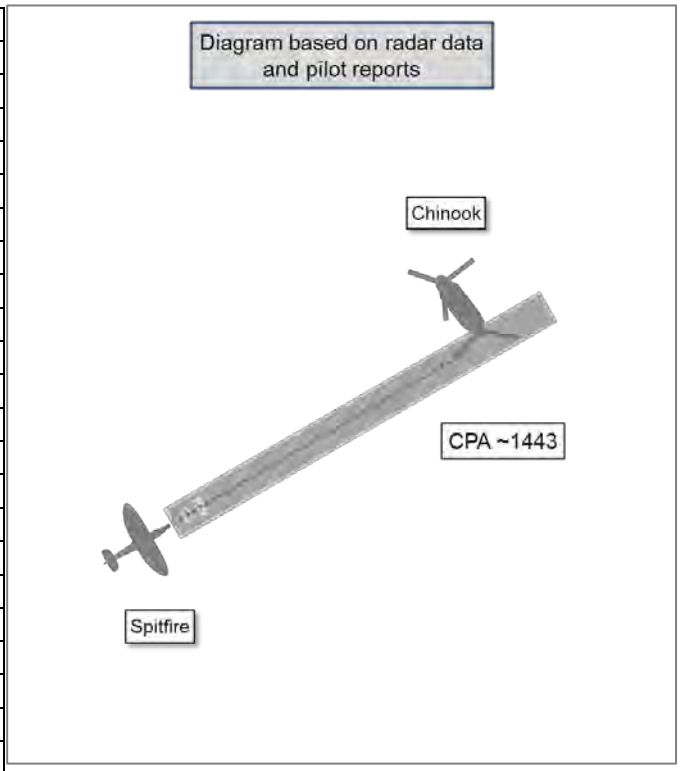
AIRPROX REPORT No 2018121

Date: 09 Jun 2018 Time: 1443Z Position: 5239N 00218W Location: RAF Cosford – elev 272ft

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Chinook	Spitfire
Operator	HQ JHC	Civ FW
Airspace	London FIR	London FIR
Class	G	G
Rules	VFR	VFR
Service	ACS	ACS
Provider	Cosford Tower	Cosford Tower
Altitude/FL	300ft	NK
Transponder	A, C, S	None[1]
Reported		
Colours	Green	NK
Lighting	HISL, nav	NK
Conditions	VMC	VMC
Visibility	30km	NK
Altitude/FL	25ft	NK
Altimeter	agl	NK
Heading	330°	~060°
Speed	2kt	NK
ACAS/TAS	TCAS II	NK
Alert	None	NK
Separation		
Reported	0ft V/40ft H	NK
Recorded	NK	



THE CHINOOK PILOT reports that he had completed a practice display at RAF Cosford and was cleared to land on RW06RH, before vacating at the far end for parking on the grass, under the guidance of a marshaller. As he was transitioning to the hover over the runway, the pilot of a civilian registered Spitfire requested, and was cleared for, a 'join for run-and-break'. The Chinook pilot came to the hover and turned with the tail over the runway. The crew were trying to positively identify their marshaller and were holding position due to their proximity to a vintage helicopter, conscious of potential downwash issues. At this point the co-pilot called 'vacate immediately' (or words to that effect) to 'get them off the runway'. Despite not being under the guidance of the marshaller, he exited the runway immediately, unsure of the reason why. The co-pilot had requested the immediate vacation because he could see the Spitfire approaching and had concerns for safe separation. Despite having joined for a 'run and break', the Spitfire pilot flew a 'low approach' which the Chinook crew considered dangerous. The Spitfire passed behind the hovering Chinook at the same height (about 25 ft) before pulling up into the circuit. The Chinook pilot noted that the Spitfire passed through the same airspace that the Chinook had been hovering in prior to the call from the co-pilot. The Chinook pilot spoke with Cosford ATC and the Flying Control Committee, who agree that this was an unacceptable arrival at the show. He reported that the Spitfire pilot had stated that he did not see the Chinook until the very final stages of the incident.

