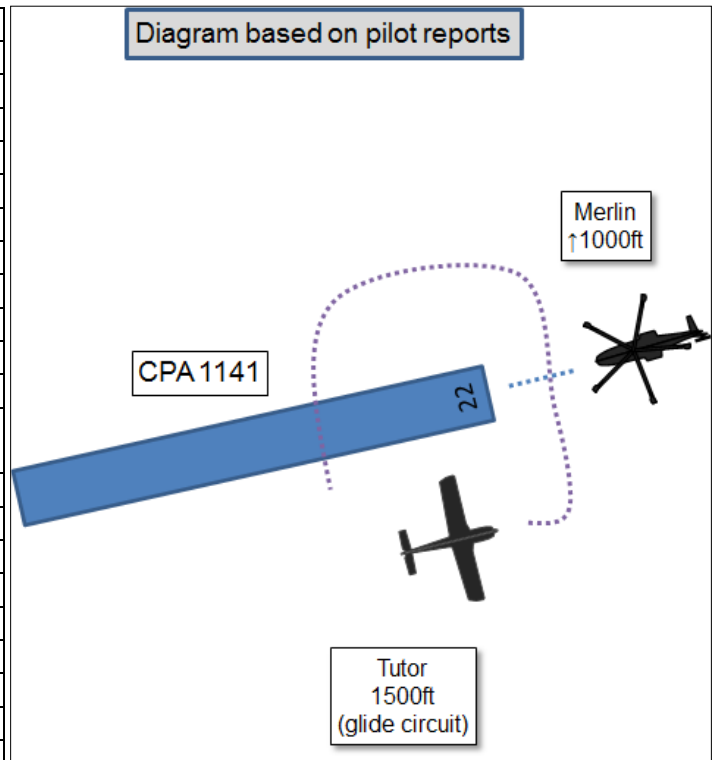


AIRPROX REPORT No 2016231

Date: 26 Oct 2016 Time: 1141Z Position: 5100N 00238W Location: Yeovilton

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Merlin	Tutor
Operator	RN	RN
Airspace	Yeovilton ATZ	Yeovilton ATZ
Class	G	G
Rules	IFR	VFR
Service	Traffic	Aerodrome
Provider	Yeovilton	Yeovilton
Altitude/FL		
Transponder	A, C, S	A, C, S
Reported		
Colours	Grey	
Lighting	HISL, Nav, landing	
Conditions	VMC	VMC
Visibility	20km	
Altitude/FL	1000ft	1500ft
Altimeter	QFE (1026hPa)	QFE
Heading	220°	NR
Speed	80kt	120kt
ACAS/TAS	TAS	Unknown
Alert	None	Unknown
Separation		
Reported	100ft V/250m H	NR
Recorded	NK	



THE MERLIN PILOT reports that he had just completed an SRA to RW22 at Yeovilton. The approach had been flown with a simulated Eng 3 failed and a Practise Pan had been declared. He flew to his MDH of 720ft and was cleared for a low approach by ATC. At the Missed Approach Point, the handling pilot (HP), who was under an IF hood, initiated the Missed Approach Procedure (MAP) and started to climb, contacting Yeovilton App as he did so. The aircraft was climbed straight in accordance with the MAP. When passing 900ft QFE, the non-handling pilot (NHP), on the left-hand-side, saw a Tutor ahead and to the left of the aircraft, displaced by 2-300m and 200ft above, crossing left-to-right. Assessing that a risk of collision existed, he instructed the HP to level the aircraft. With the aircraft now maintaining 1000ft QFE, the HP tried to see the traffic by raising his head to look from under his IF hood, but the traffic was too close and high, causing it to be obscured by the cockpit structure. The NHP maintained visual with the Tutor throughout as it continued to cross left-to-right directly ahead of the Merlin, about 2-300m ahead and 100ft above. It then initiated a left-hand turn and re-crossed in front, now crossing right-to-left. The Merlin was maintaining runway track throughout, the distance between the aircraft was maintained because both were travelling at a similar speed and the height separation remained at 100ft. The Merlin was not descended in order to maintain a good visual contact throughout, lateral separation varied and depended upon the relative movement of the Tutor to the Merlin. An Airprox was declared on the Approach frequency.

