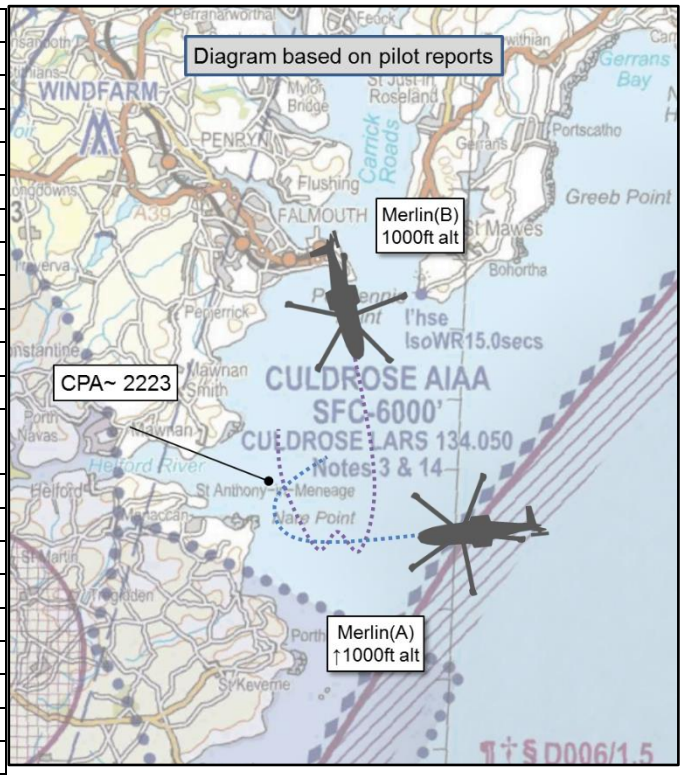
AIRPROX REPORT No 2018208

Date: 07 Aug 2018 Time: 2223Z Position: 5005N 00504W Location: 8nm E Culdrose

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Merlin(A)	Merlin(B)
Operator	RN	RN
Airspace	London FIR	London FIR
Class	G	G
Rules	VFR	VFR
Service	Basic	Basic
Provider	Culdrose	Culdrose
Altitude/FL	NK	NK
Transponder	A, C, S	A, C, S
Reported		
Colours	Grey	Grey
Lighting	Nav, Strobes, Hover flood lights	Nav, Anti-Cols
Conditions	VMC	VMC
Visibility	>10km	20km
Altitude/FL	1000ft	1000ft
Altimeter	QNH (1001hPa)	QNH
Heading	270°	NR
Speed	100kt	80kt
ACAS/TAS	TAS	TAS
Alert	TA	TA
Separation		
Reported	0ft V/80m H	0ft V/200ft H
Recorded	~39ftV/ 80m H	



THE MERLIN(A) PILOT reports that he was operating slightly to the west of Falmouth 'in the dip' at 40ft, facing west, with all floodlights on. He was conducting SAR training with a 'dead-Fred' training aid. At around 2217hrs, the final lift was being conducted and, as the training aid was being brought to the door, the 'double-lift man' and winch operator lost control of it and it fell back into the water. At this time, they heard another Merlin call that it was inbound on the Falmouth one-way route, that they were visual with Merlin(A) and would be passing over and crossing in front of the aircraft en-route to the Helford river. This was acknowledged both to the other pilot and within their own crew. A short while later, the training aid had been recovered and the crew prepared to depart the dip and RTB. The Observer at the mission booth was tasked with contacting ATC for a clearance on the one-way route. At the same time, the LHS pilot conducted post-hoist-operation challenge and response checks, and the RHS pilot transitioned away from the hover, climbing to 1300ft QNH (approximately 1000ft QFE). As the aircraft levelled off, the TAS declared 'traffic 10 o'clock, 0 miles'. On looking in the 10 o'clock an aircraft was seen level at approximately 4nm but converging. At this point the aircraft commander liaised with the Observer and it was made clear that they did not have clearance on the Falmouth one-way route. A right-hand turn was initiated and, after turning through 30°, Merlin(B) was seen at the same height crossing right-to-left about 4 rotor spans away (80m). The handling pilot instigated an avoiding action turn to the right, rolling out facing east, and an Airprox was declared to ATC. They continued out to sea until a clearance for the one-way route was obtained.