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

THE SPITFIRE PILOT did not submit a completed Airprox CA1094 reporting form but provided a narrative of events. He called ATC at RAF Cosford on the assigned frequency and was advised that a display practice was in progress and would take about 7 minutes. He elected to hold 5 miles south of the airfield. Sometime later, he was advised that the display had 1 minute to run (he was not told what

[1] The Spitfire SSR was first observed to the south of the Birmingham CTR displaying a Birmingham Approach squawk but the SSR output ceased in the vicinity of Stourbridge. The primary return was then observed to track towards Cosford and faded from radar before CPA. The Chinook SSR was observed throughout, including at the reported position of the Airprox.

the display item was). He was asked to call Cosford Tower and then was given the runway as 06RH, with the prevailing QFE. He heard no mention of a helicopter and even had he been aware at that stage, would not have expected the helicopter to be anywhere close to the runway upon his arrival several minutes later. He requested a run-and-break to land and said that he would call initials, which he did at 4 miles. He was given clearance for the run-and-break, and clearly took that to mean it was 'my runway'. He descended gently to a height well within his DA permission, to the south of the runway centreline, and prepared to break to the south. As he approached RW06, he observed a large black helicopter, that he recognised as a Chinook, hovering over the grass to the north of the paved runway, which he certainly was not expecting and had not been warned about. He immediately adjusted his track further to the south and broke to the right to land. The landing was uneventful, and he put the incident down to poor ATC practice, which clearly it was in his opinion. The pilot made the following points:

1. If a helicopter was clearing the runway when he first contacted Cosford Tower then why was this helicopter still holding close to the runway, when he had been given clearance for a run-and-break? The Chinook pilot should have cleared far more quickly and needs to explain his actions in this regard.
2. Why, as is common practice with civilian ATC, did Cosford ATC not warn him about potential wake turbulence, which was clearly a factor and should have required a delay to his approach to allow dangerous wake vortices to disperse.
3. When he called initials at 4 miles, if a helicopter was still on the runway, why did ATC not advise him to maintain not below a certain height or at least that the helicopter was there? The lack of any instruction was indicative to him that there were no height restrictions at a tower-controlled airfield and 'the runway was mine'.
4. He was fully aware of the circuit height; however, he was not joining the circuit, he was undertaking a 'run-and-break' to land and was (until the helicopter was sighted) well clear of other aircraft. This was not a 'low pass' nor a 'dangerous' manoeuvre but a standard arrival for an aircraft of this category and is practiced during most landing phases. It was a legitimate part of a landing sequence for which he had been granted ATC clearance and was undertaken in order to rapidly reduce airspeed to within landing gear limitation, whilst remaining as close as possible to the runway and subsequent glide options in the event of an engine failure. That is the purpose of the 'run-and-break' manoeuvre and is something familiar to every fast warbird pilot.
5. This was a display weekend and, as a licenced display pilot of many years' experience, he was of the clear impression, as has been the case over many previous years, that DA heights were acceptable, when both days were NOTAM'd as such. He flew well within his DA limitations. In fact, this was his 15th year at the RAF Cosford show and this arrival was very much SOP for his organisation and had not in the past been questioned or criticised, not just at RAF Cosford but also at many other events both civilian and military.
6. He spoke to a member of the FCC in passing that afternoon and the only comment made, was that the Chinook pilot was 'unhappy'. He explained that he was also unhappy, bearing in mind the lack of what he considered to be appropriate guidance from Cosford ATC. He was not sanctioned or warned in any way by the FCC and undertook his display the next day without any further comment on the Airprox incident.

He did not make an assessment of the degree of risk.

THE COSFORD AERODROME CONTROLLER reports that he was on duty for the Cosford Airshow arrivals and practice displays. A Chinook had landed on RW06RH and the controller had given permission to a Spitfire pilot to run-and-break to join the RW06RH circuit. As the Chinook was manoeuvring onto its parking spot on the Northern grass/flight line, the Spitfire descended on runway track to a height of approximately 30ft before pulling up onto the downwind leg of the visual circuit. This was unexpected because a low run-and-break is nominally conducted at 500ft AGL. The Chinook pilot called via landline to discuss the incident and filed a DASOR.

