation had been benign; nevertheless, the Board were heartened to hear that lessons had already been learned, and that liaison was taking place between the balloon operator and Warton to prevent a similar incident in the future.

In assessing the effectiveness of the barriers associated with this incident, the Board concluded that the key factors had been that:

- **ATC Conflict Detection and Resolution** had only been **partially effective** because the balloon had not painted on radar and the visual report from the VCR had introduced a false mental picture of the balloon's location in the mind of the Warton Radar Approach controller.
- **Flight Crew Pre-flight Planning** was considered to have been **ineffective** because the balloon pilot had not assimilated that his flight might cause conflict with Warton radar traffic.
- **Flight Crew Situational Awareness** was also only **partially effective** because the EMB135 pilot was only given generic information about the balloons, and this information did not include the height and accurate location of the specific balloon that came into conflict.
- **Onboard Warning/Collision Avoidance Equipment** was assessed as **ineffective** because there was no system available on the hot-air balloon.

In discussing the cause of the Airprox, the Board quickly agreed that, although he had seen the hot-air balloon at an early stage, as he tracked towards it on his approach to Warton the EMB135 pilot had become concerned by its proximity. That being acknowledged, and given the separation achieved by his correct actions to avoid, members also quickly agreed that this incident was benign in that normal safety standards had pertained; therefore, they assessed the risk as Category E.

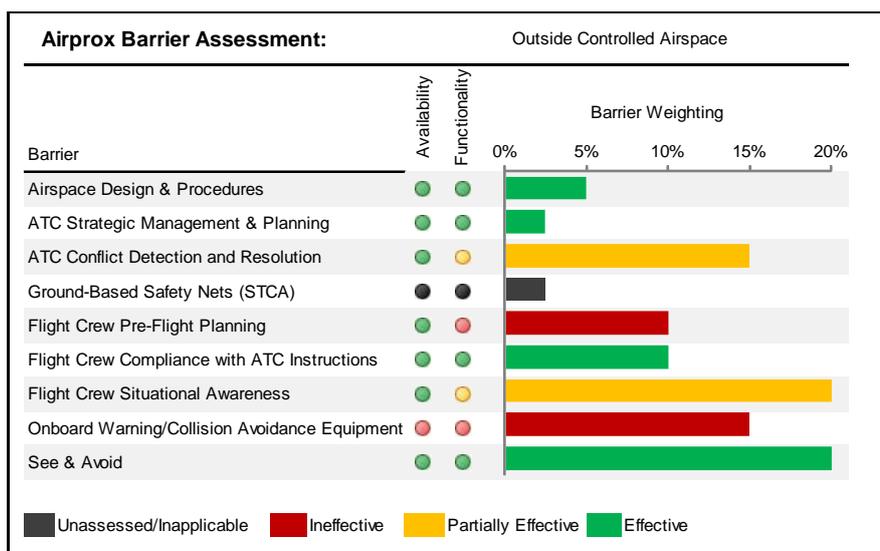
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The EMB135 pilot was concerned by the proximity of the Hot-Air Balloon.

Degree of Risk: E.

Barrier assessment:

Modern safety management processes employ the concept of safety barriers that prevent contributory factors or human errors from developing into accidents. Based on work by EASA, CAA, MAA and UKAB, the following table depicts the barriers associated with preventing mid-air-collisions. The length of each bar represents the barrier's weighting or importance (out of a total of 100%) for the type of airspace in which the Airprox occurred (i.e. Controlled Airspace or Uncontrolled Airspace).³ The colour of each bar represents the Board's assessment of the effectiveness of the associated barrier in this incident (either Fully Effective, Partially Effective, Ineffective, or Unassessed/Inapplicable). The chart thus illustrates which barriers were effective and how important they were in contributing to collision avoidance in this incident.



Barrier Effectiveness		Consequence		
		Non-functional	Partially Functional	Functional
Availability		1	2	3
Completely Unavailable	1	1	2	3
Partially Available	2	2	4	6
Available	3	3	6	9

Key:

- Effective
- Partially Effective (If the system was partially available but fully functional score availability as 2.5)
- Ineffective
- Unassessed/Inapplicable

³ Barrier weighting is subjective and is based on the judgement of a subject matter expert panel of aviators and air traffic controllers who conducted a workshop for the UKAB and CAA on barrier weighting in each designation of airspace.