He assessed the risk of collision as 'Very High'.

THE MERLIN(B) PILOT reports that on completion of his sortie he departed the northern end of Falmouth Bay. Once established at 1000ft, all required checks were completed and approval obtained from ATC for approval for transit on the one-way route. As they turned towards the mouth of the Helford, a TAS alert was heard. Moments later the crew member, who was sat in the rear cabin, saw

an aircraft directly below them. The P1, who was sat in the left seat, was then able to see the other aircraft and directed the P2 to turn right. The other aircraft climbed to the same level and also turned right, but then manoeuvred to achieve safe separation. Once safe separation had been positively established, the aircraft was recovered to Culdrose without any further incident.

He assessed the risk of collision as 'Very High'.

THE CULDROSE APP CONTROLLER reports that although the Merlins were operating in Falmouth Bay under a Basic Service, they were dropping in and out of radar coverage due to being at low-level. Both pilots were aware of the other also operating in the area. Merlin(B) called exercise complete and requested inbound on the Falmouth route for recovery to Culdrose. At the time, this aircraft could be seen on the radar. The airfield details were passed and the pilot was told to standby whilst approval for transit on the one-way route was sought from the local controller, as per the Culdrose DAM. The local controller gave approval and this was passed to the Merlin pilot. Merlin(A) then called exercise complete in the Falmouth Bay area. At the time, this aircraft was not showing on the radar but, based on his position report, was believed to be about 7nm east of the previous Merlin. Merlin(A) called for recovery to Culdrose via the Falmouth route; again airfield details were passed and approval sought. Approval was given by the local controller and passed to the pilot. Merlin(B) then called visual with one below, which later transpired to be Merlin(A), and asked whether the two aircraft had been deconflicted because Merlin(A) had climbed directly in front of them. The controller advised that he couldn't see Merlin(A) on the radar and approval had been given for both aircraft to join the route. Merlin(B) was seen to take avoiding action. It transpired that Merlin(A) had given an inaccurate position report, and was 7nm west of his reported position, just in front of Merlin(B). No Airprox was reported on frequency, although there was a lot of breakthrough and poor comms. He noted that approval on the route does not constitute deconfliction with any other aircraft; approval on the route clears the aircraft to proceed in one direction, ensuring that nothing will be heading in the opposite direction, but multiple aircraft can use the route providing they are flying in the same direction. ATC may pass Traffic Information on how many aircraft are using the route to help pilot awareness, and this was done in this case.

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

THE CULDROSE SUPERVISOR reports that as the night flying DATCO, he was positioned in the VCR during the incident, therefore did not witness it. Having examined the ATC voice recordings he agreed with the controller's version of events, the VFR route was applied correctly.

Factual Background

The weather at Culdrose was recorded as follows:

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METAR EGDR 072150Z 27006KT 9999 FEW022 BKN040 15/12 Q1011 BLU TEMPO SCT022 WHT=
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Analysis and Investigation

UKAB Secretariat

The Merlin 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 Merlin(A) pilot was required to give way to Merlin(B).[2]

Occurrence Investigation

A Culdrose OSI produced the diagrams at Figures 1-3 using data from the aircraft; the red track depicts the track taken by Merlin(A) C/S D14, and the Blue, Merlin(B) C/S D11. Note that the track points shown are not always synchronised with each other in time.

[1] MAA RA 2307 – Rules of the Air, paragraphs 1 and 2, Avoidance of Collisions.
[2] SERA.3210 Right-of-way (c)(2) Converging.

