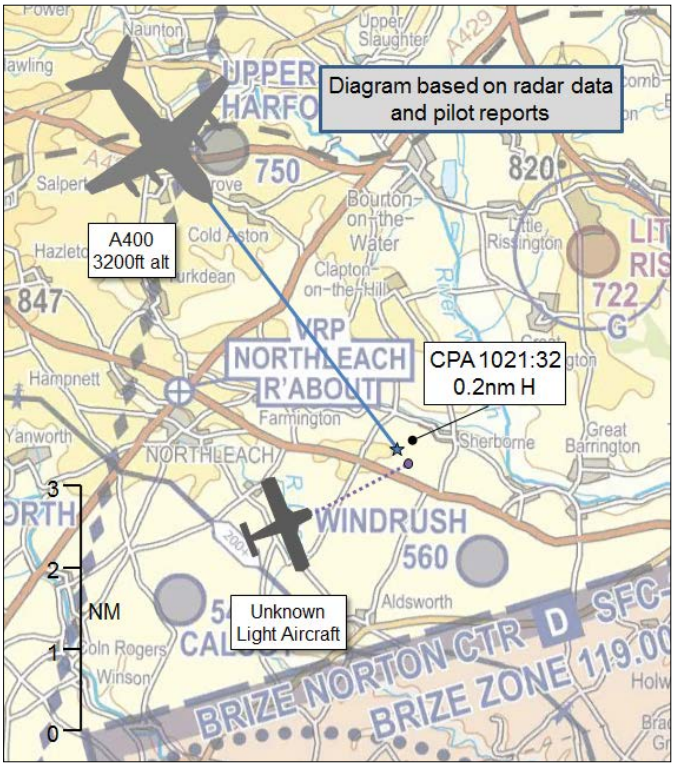
AIRPROX REPORT No 2016179

Date: 31 Jul 2016 Time: 1021Z Position: 5149N 00146W Location: 7nm NW Brize

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	A400	Light Aircraft
Operator	HQ Air (Ops)	
Airspace	Lon FIR	
Class	G	G
Rules	IFR	
Service	Traffic	
Provider	Brize	
Altitude/FL	FL032	
Transponder	A, C, S	Nil
Reported		
Colours	Grey	White, Red
Lighting	Beacon, Strobes, Landing	
Conditions	IMC	
Visibility	50km	
Altitude/FL	2900ft	
Altimeter	QFE (1017hPa)	
Heading	150°	
Speed	NK	
ACAS/TAS	TCAS I	
Alert	None	
Separation		
Reported	0ft V/0.5nm H	
Recorded	0.2nm H	



THE A400 PILOT reports that he was on recovery to Brize and receiving a Traffic Service from Brize Director. He was in 'clean' air [UKAB note: interpreted to mean not in cloud], although technically IMC due to clearance from the cloud. There were several TCAS contacts in vicinity of the Brize zone. Whilst conducting an intermediate descent, Traffic Information was given on traffic right at a range of 6nm, no height information, two further lots of Traffic Information were given, but the crew could not spot the contact. Eventually it was seen by the non-handling pilot, directly on the nose at the same altitude and at a range of ½nm. It was a single-engine, low-wing aircraft, white upper, with a red and white stripe lower, no lights were observed. There was no TCAS indication of the subject aircraft at any stage, and the crew believed that he was flying in cloud just before the Airprox. The aircraft crossed their flight path at 90° from right to left, and the A400 passed behind him by ¾ nm. They informed Brize ATC at the time.

He assessed the risk of collision as 'Medium'.

THE LIGHT-AIRCRAFT PILOT COULD NOT BE TRACED.

THE BRIZE APP CONTROLLER reports that he was controlling the A400 inbound from the north-west for a TAC to ILS for RW25. The radar picture was fairly cluttered however weather conditions were good, with a reported visibility of more than 50km. The A400 was receiving a Traffic Service; Traffic Information on a non-squawking aircraft had been given. Once inside the Brize CTR the pilot reported that the other aircraft had been at a similar level and that he would be reporting an Airprox.