He assessed the risk of collision as 'High'.

THE TUTOR PILOT reports that he was teaching glide circuits and was flying circuits at 1500ft. During one of the circuits, he was informed about a Merlin carrying out a radar approach to RW22, with a Practise Pan. He reported downwind with his intentions and was told that the Merlin was at 2 miles. He looked for the Merlin, but couldn't see it initially, so reported 'not sighted' to ATC and elected to go around at glide circuit height because he would not be able to carry out his approach.

He took control from the student, selected flaps to 'up', and accelerated from 80kt to 120kt to give further separation. He was now upwind of the threshold and still at 1500ft. He was on the left-hand side of the cockpit so, whilst on the deadside, he looked for the Merlin; he saw it behind and well below so he crossed back to the liveside to resume the glide circuit instruction. He estimated the Merlin was 500ft below and even further away laterally when he crossed the runway. He opined that if radar traffic were only cleared to transit through the circuit at 500ft until clear of the circuit, any possible conflict between VFR and IFR traffic would be removed.

He assessed the risk of collision as 'Low'.

THE YEOVILTON ADC reports that at around 1140 a visiting Merlin from Culdrose was conducting a practice IF approach to RW22. At 3nm, the ADC under training gave the clearance for a low approach and gave the circuit state as '1 in'. When the Merlin was passing 2nm he asked the Tutor pilot in the circuit if he was visual with the Merlin, he wasn't and opted to go around at glide circuit height. As the Tutor turned perpendicular to the runway to go around, the pilot called visual with the Merlin, which had just begun its low approach. Due to their being obscured by the roof of the VCR, the tower personnel then lost sight of the two aircraft as they climbed out and flew deadside respectively; consequently no ATC personnel witnessed the aircraft coming into close proximity.

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

THE YEOVILTON APP reports that he was the Approach controller when the Merlin was conducting a low-approach from a radar recovery. Once on frequency, the Merlin pilot reported that he had come close to a Tutor in the circuit. He reported that he could not continue his climb because the Tutor was directly on top, 200ft above. She later learned that the Tutor was conducting a glide circuit. She took down the reported details of the Airprox, but because it happened in the visual circuit did not have any further detail to add.

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

THE YEOVILTON VCR SUPERVISOR reports that training was taking place in the ADC position during low/medium levels of traffic. The profiles of the aircraft involved were of a routine nature and, although the Merlin was a visitor, he was familiar with Yeovilton's published procedures. When the Tutor was downwind he was not visual with the radar traffic, but he did become visual when turning to position deadside, having elected to initiate his own go-around. Once established deadside, all ATC personnel in the VCR lost sight of the aircraft due to the roof. Sight was regained once the Tutor was downwind and the Merlin was conducting his low approach.

Factual Background

The weather at Yeovilton was recorded as follows:

METAR EGDY 261050Z 23006KT 9999 FEW010 SCT040 14/11 Q1029 BLU NOSIG=

Portions of the tape transcripts between the ADC and Tutor pilot are below:

From	To		Time
ADC	Circuit Broadcast	Merlin 4 miles low approach runway 22	1039:16
Tutor	ADC	" (inaudible) tower, request climb fifteen hundred feet for glide circuit"	1039:46
ADC	Tutor	fifteen hundred feet approved {Tutor C/S}	1039:53
ADC	Circuit Broadcast	Radar, 3 miles runway 22	1039:58
ADC	Radar	Radar, practice pan {Merlin C/S} clear to low approach runway 22, one in tutor.	1040:02
Tutor	ADC	{Tutor C/S} downwind touch and go	1041:43
ADC	Tutor	{Tutor C/S} roger, surface wind 210 7 knots, are you visual with the merlin final for 22 er 2 miles	1041:47

From	To		Time
Tutor	ADC	Er not visual {Tutor C/S} going around circuit height glide circuit height	1041:57
ADC	Tutor	{Tutor c/s}	1042:06
Tutor	ADC	Aand, er visual now Britannia 211"	1042:16

Portions of the tape transcripts between the Talkdown Controller and Merlin pilot are below:

From	To		Time
Talkdown	Merlin	3 miles one thousand and 5 feet {Merlin C/S} cleared low approach runway 22 one in Tutor acknowledge	1040:12
Merlin	Talkdown	Low approach {Merlin C/S}	1040:20
Talkdown	Merlin	On centreline, half a mile passing missed approach point	1042:11
Merlin	Talkdown	{Merlin C/S} is er simulated er not visual, and er carrying out missed approach procedure switching to approach	1042:29
Talkdown	Merlin	{Merlin C/S} roger continue with approach er channel 3"	1042:39

Analysis and Investigation

Military ATM

NCHQ

This Airprox highlights the need for a good look out and the challenges around integration of instrument traffic and visual circuit traffic. In this instance, VFR traffic was visual with IFR traffic, though it is important that any procedures don't introduce a point of conflict such that a good look out becomes the only barrier to MAC.

The Tutor pilot was aware of the Merlin's intentions to Low Approach from the SRA as the standard liaison calls and broadcasts on ADC freq had been made, but was not aware of the "simulated not visual call" and change of intentions to execute MAP because this broadcast was not made. When the Tutor was initially not visual with the Merlin, he correctly executed a go around at 1500ft and then from his position upwind deadside became visual with the Merlin approaching the threshold. Thinking that the Merlin was conducting a Low Approach (to climb and depart), he still deemed that there was sufficient vertical and lateral separation for him to cross from deadside to liveside. Thereafter, the VFR traffic was visual with IFR traffic and maintained separation from it.

The Merlin was conducting a MAP from a high MDH of 720ft and remained on APP freq, though was informed of circuit traffic via the usual clearance call at range 3 miles. Though simulating IMC, the non-handling pilot maintained a good look out and became visual with the Tutor.

A review of the ATC procedures pertinent to this event has highlighted that the Missed Approach and Comms Failure (MACF) procedure for RW22, which is designed to separate aircraft from Yeovil Westland, (climb on runway track to 1000ft QFE, turn onto a heading of 285 and continue to climb to 3000ft) will potentially introduce a point of conflict with aircraft in RW22 deadside. The MACF procedure is therefore being reviewed.

UKAB Secretariat

The Merlin and Tutor pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard¹. An aircraft operated on or in the vicinity of an aerodrome shall conform with or avoid the pattern of traffic formed by other aircraft in operation².

¹ SERA.3210 Right-of-way (c)(2) Converging.

² SERA.3225 Operation on and in the Vicinity of an Aerodrome.

Summary

An Airprox was reported when a Merlin and a Tutor flew into proximity at 1141 on Wednesday 26th October 2017. The Merlin pilot was operating under IFR in VMC, and in receipt of a Traffic Service from Yeovilton App, having just conducted an IFR approach to RW22, for a low approach. The Tutor pilot was VFR in VMC, operating in the visual circuit and in receipt of an Aerodrome Service from Yeovilton ADC.

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 considered which of the two encounters should be judged to be the Airprox, and decided that it should be the Tutor's first crossing in front of the Merlin as it went around from the final approach. During the second encounter, the Tutor pilot was visual with the Merlin and crossed to the live-side because he consciously saw that the Merlin was remaining below him.

The Board then considered the actions of the Merlin pilot who was conducting an instrument approach. They noted that although he had been given clearance for a low-overshoot, he was entitled to execute a MAP at any time. Members noted that he had not been given any Traffic Information on the Tutor, other than '1 in' call given with his 3nm clearance. Military ATC members commented that this was normal practise at military airfields because it is expected that the visual circuit traffic will give way to instrument traffic. Having seen the Tutor about to cross ahead as the HP performed the MAP, the Merlin NHP called for the HP to remain low to ensure separation and the crew were then unsettled enough to stop the MAP in order to keep the aircraft low as it transitted through the circuit. The Board noted that this was a salutary reminder of the look-out responsibilities of the NHP during IF operations, and commended the NHP for his timely and positive instructions to the HP who was not visual with the Tutor at that time.