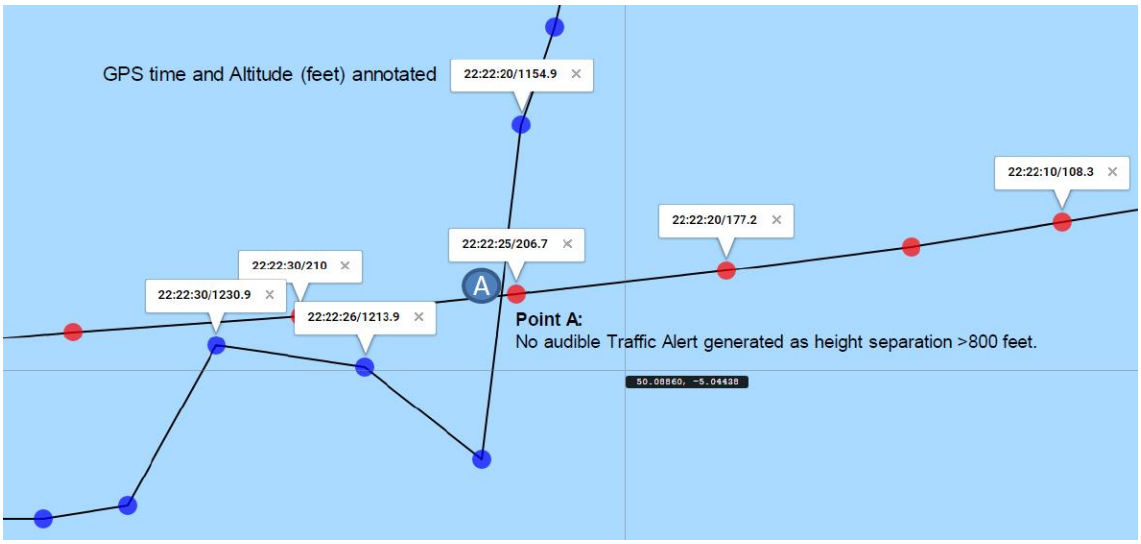

Figure 1. 2222:10 to 2222:30 showing initial crossing Point A (>800ft vertical separation)

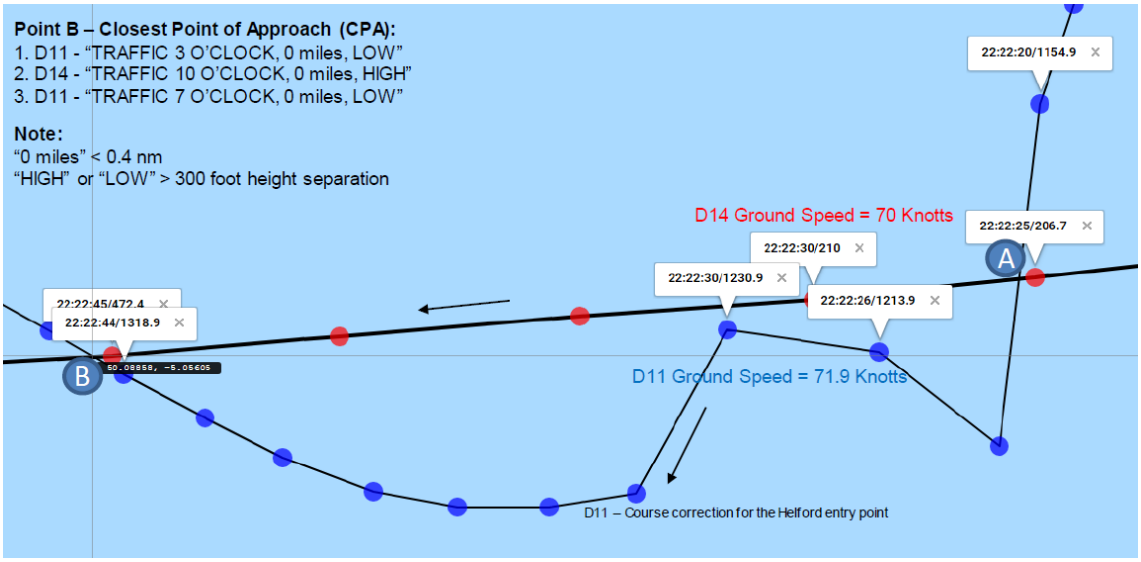

Figure 2. 2222:20 to 2222:44 showing second crossing Point B (>800ft vertical separation)