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

Factual Background

The weather at Brize was recorded as follows:

METAR EGVN 310950Z 32006KT 9999 FEW030 BKN070 18/10 Q1017 BLU NOSIG=

Portions of the tape transcripts between Brize Norton Director and the A400 are below:

From	To	Speech Transcription	Time
A400	Director	Brize Director hello {A400 c/s}, FL100 direct to Brize.	10:15:42
Director	A400	{A400 c/s} Brize, Identified, Traffic Service.	10:15:48
A400	Director	Traffic Service {A400 c/s}.	10:15:52
A400	Director	{A400 c/s} we've copied ATIS Foxtrot, and we have 4 POB.	10:16:07
Director	A400	{A400 c/s} descend to altitude 4000ft Brize QNH 1017.	10:16:24
A400	Director	Descend 4000ft on 1017 {A400 c/s}.	10:16:30
Director	A400	{A400 c/s} descend to altitude 4300ft 1017.	10:16:36
A400	Director	4300ft {A400 c/s}.	10:16:38
Director	A400	{A400 c/s} cleared to the initial approach fix.	10:16:43
A400	Director	Cleared to initial approach fix {A400 c/s}	10:16:46
Director	A400	{A400 c/s} Traffic, East 6 miles, manoeuvring under my control manoeuvring east at this time.	10:19:17
A400	Director	Copied, looking {A400 c/s}	10:19:24
Director	A400	{A400 c/s} descend to altitude 3300ft.	10:19:30
A400	Director	3300ft {A400 c/s}.	10:19:35
Director	A400	{A400 c/s} Traffic South 10 miles North East bound no height information	10:19:43
A400	Director	Looking {A400 c/s}	10:19:48
Director	A400	{A400 c/s} previously called traffic erm, south, south east erm 6 miles tracking east no height information	10:20:27
A400	Director	Looking {A400 c/s}	10:20:33
Director	A400	{A400 c/s} erm previously called traffic now south erm 3 miles tracking east no height information	10:20:52
A400	Director	{A400 c/s}	10:20:57
Director	A400	{A400 c/s} previously called traffic now south half mile tracking east no height information	10:21:12
A400	Director	{A400 c/s} Visual	10:21:21

Analysis and Investigation

Military ATM

At 1020:28 (Figure 1), the A400 is tracking south east, level at 3300ft, routing to the initial approach fix. The unknown aircraft is 5nm to the south and tracking north east, showing no transponder information. At this point the Brize controller passed Traffic Information to the A400 for the second time '*previously called traffic erm, south, south east erm 6 miles tracking east no height information'.*