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

THE COSFORD ATCO I/C reports that he was on his 1hr break after being on console for 2hr and did not witness the occurrence.

Factual Background

The weather at Cosford was recorded as follows:

```
METAR EGWC 091450Z 07005KT 9999 SCT025 BKN060 19/12 Q1016 BLU=
```

A transcript of the Cosford Tower R/T frequency was provided, as follows:

From	To	Speech Transcription	Time
Chinook	ATC	Tower Chinook two minutes to completion.	14:39.20
ATC	Chinook	Roger	14:39.46
Chinook	ATC	Tower Chinook now complete, requesting landing runway zero six	14:41.40
ATC	Chinook	Chinook runway zero six clear to land, surface wind zero seven zero, six knots	14:41.46
Chinook	ATC	Chinook roger clear to land	14:41.52
ATC	Chinook	I just heard you're parking on a different position at the end of the flight line, marshaller awaiting	14:41.53
Chinook	ATC	Cleared to land zero six and looking for the marshaller	14:41.56
Spitfire	ATC	Cosford Tower Spitfire [C/S], we're currently four miles south of field	14:42:11
ATC	Spitfire	Spitfire [C/S] Cosford Tower, join runway zero six right hand, Q F E one zero zero six, I've got one helicopter on the runway	14:42.17
Spitfire	ATC	Roger that, we'd like to join four miles for run and break into the right hand circuit to land	14:42.24
ATC	Spitfire	Run and break approved	14:42.25
Spitfire	ATC	Run and break approved, will call initials	14:42.29
Spitfire	ATC	Spitfire initials for the run and break	14:42.46
ATC	Spitfire	Spitfire circuit clear	14:42.50
Spitfire	ATC	Roger Spitfire	14:42.50
Spitfire	ATC	Spitfire breaking right	14:43.32
ATC	Spitfire	Spitfire	14:43.32
Spitfire	ATC	Spitfire say wind please	14:43.33
ATC	Spitfire	Spitfire say again	14:43.34
Spitfire	ATC	Spitfire say your surface wind please	14:43.35
ATC	Spitfire	Zero seven zero, six knots	14:43.36
Spitfire	ATC	Spitfire downwind gear down	14:44.19
ATC	Spitfire	Surface wind zero seven zero, six knots	14:44.21

Analysis and Investigation

Military ATM

Both pilots were in receipt of an Aerodrome Control Service from Cosford Tower. The Chinook pilot had completed a display practice in preparation for the Cosford Air show, had landed and was in the process of vacating the runway. Coincidental with this, the Spitfire pilot called to join the visual circuit, was correctly cleared for a run-and-break and was warned that there was a helicopter (the Chinook) on the runway.

The Unit investigation noted that the Spitfire pilot requested and was approved for a visual run in and break arrival which the Cosford ADC was expecting to be conducted in accordance with published procedures (not below 500ft). This mental model was reinforced by the aircrew aide-memoir, provided to all display participants, which stated that:

> *Aircraft are to arrive using standard manoeuvres eg run and break to land. Aerobatic manoeuvres are not permitted.*

The Spitfire pilot believed that the clearance for a 'run-and-break' also included clearance for a 'display' arrival and did not appear to assimilate the Traffic Information provided by the Cosford ADC on the Chinook. As such, the Spitfire pilot conducted the run-and-break at about 30ft, the same height at which the Chinook pilot was hover-taxiing to park. The Chinook co-pilot noted the impending confliction and ordered an 'immediate' vacation of the runway after which the Spitfire reportedly flew through the airspace which the Chinook had just vacated.

Due to the reported heights of the aircraft involved, the radar replay did not show the Spitfire. However, the photograph below was taken at the time of the incident:

UKAB Secretariat

The Chinook and Spitfire pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard[2]. 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 operation[3]. When an aircraft carries a serviceable SSR transponder, the pilot shall operate the transponder at all times during flight, regardless of whether the aircraft is within or outside airspace where SSR is used for ATS purposes[4]. And when not receiving air traffic services, select [Mode A] code 7000 in order to improve the detection of suitably equipped aircraft unless otherwise prescribed by the competent authority[5]. When the aircraft carries serviceable Mode C equipment, the pilot shall continuously operate this mode unless otherwise dictated by ATC[6]. Aircraft equipped with Mode S having an aircraft identification feature shall transmit the aircraft identification as specified in Item 7 of the ICAO flight plan or, when no flight plan has been filed, the aircraft registration[7].