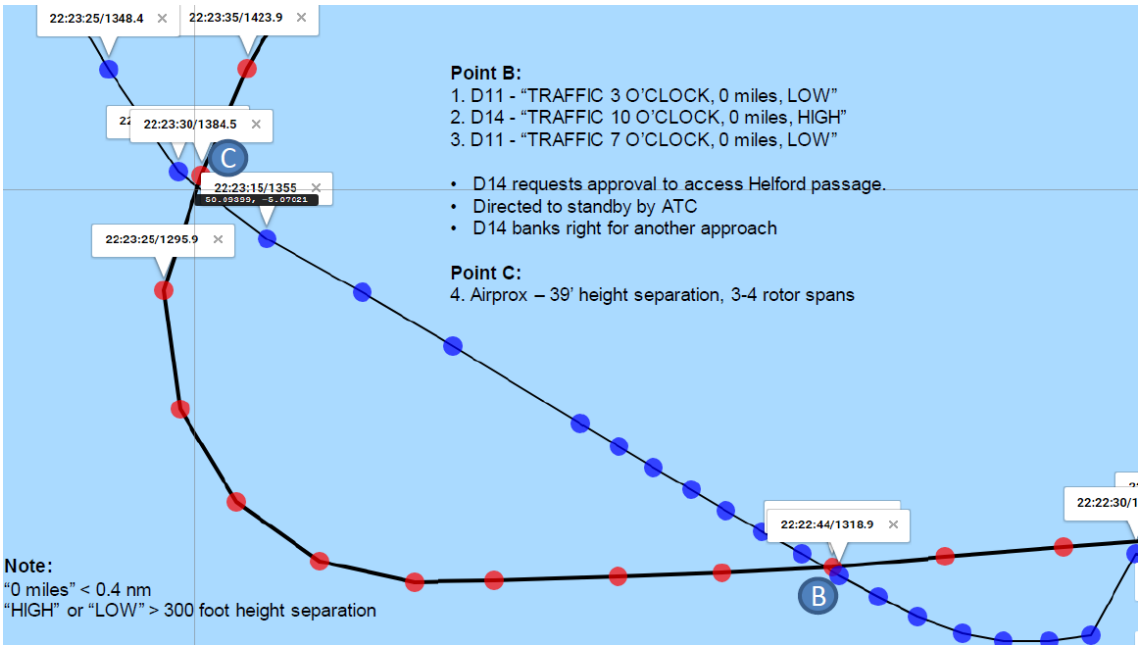

Figure 3 – 2222:44 to 2223:30 showing CPA at third crossing Point C

The OSI proposed a number of causal factors in the incident. Although both crews had received TAS warnings, the pilots assumed the TAS had 'self-detected' which had been a common fault when the TAS was first installed, and is an on-going issue. Additionally, the TAS display unit was located on the lateral consoles in the cockpit (under the window, by the pilot's elbow) making it difficult to view, and therefore the crews were reliant on the aural warning, which could easily be lost in the busy cockpit environment. Furthermore, there was no policy within the Merlin fleet about how to respond to a TAS alert, and the crews did not double-press the TI selector for an aural update which would have given them updates on the TA.

Merlin(A) had limited fuel remaining and, because of an earlier delay for weapon loading training, had launched with 200kgs less fuel than originally expected. This, combined with the dropping of the dead-Fred dummy back into the water, meant that the aircrew were conducting 20min fuel checks which continuously predicted only 6mins fuel allowance above their minimum landing fuel which added to the crew's workload. Furthermore, a number of crew in both aircraft were undergoing night-currency checks prior to deployment the following week. The OSI highlighted that pressure to complete the checks to ensure currency, plus an increased workload, led to a lack of CRM in both aircraft during periods of the flights. Furthermore, because of the checks during night flying, some crew members exceeded their crew duty period.