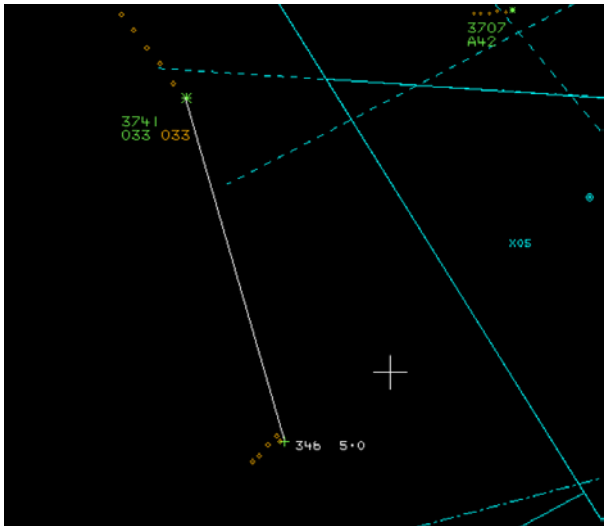


Figure 1: Geometry at 1020:28

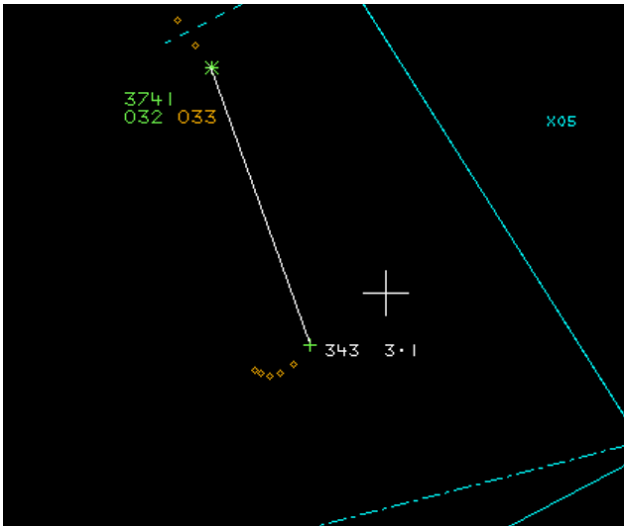


Figure 2: Geometry at 1020:52

(A400 squawking 3741; primary contact)

At 1020:52 (Figure 2), the A400 continues to transit toward the initial approach fix and at 3nm, for the third time, the controller again passes Traffic Information *'previously called traffic now south erm 3 miles tracking east no height information'.*

At 1021:13 (Figure 3), Traffic Information is passed for the fourth time '*previously called traffic now south half mile tracking east no height information'.*

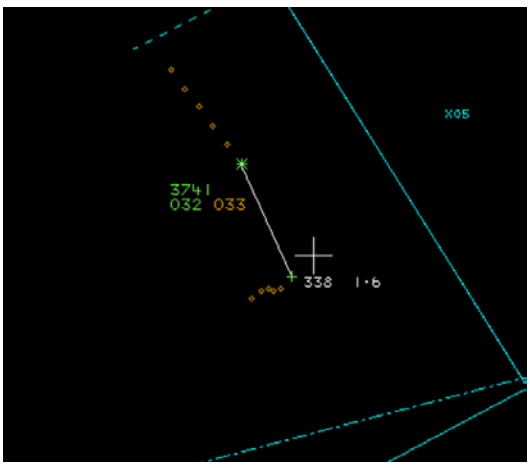


Figure 3: Geometry at 1021:13

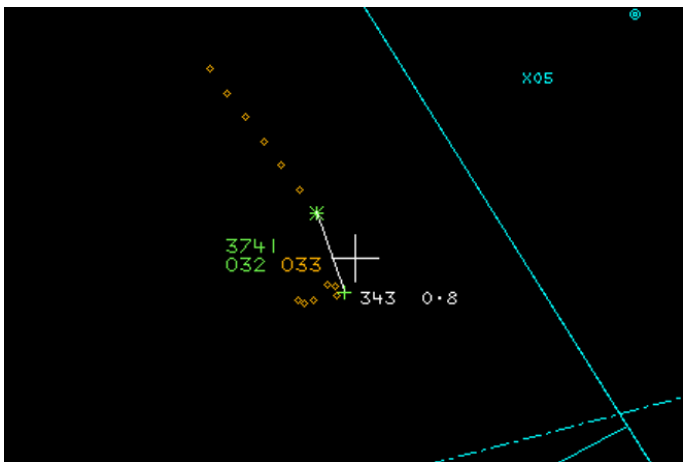


Figure 4: Geometry at 1021:12

(A400 squawking 3741; primary contact)

At 1021:22 (Figure 4), the A400 pilot calls visual with the unknown aircraft, lateral separation is 0.8nm at this point.

The Brize Approach controller provided timely and relevant Traffic Information to the A400 pilot. Traffic Information was passed four times, updating the pilot about the non-transponding traffic as the situation developed. The unknown aircraft was not speaking to Brize ATC, and was not displaying any Mode A/C information, thus making it impossible for the vertical confliction to be identified. The Brize Approach controller was not providing the A400 aircraft with vectors because it had been cleared to the initial approach fix.

The A400 pilot acquired the unknown aircraft visually with 0.8nm lateral separation. Traffic Information and pilot lookout were effective barriers in this incident; however, the A400 pilot reported that safe separation had been reduced. TCAS was an ineffective barrier due to the conflicting aircraft not transponding.

UKAB Secretariat

The NATS radar reply showed the CPA to be at 1021:32 with 0.2nm separation.