The Board then turned to the actions of the Tutor pilot. Members noted that he had been given Traffic Information on the overshooting Merlin when he was downwind, but that this information included the fact that the Merlin would be conducting a low-overshoot rather than a MAP. There then ensued a prolonged debate about whether or not he should have crossed through the approach lane in front of the Merlin as he went around at circuit height when not visual with it. Many members thought that this was extremely unwise because the Merlin could have executed the MAP at any time, for any number of reasons; as such, the Merlin could very easily be at the Tutor's height as he crossed through the approach lane even though a low-approach had been notified. In debating the courses of action available, rather than go-around, GA members commented that an aircraft in a civilian circuit would also use the option of an orbit downwind, but the Board had previously been informed that this does not happen in military visual circuits. Some members thought that the Tutor pilot should have extended downwind until visual with the Merlin, and only then crossed, or fitted in behind. This view put them at odds with the Navy HQ comments that he was correct to go around at 1500ft circuit height, and some military members defended the pilot's decision, stating that this was what military pilots were trained to do. Some members wondered whether this training was to blame, in that military pilots are not encouraged to conduct an orbit or extend downwind. Other members with military experience commented that although the procedure to go-around was the most frequently used, it was still the pilot's responsibility to ensure he did not pass in front of an aircraft on the approach without being visual; he could have asked ATC for an updated position report on the Merlin, delayed his turn until he gained visual contact, or simply continued downwind to turn behind at the 3nm point which was the last position that the Merlin had been reported to him. Finally, the Board were perplexed as to why the Tutor pilot did not get an alert on his TAS warning him of the Merlin's position; the Merlin was squawking and the TAS should have picked it up. Some members wondered whether the Tutor TAS procedures called for its continued use in the visual circuit rather than being selected off.

The Board then looked at the actions of ATC and noted that the ADC controller did not know that the Merlin was executing a MAP because the information was not passed by the SRA controller. If it had been then the ADC would then have made a broadcast to the visual circuit which would have alerted the Tutor pilot. That being accepted, when the Board looked at the timings, they could see that the Tutor was already in the go-around when the Merlin called simulated not visual, so it appeared that such a call would have made little difference on this occasion. Some members wondered whether the ADC should have told the SRA controller that the Tutor was going around; this could then have been relayed to the Merlin pilot so that he was not surprised by its appearance. The Board were informed that whilst experienced controllers might do this, it was not routinely required. ATC members noted that the ADC had used non-standard phraseology on the downwind call in that he did not expressly tell the Tutor pilot that the Merlin on radar was ahead; acknowledging this lapse, the Board thought that on this occasion it had not misled the Tutor pilot because his subsequent transmissions indicated that he was aware that the Merlin was ahead.

There then followed another prolonged debate about 'passive' controlling in military circuits, where pilots are expected to fit in around each other versus the civilian method of 'actively' controlling the circuit. The Board had been around this buoy many times in the past, and it was noted that they had previously recommended that HQ Air Command review visual circuit practises to see whether active controlling was more appropriate given the increasing instances of multi-type operations. The subsequent wide-ranging review, whilst making many recommendations, concluded that in general the military wished to continue with their method of conducting circuits, leaving the discretion with the pilots as to whether they could fit in around radar traffic and with each other. Principle in their reasoning was the potential greater disparity in speeds between military aircraft which meant that controllers could not as easily judge closure rates as could the pilots involved, and the need for military pilots to be familiar with pro-actively ensuring their own safety during deployed operations where the quality of controlling could be variable. Board members acknowledged these points, but observed that if that was the requirement then pilots needed to ensure that they did in fact conduct themselves to that effect by flying defensively and with vigilance in the circuit.

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

- **Airspace design and procedures** was only **partially effective** because design of the MAP procedure appeared to introduce a potential conflict in the visual circuit for traffic deadside.
- **ATC conflict detection and resolution** was **partially effective** because although ATC had given Traffic Information to the Tutor pilot about the Merlin, this was not updated as the Merlin commenced the MAP rather than a low-approach as previously informed.
- **Flight Crew Situational Awareness** was considered only **partially effective** because the Tutor pilot was not aware that the Merlin had executed a MAP, and the Merlin pilot was unaware that the Tutor was going around.
- **Onboard warning/ collision avoidance equipment** was assessed as **ineffective** because the Tutor pilot did not get a TAS alert from the Merlin.