Over the previous months, the Sqn had been suffering from a sustained period of minimal preparation and recovery time between tasking, which had previously been highlighted to the HQ. Consequently operational tempo had resulted in a lack of manpower and aircraft because maintainers were becoming fatigued and this was putting the Sqn under pressure to deliver the suitably qualified aircrew. Furthermore, supervision was stretched due to the Sqn being under pressure to prepare for the forthcoming deployment.

No.	Summary	Status
2018/8422/R1	Aircrew Education	implemented
2018/8422/R16	Review MHF lookout procedures	adopted
2018/8422/R5	Supervision and flight authorisation procedures	implemented
2018/8422/R2	De-confliction Planning	implemented
2018/8422/R3	Aircrew currency	adopted
2018/8422/R4	Night Flying - Aircrew Fatigue	implemented
2018/8422/R6	Traffic Avoidance System - Design Review	adopted
2018/8422/R7	Traffic Avoidance System - Policy & Training	adopted
2018/8422/R17	Safety Critical Roles	adopted
2018/8422/R9	NVD Training Syllabus	adopted
2018/8422/R10	Review RNAS Culdrose DAM 3501	implemented
2018/8422/R11	Review CSO 2112 (Use of CADS)	implemented
2018/8422/R12	Force Generation and Aviation Assurance	adopted
2018/8422/R13	Force Regeneration Periods	adopted
2018/8422/R15	Station Incident Response Timings	rejected

Figure 4. OSI Recommendations

The OSI made 15 recommendations (Figure 4), of which 14 have been implemented or adopted.

Comments

Navy HQ

A thorough investigation into the Airprox was conducted citing the outcome as loss of safe separation of the 2 Merlins and the cause to be human factors-perception-situational awareness-hazard awareness:

> *"Merlin (A) lost Situational Awareness of the location of Merlin(B) (he believed the other Merlin was 1min ahead and travelling down Helford river at 120 knots). On aural Traffic Advisory (TA), the pilot assumed TAS had self-detected. Additionally navigation lights from a third aircraft was seen at the 9 o'clock bearing approx 4nm away which potentially lead to confirmation bias."*

Both aircraft were under a Basic Service with Culdrose ATC and operating largely below radar coverage in the Falmouth Bay allocated areas and at the mouth of the Helford river. The Helford river operates a one-way system at night, and approval from the ADC via the radar controller is required, although this procedure is under review, it would not have changed the positioning of the aircraft in this Airprox.

Despite initially deconflicting their own recovery to the airfield to allow the aircraft astern to recover ahead, several factors including unfamiliar aircraft set up, mis-trust of the TAS TAs (due to early equipment issues and spurious contacts which have now been resolved[3]), workload due to multiple assessments and currency requirements as well as confirmation bias of another aircraft led to poor situational awareness resulting in the Airprox.

Several recommendations have been generated as a result of this Airprox, a few of which have already been implemented and the remainder are ongoing to address the causal factors found in this investigation to prevent re-occurrence.

Summary

An Airprox was reported when two Merlins flew into proximity in the Falmouth Bay area at 2215hrs on Tuesday 7th August 2018. Both pilots were operating under VFR in VMC, and both were receiving a Basic Service from Culdrose App.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from both pilots, transcripts of the relevant R/T frequencies, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

Prior to looking at the actions of the crews, the RN Board member provided some background to the Airprox. The Sqn was undertaking a number of currency checks, and both aircraft had several crew members on board undergoing checks during the sortie. This had placed the crews under significant pressure as they attempted to achieve everything necessary to complete the checks.