The A400 and light aircraft pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard[1]. If the incident geometry is considered as converging then the A400 pilot was required to give way to the light aircraft[2].

Comments

HQ Air Command

The A400 pilot reports that whilst in clear air, due to proximity of cloud, then it is a reasonable assumption that the unknown ac was in the same conditions without an ATC service or transponder. That said, the A400 on a Traffic Service was provided information 4 times and this eventually cued him to see the unknown ac at 0.8nm; he was then able to make the judgement that no manoeuvring was required to avoid a collision. Unfortunately, TCAS could not be used as an effective barrier because the unknown ac was not transponding.

Summary

An Airprox was reported when an A400 and a light aircraft flew into proximity at 1021 on Sunday 31st July 2016. The A400 pilot was operating under IFR in IMC, and in receipt of a Traffic Service from Brize. The light aircraft pilot could not be traced.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from the A400 pilot, 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 A400 pilot and noted that he was effectively VMC but that he had reported that his distance from cloud put him within the definition of IMC. Although members agreed that he could clearly see around him to a degree, given his likely relatively high speed,[3] they wondered whether he would have been better placed to have asked for a Deconfliction Service rather than a Traffic Service so that ATC could assist in avoiding other traffic that might be obscured to him. That being said, the Board noted that ATC had passed Traffic Information to him regarding the other traffic on 4 occasions (albeit with height unknown) and, given his collision avoidance responsibilities, members wondered why he had continued towards it without taking any action to break the collision geometry. Although ATC were not able to pass height information because the other aircraft was non-transponding (possibly lulling the A400 pilot into thinking it wasn't at his altitude), the Board

[1] SERA.3205 Proximity.
[2] SERA.3210 Right-of-way (c)(2) Converging.
[3] The A400 speed was not reported in the Airprox form but is likely to have been in the region of 200-250kts.

commented that GA traffic most frequently transited at around 2-3000ft in this area, and that it would have been prudent for the A400 pilot to have taken this into consideration.

The Board regretted that the light aircraft pilot could not be traced; without his report it could not be known whether he was visual with the A400 or not, why he was flying without his transponder operating (if his aircraft had one fitted) and why he had not spoken to Brize LARS as he passed by their CTR. Members commented on the A400 pilot's report that he thought the light aircraft had been flying in cloud but without the light-aircraft pilot's report they could not substantiate that either. GA members commented that they thought it more likely that the light aircraft was simply obscured from the A400 pilot's view by cloud between them, but the Board could not determine this one way or the other. In this respect, members commented that, if flying below 140kts, the light-aircraft was simply required to be clear of cloud rather than the more rigorous requirements for separation from cloud for faster aircraft. Notwithstanding this uncertainty, the Board commented that, assuming the light-aircraft was fitted with a transponder and radio, its pilot would have been well advised to have contacted Brize LARS when flying in this area, particularly given the likelihood of encountering large, fast military aircraft operating at those heights in the Brize radar pattern for which even just squawking 7000/ModeC would provide ATC and TCAS-equipped aircraft with more situational awareness.

Turning to ATC, the Board noted that the controller had provided timely and accurate Traffic Information, which had then been updated a further 3 times. The Board then had a lengthy discussion about whether the controller could, or should, have provided a vector to avoid the unknown aircraft. ATC members commented that, as a primary-only return without height information, the controller did not know whether the aircraft was co-altitude and, although the controller had cleared the A400 pilot to route to the Initial Approach Fix, this was not the same as giving vectors; as a result the rule about not vectoring an aircraft under a Traffic Service into confliction did not apply in this case because the pilot was under his own navigation. Furthermore, controlling members were firm in their view that by providing avoiding action under a Traffic Service, the controller would have blurred the lines between the types of service; the pilot could have asked for an upgrade to Deconfliction Service at any time, and then deconfliction advice would have been given (as soon as practicable). It was therefore agreed that the controller had discharged his duty of care by repeatedly passing the Traffic Information, and should be commended for such.