[2] SERA.3205 Proximity.
[3] SERA.3225 Operation on and in the Vicinity of an Aerodrome.
[4] SERA.13001 Operation of an SSR transponder.
[5] SERA.13005 SSR transponder Mode A code setting.
[6] SERA.13010 Pressure-altitude-derived information.
[7] SERA.13015 SSR transponder Mode S aircraft identification setting.

Occurrence Investigation

The service Occurrence Safety Investigation (OSI) is summarised as follows:

The various recoveries and joins for Cosford are detailed in the FOB Order C-2-4 with the Visual Run In and Break (VRIAB) featured at Para 16. The quoted minimum height is 500ft QFE. Circuit height is at Para 6, being 800ft for light-aircraft and 1000ft for DHFS RW and 'larger' FW aircraft. Cosford circuit height is also published in the BINA [en-route supplement]. The [UK AIP] does not feature military aerodromes but others such as Pooleys or the ASE VFR Flt Guide do. A pre-flight telephone call to Cosford ATC or even a last resort question on the R/T post initial contact are also ways of determining this data. The Spitfire pilot stated that he was aware of the Cosford circuit height.

The Arrival Procedure at page 2 of the 2018 Cosford Air Show Aircrew Aide Memoire states as follows:

> 'All aircraft are to arrive using standard manoeuvres for the aircraft type, eg a run and break to land.'

No minimum height is given for the VRIAB, or for any type of join.

The Cosford Tower controller gave join instructions stating that there was a helicopter on the runway. This was acknowledged by the Spitfire pilot who requested a run-and-break into the right-hand circuit to land. The Tower controller approved the VRIAB, which the Spitfire pilot acknowledged, stating that he would 'call initials'. The Spitfire pilot did not read back the runway or QFE, nor verbally acknowledge the helicopter traffic on the runway. The Tower controller conceded in interview that he should have challenged for a readback of join instructions. The Spitfire pilot stated that he had no idea of the helicopter traffic being on the runway, apparently not assimilating the Tower controller's transmission in that regard.

ATC were 75% effectively manned for the duration of the airshow. Whilst this is an increase from the normal 50% effective manning at RAF Cosford, the additional ATCO had only qualified in the RAF Cosford VCR 6 days prior to the show. The ATCO knew and understood the published aerodrome join heights, so was surprised to see the Spitfire arriving, approaching over the RW06 threshold at seemingly much less than 500ft (considered to be circa 50ft).

In his statement, the Spitfire pilot explained that he was given clearance for the run-and-break and took that to mean it was 'my runway'. However, he was only given approval to join, not a clearance, and was told that the circuit was clear (which does not imply that the runway is unoccupied). At a military airfield a run-and-break is flown at a set height to enable an expeditious join into the visual circuit via initials whilst still allowing the runway to be used by other traffic. Any joining aircraft should not descend below the approved break height until cleared to do so.

In describing his profile and descent towards the airfield the Spitfire pilot explained that 'He descended gently to a height well within his DA permission, to the south of the centreline and prepared to break to the south'. However, he was not being cleared to display; he was arriving/joining and should have followed the VRIAB procedure by remaining above 800ft (or requesting a low break where he could descend to 500ft). It was considered that it was the Spitfire pilot's mindset to fly the same type of low-level run-and-break as had been his practice for the previous 15 years at Cosford, and more elsewhere.

OSI Conclusions:

1. The Spitfire pilot chose to fly a non-standard (for a military airfield) low-level run in and break, not approved by ATC, that took his aircraft close to the rear of the hovering Chinook, which was seen late.

2. The Spitfire pilot mis-applied his DA height privileges for an arrival: it was not a display.

3. The Arrival Procedure in the 2018 Cosford Air Show did not specify minimum heights for arrivals. Though available elsewhere, it would have been better to include minimum heights.