Barrier	Availability			Functionality			Unassessable / Absent
	Fully (3)	Partially (2)	Not Available (1)	Fully (3)	Partially (2)	Non Functional (1)	
Airspace Design and Procedures	Appropriate airspace design and/or procedures were available	Airspace design and/or procedures were lacking in some respects	Airspace design and/or procedures were not appropriate	Airspace design and procedures functioned as intended	Airspace design and/or procedures did not function as intended in some respects	Airspace design and/or procedures did not function as intended	The Board either did not have sufficient information to assess the barrier or the barrier did not apply; e.g. TCAS not fitted to either aircraft or ATC Service not utilised. Note: The Board may comment on the benefits of this barrier if it had been available
ATC Strategic Management and Planning	ATM were able to man and forward plan to fully anticipate the specific scenario	ATM were only able to man or forward plan on a generic basis	ATM were not realistically able to man for or anticipate the scenario	ATM planning and manning functioned as intended	ATM planning and manning resulted in a reduction in overall capacity (e.g. bandboxed sectors during peak times)	ATM planning and manning were not effective	
ATC Conflict Detection and Resolution	ATS had fully serviceable equipment to provide full capability	ATS had a reduction in serviceable equipment that resulted in a minor loss of capability	ATS had a reduction in serviceable equipment that resulted in a major loss of capability	The controller recognised and dealt with the conflict in a timely and effective manner	The controller recognised the conflict but only partially resolved the situation	The controller was not aware of the conflict or his actions did not resolve the situation	
Ground-Based Safety Nets (STCA)	Appropriate electronic warning systems were available	Electronic warning systems is not optimally configured (e.g. too few/many alerts)	No electronic warning systems were available	Electronic warning systems functioned as intended, including outside alerting parameters, and actions were appropriate	Electronic warning systems functioned as intended but actions were not optimal	Electronic warning systems did not function as intended or information was not acted upon	
Flight Crew Pre-Flight Planning	Appropriate pre-flight operational management and planning facilities were deemed available	Limited or rudimentary pre-flight operational management and planning facilities were deemed available	Pre-flight operational management and planning facilities were not deemed available	Pre-flight preparation and planning were deemed comprehensive and appropriate	Pre-flight preparation and/or planning were deemed lacking in some respects	Pre-flight preparation and/or planning were deemed either absent or inadequate	
Flight Crew Compliance with Instructions	Specific instructions and/or procedures pertinent to the scenario were fully available	Instructions and/or procedures pertinent to the scenario were only partially available or were generic only	Instructions and/or procedures pertinent to the scenario were not available	Flight crew complied fully with ATC instructions and procedures in a timely and effective manner	Flight crew complied later than desirable or partially with ATC instructions and/or procedures	Flight crew did not comply with ATC instructions and/or procedures	
Flight Crew Situational Awareness	Specific situational awareness from either external or onboard systems was available	Only generic situational awareness was available to the Flight Crew	No systems were present to provide the Flight Crew with situational awareness relevant to the scenario	Flight Crew had appropriate awareness of specific aircraft and/or airspace in their vicinity	Flight Crew had awareness of general aircraft and/or airspace in their vicinity	Flight Crew were unaware of aircraft and/or airspace in their vicinity	
Onboard Warning/Collision Avoidance Equipment	Both aircraft were equipped with ACAS/TAS systems that were selected and serviceable	One aircraft was equipped with ACAS/TAS that was selected and serviceable and able to detect the other aircraft	One aircraft was equipped with ACAS/TAS that was selected and serviceable but unable to detect the other aircraft (e.g. other aircraft not transponding)	Equipment functioned correctly and at least one Flight Crew acted appropriately in a timely and effective manner	ACAS/TAS alerted late/ambiguously or Flight Crew delayed acting until closer than desirable	ACAS/TAS did not alert as expected, or Flight Crew did not act appropriately or at all	
See and Avoid	Both pilots were able to see the other aircraft (e.g. both clear of cloud)	One pilots visibility was uninhibited, one pilots visibility was impaired (e.g. one in cloud one clear of cloud)	Both aircraft were unable to see the other aircraft (e.g. both in cloud)	At least one pilot takes timely action/inaction	Both pilots or one pilot sees the other late and one or both are only able to take emergency avoiding action	Neither pilot sees each other in time to take action that materially affects the outcome (i.e. the non-sighting scenario)	