In looking at the barriers to mid-air collision that were relevant to this incident, the Board assessed that the following were key contributory factors:

- **ATC Strategic management** and **ATC conflict and detection** were **effective** barriers, although there were no **Ground Based Conflict Alerts** available and so this was ineffective.

- **Compliance with ATC instructions** was **ineffective** because despite repeated Traffic Information, the A400 pilot did not alter his track to break the collision geometry.

- **Onboard Warning (TCAS)** was **ineffective** because the conflicting light-aircraft was not transponding and therefore not detectable by the A400 system.

- **See and Avoid** was only **partially effective** because by the time the A400 pilot saw the light aircraft he was within 0.5nm of it.

The Board then looked at the cause and the risk of the Airprox and quickly agreed that due to his inaction on receipt of multiple Traffic Information, the A400 pilot had flown into conflict with the unknown light-aircraft. The risk was assessed as Category B, the proximity of the two aircraft was such that safety had been much reduced below the norm.

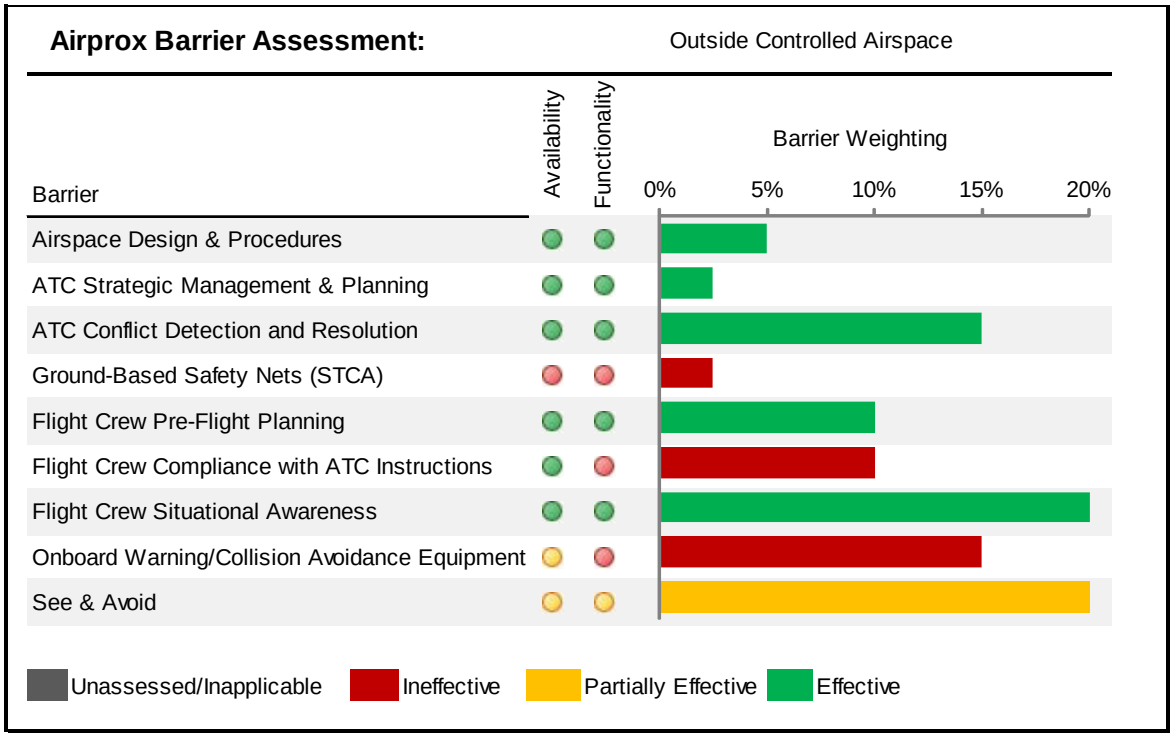
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The A400 pilot flew into conflict with the unknown light aircraft.

Degree of Risk: B.

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).[4] 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

[4] 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			Unassessed / Inapplicable
	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. 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 confliction 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	Neither aircraft were fitted with ACAS/TAS or their systems were not selected on or unserviceable or systems incompatible	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)	