4. Lookout by the Chinook crew and calm appropriate forward movement assisted in highlighting visibility to the Spitfire pilot and enabled extra separation.

5. ATC were 75% effectively manned for the duration of the airshow. Whilst this is an increase from the recent 50% effective manning, full day-to-day manning outwith the airshow would prevent the requirement to draft in additional manpower at short notice. Although a tenuous link, regular and experienced manning of the ATCO posts may have assisted in preventing this incident. A thorough pre-event briefing for ATC staff, that includes lessons identified from previous air shows, may also help in ensuring thorough understanding of the potential for the unexpected.

6. If non-standard arrivals are witnessed, ATC should question them and ensure that pilots of such aircraft are debriefed.

Comments

JHC

The Chinook crew used effective lookout and crew resource management as barriers to a potential mid-air collision. Having been cleared to land after finishing their display, the crew's choice not to vacate the runway immediately, and consider downwash on other static aircraft was entirely reasonable and appropriate. Their swift and calm reaction upon sighting the aircraft is commendable and certainly prevented a potentially disastrous CPA. It is noted that the barrier of electronic conspicuity may have failed due to the Spitfire SSR ceasing output prior to the Airprox.

JHC concurs with the conclusions of the Occurrence Safety Investigation and would add the following. It would appear that the Spitfire pilot's previous experience and familiarity with air shows led to many dangerous assumptions and reduced situational awareness. This was exacerbated by missing a radio transmission giving information on the Chinook's position, the incorrect application of DA height limits when not on a display, and the belief that upon being cleared for a VRIAB, the runway 'belonged' to him; this is in contradiction to RAF Battlespace Management Orders. The pilot's statement of 15 years of similar runway joins highlights a potential normalised deviance which has not been appropriately managed or realised.

JHC would reinforce the need for a robust procedure in response to such events, and would expect the FCC to question/re-educate aircrew that contravene regulation in an appropriate manner. The debriefing of a potentially fatal and public MAC cannot be treated casually, especially when trying to avert any form of potential dangerous normalised activity.

Summary

An Airprox was reported when a Chinook and a Spitfire flew into proximity at RAF Cosford at about 1443hrs on Saturday 9th June 2018. Both pilots were operating under VFR in VMC, both in receipt of a Aerodrome Control Service from Cosford Tower.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from both pilots, a transcript of the relevant R/T frequency, radar photographs/video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

The Board first discussed the regulations pertaining to the Spitfire pilot's join at Cosford. They acknowledged that the military regulations were clear to the military in that the minimum run-and-break

height was 500ft. Unfortunately, none of the supporting documentation provided by the airshow organisers included that vital piece of information, and none of the service publications which contained it were available to the civilian Spitfire pilot. Members considered this to be a contributory factor. Members opined that it would have been good practice for the Spitfire pilot to have confirmed the permitted minimum break height with ATC during his join, but they understood that he may have been normalised to conducting his run-and-breaks from such a low height as a result of his previous experiences at Cosford and other display airfields where he had not previously been challenged about this. In this respect, it was noted that MAA Regulatory Article (RA) 2335 states that the FDD should be responsible for 'The briefing (including Pilots' notes) and debriefing of participating Aircrew'[8]. Some members wondered whether, given the extent of his experience at military airshows, the Spitfire pilot could reasonably have been expected to know that there would normally be a minimum break height at military airfields; others countered that this varied from airfield to airfield and so he could not be expected to know the minima at each, although they acknowledged that it would rarely be at the height at which he did perform his run-and-break. Regardless, the fact of the matter was that the Spitfire pilot was not aware of the minimum break height, which members also felt was a contributory factor.

Notwithstanding his understanding of the minimum break height, the Spitfire pilot was of the opinion that he could use the minimum height of his DA authorisation as the basis for the run-and-break, which he also stated he had used for his previous 15 annual appearances at Cosford. Some members felt that the day in question could have been interpreted by the Spitfire pilot as a practice day (reinforced by the fact that the Chinook pilot himself had been conducting a practice) and therefore that it was understandable that he could have assumed that he could use his DA clearance for his arrival. However, the majority agreed that the Spitfire pilot had specifically been cleared only to join the circuit, and that this was separate and distinct from a clearance for a practice or display.