The Board then considered the cause of the Airprox, and quickly agreed that in crossing in front of the Merlin without being visual, the Tutor pilot had flown into conflict with the Merlin. A discussion then followed about the role ATC had to play, and whether not telling the Tutor pilot that the Merlin was initiating the MAP had an impact on the outcome. In the end, it was agreed that because the Merlin pilot reported executing the MAP at about the same time that the Tutor pilot was already about to cross the extended centreline, it was decided that ATC were not a contributory factor. In assessing the risk, it was quickly agreed that because the Merlin pilot had seen the Tutor and was able to take timely action, the risk was Category C; safety was degraded but timely and effective avoiding action meant there was no risk of collision.

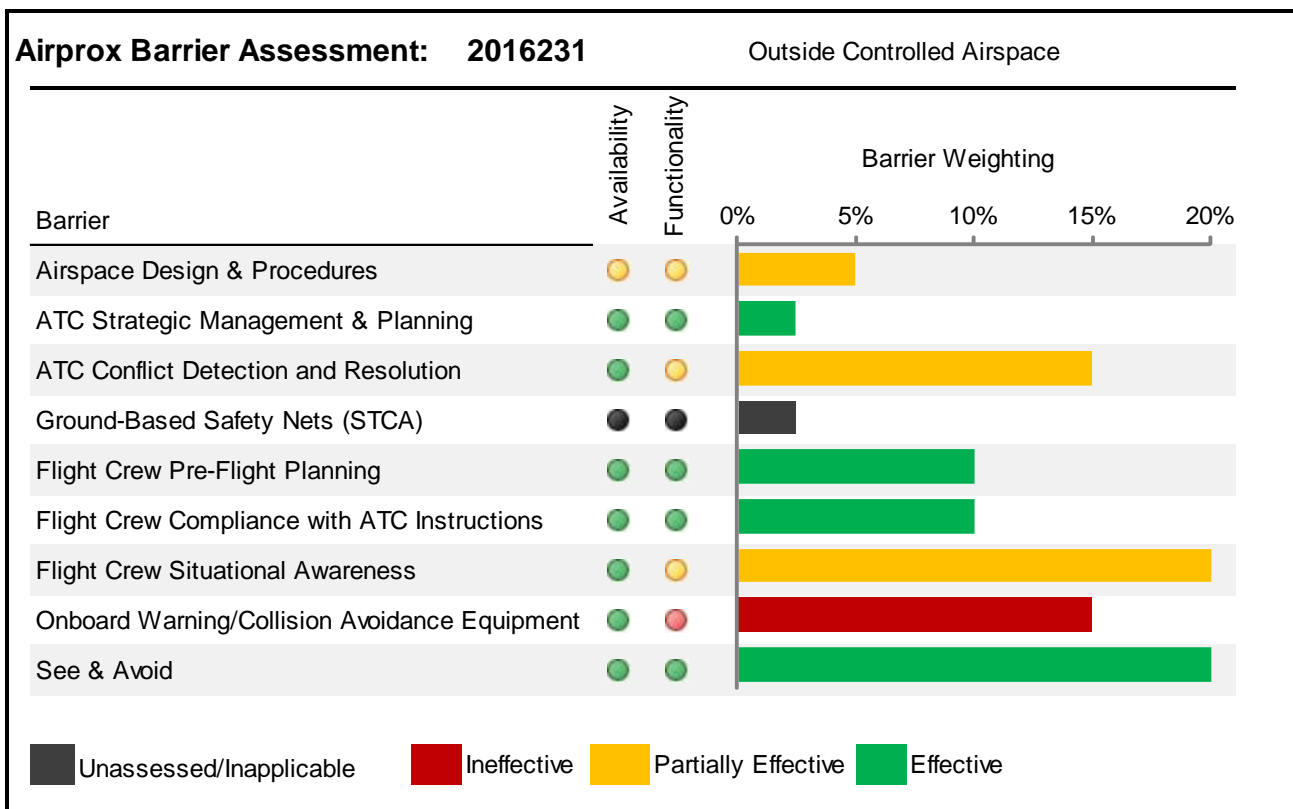
PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Tutor pilot flew into conflict with the Merlin.

Degree of Risk: C.

Barrier Assessment³:

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 Unassessable/Absent). The chart thus illustrates which barriers were effective and how important they were in contributing to collision avoidance in this incident.



³ The UK Airprox Board scheme for assessing the Availability, Functionality and Effectiveness of safety barriers can be found on the [UKAB Website](#)

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.