The Board then looked at the actions of Merlin(A) crew and noted that they had come to the end of their sortie and were already low on fuel when the winchman dropped the dead-Fred dummy back into the water. The extra time taken to retrieve the dummy then put additional pressure on the pilots to return to Culdrose expeditiously. The RN member informed the Board that a few minutes prior to their climb, when Merlin(B) had called for recovery, the two crews had spoken on a squadron frequency and Merlin(A) pilot had agreed to maintain low-level until Merlin(B) had passed him. Having entered into this agreement, the Board could only conclude that with so much going on in the cockpit, Merlin(A) pilot

[3] Subsequent to the Board front-line operators confirmed that in fact the issues were still not resolved, and a number of DASORs have been submitted in recent months regarding TAS spurious alerts..

had either become task focused and forgotten about Merlin(B); thought that Merlin(B) was ahead when its pilot had said they were visual with his aircraft and would be crossing in front and inbound on the Falmouth one-way route; or had misidentified another Merlin also operating in the bay as Merlin(B) (which the crew reported they had seen at 10 o'clock, range 4nm, when the TAS had alerted at Point B on the OSI diagrams). [UKAB Note: subsequent to the Board meeting, the Merlin(A) pilot confirmed that he had formed the mental picture that Merlin(B) was well ahead as a result of its pilot informing him that they were visual and crossing ahead].

For their part the Merlin(B) crew were also working hard, and also had various currency checks being completed on crew members. Furthermore because of an unserviceable digital display in the rear of the aircraft, the pilot had the settings on his digital map display set to those normally adopted by the aircrewman; this was an unfamiliar setting for the pilot which led him to slow down on recovery to regain his situational awareness. Subsequently, his turn to position for the recovery on the one-way route took longer than would normally be expected, which may have been why Merlin(A) had assumed he had already passed. The Board were told that the crews were not operating with NVGs and that an additional tool used by the maritime fleet for situational awareness, an i-band transponder, was not working on Merlin(A), again contributing to a loss of situational awareness for Merlin(B).

The Board noted that the OSI had commented that the TAS display within the Merlin was located such that it was difficult to view, and pilots relied only upon audible Traffic Alerts, which in this case would be provided when another aircraft was less than 30 secs away. Although the OSI had stated that Merlin(A) pilot thought the TAS was self-detecting, subsequent information from him highlighted that in fact he believed it was reporting on another Merlin that he could see 4nms away and that it was giving him inaccurate information. In a busy cockpit environment, the alerts could easily be overlooked (hearing is one of the first senses to degrade when humans are under pressure) and in this case the crews had discounted the warnings anyway because they believed that the TAS was self-detecting or giving inaccurate information. The OSI also highlighted that the actions on how to respond to a TAS alert was not sufficiently robust, with crews provided with detailed information on how the TAS works, but not what to do once it had alerted.

There then ensued a prolonged debate amongst the Board members about the overall context of the incident and the multiple factors that had led up to the incident. Fundamentally, members did not feel that enough attention had been given by all the crews and supervisors as to the likely conflictions that might occur during the aircrafts' night recoveries. Members with considerable military night flying experience commented that a robust night-flying recovery system should entail specific gate-time windows for the one-way route for each aircraft, with unallocated 'Rolex' windows being interspersed for contingencies such as delayed departures etc. Noting also that the Merlin(A) i-band transponder was not working, some members wondered whether there were other systems available to the pilots to provide situational awareness, not least being positive deconfliction through the use of radio calls as they approached a 'gate' location. They were heartened to hear that the RN had since instigated a new booking and numbering system for the areas of Falmouth Bay to ensure that in future crews would be aware of exactly where other aircraft were operating. Members noted that in this incident ATC had been unable to help the pilots with their situational awareness because the aircraft were intermittently displaying on their radar. They also noted that Merlin(A) had given ATC an inaccurate estimation of position which had led ATC to think that the aircraft were well separated; likely due to in-cockpit workload within Merlin(A), this highlighted the need for pilots to ensure that position reports were as accurate as possible when operating in what was effectively an uncontrolled environment. Short of simply ensuring that no aircraft were routing in the opposite direction down the one-way route, some members wondered what the value was of ATC's involvement in the recovery process if they were not providing any sequencing for multiple aircraft using the route; there was no restriction on aircraft routing the same way. One member with previous ATC experience at Culdrose recalled that a radar head had once been positioned such that it provided coverage of the Falmouth Bay area which, had it still existed, would have allowed the controller to see where the two Merlins were when they called up; but unfortunately this radar head had since been decommissioned.

The Board concluded that, fundamentally, this Airprox was a classic example of how a number of factors all lined up in the classic 'Swiss cheese' model: the crews had been under pressure to complete

their tasks prior to deployment; Merlin(A) was short of fuel; Merlin(A) was further delayed on recovery by having to re-retrieve the dummy; Merlin(A) pilot had given an inaccurate position estimate; Merlin(B) was slower during recovery than normal; ATC had no radar coverage of Falmouth Bay; the recovery deconfliction plan was not robust; the TAS display was in a poor location within the cockpit; Merlin(A)'s i-band transponder was unserviceable; Merlin(B)'s pilot was using an unfamiliar display setup; and Merlin(A)'s pilot likely lost situational awareness on Merlin(B) due to task focus or misperception of Merlin(B)'s actual position. Ultimately, much of this was a result of the crews trying to do too much in one sortie, and the Board wondered what role Sqn supervision had taken in the oversight of the night's activities.

Finally, the Board looked at the cause and risk and, in reviewing the 2 aircraft tracks prior to CPA, concluded that the 2 aircraft had been on converging headings for upwards of 20-25 secs as Merlin(A) pilot had turned and climbed towards Point C. As such, with Merlin(B) on his right, it was for Merlin(A) pilot to give way. Some members thought that the cause was simply the effective non-sighting by both pilots, but the majority agreed that, notwithstanding a plethora of contributory factors, ultimately Merlin(A) pilot had climbed into confliction with Merlin(B) which he knew at least was operating somewhere near the recovery route at 1000ft. Principle amongst the contributory factors were: Merlin(A) crew were tasked focused to the detriment of look-out and situational awareness; the TAS display in the Merlin was not located in an appropriate position; the Merlin TAS procedures were ambiguous; and Merlin(A) crew perceived the valid TAS alert as a false alert. In assessing the risk the Board agreed that there had been a serious risk of collision, and that providence had played a major part in events; risk Category A.

The Board commented that the OSI had been very thorough and had made a number of recommendations. Accordingly, although ordinarily they would have made recommendations with regard to the TAS procedures and particularly the unsuitability of the TAS display location, because this had already been covered by OSI recommendations there was little point in repeating them. The RN member confirmed that the RN was actively pursuing resolutions to these OSI recommendations.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Merlin(A) pilot climbed into conflict with Merlin(B).

Contributory Factors:

1. Merlin(A) crew was task focused to the detriment of lookout and SA.
2. The TAS display was not located in an appropriate position.
3. The Merlin TAS procedures were ambiguous.
4. The Merlin(A) crew perceived the valid TAS alert as a false alert.

Degree of Risk: A.

Safety Barrier Assessment[4]

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

Flight Crew:

Regulations, Processes, Procedures, Instructions and Compliance were assessed as **partially effective** because there was a lack of robust TAS procedures for the Merlin.

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

Tactical Planning was assessed as **partially effective** because there had been an opportunity to deconflict the aircraft in Falmouth Bay at the planning stage of the sortie.

Situational Awareness and Action were assessed as **partially effective**, although the pilots had generic situational awareness from the RT, they did not fully act upon it.

Warning System Operation and Compliance were assessed as **ineffective** because the TAS display was not able to be seen easily by the pilots, and the audible alerts were not acted upon.

See and Avoid were assessed as **ineffective** because neither pilot saw the other aircraft in time to take timely and effective avoiding action.