Turning to the Spitfire pilot's arrival, members agreed that he had seemingly not assimilated the Tower controller's information that there was a Chinook on the runway, or had assumed that it would be clear by the time he arrived at the airfield. Contrary to his understanding that 'the runway was [his]' after his call at 4 miles, ATC procedures are such that a pilot is not informed of the state of aircraft on the runway until calling final. Members noted that CAP413 contains the relevant phraseology and that the response to the 'initial' call is to pass the number and position of aircraft in the visual circuit[9] (aircraft landing on the runway are not considered to be 'in the visual circuit'). After further discussion, members agreed that the Spitfire pilot's assumption that the runway was clear once he had been cleared for a run-and-break was another causal factor.

Members then discussed the Cosford ATSU manning and supervision, and agree that although the manning level and experience were not ideal, the Tower controller had been duly validated and it was therefore appropriate that he was in position. Notwithstanding, the Board also discussed the arrival of the Spitfire from the Tower controller's point of view, and agreed that although the event had caught him unawares, the Tower controller would have been justified in alerting the Spitfire pilot to his incorrect height as he saw the Spitfire running in. This aspect was discussed at length, and the Board eventually agreed that ATC not intervening when the Spitfire pilot descended below the promulgated minimum break height was also a causal factor.

Turning to the event itself, the Board were faced with a number of conflicting accounts of heights, spacing, proximity and awareness of other traffic. On the one hand, the Spitfire pilot reported that he had seen the Chinook 'as he approached RW06' and had offset to the right to increase separation before breaking into the circuit. On the other, the Spitfire pilot was reported as stating that he had not seen the Chinook 'until the very final stages of the incident' and that he had 'passed through the same airspace that the Chinook had been hovering in prior to the call from the co-pilot'. Members were wary of inferring an assessment of separation from the photograph supplied in the Military ATM investigation, being cognisant of the potential for such a photograph to be misleading. After further robust discussion, it was agreed that there was insufficient factual information to decide between the claims of either the Chinook crew or the Spitfire pilot, and therefore that the cause was probably best described as the

[8] MAA RA2335 (Flying Displays and Flypasts), Flying Display Organization and Management, paragraph 24(d).
[9] CAP413, Chapter 10 (Military Specific Phraseology), paragraph 10.17 (Phraseology for Joining the Visual Circuit/Pattern).

Spitfire pilot flew close enough to cause the Chinook pilot concern. Considering the risk, some Board members felt that the Spitfire pilot had had sufficient awareness of the Chinook that he had been able to take timely action to prevent collision. However, the majority of the Board felt that even taking at face value the Spitfire pilot's claim to have been visual with the Chinook as he approached the threshold of RW06, he had flown sufficiently close to the Chinook that, in this instance, safety had been much reduced below the norm; Category B.

Finally, the Board noted that the Spitfire pilot's SSR transponder was not evident on radar whereas the Chinook's was. Notwithstanding the legal requirement to select all modes on unless directed otherwise by ATC, it may have been that the Spitfire's transponder had malfunctioned and so the Board advised the operator to investigate its serviceability at the earliest opportunity; members reiterated that with ever increasing utilisation of electronic conspicuity, SSR output was an essential aid to situational awareness and early action to avoid confliction.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The Spitfire pilot flew close enough to cause the Chinook pilot concern.

Contributory Factors:

1. The run and break minimum height limit was not specified in the Aide Memoire.
2. ATC did not intervene when the Spitfire pilot descended below the promulgated minimum break height.
3. The Spitfire pilot assumed that the runway was clear when approved for the run-and-break.
4. The Spitfire pilot was not aware of the minimum run and break height.

Degree of Risk: B.

Safety Barrier Assessment[10]

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

ANSP:

Regulations, Processes, Procedures and Compliance were assessed as **partially effective** because the minimum VRIAB height was not explicitly stated in the Aircrew Aide-memoire and the Tower controller did not challenge the Spitfire pilot when it became apparent that he was not conforming to the join procedure.

Manning and Equipment were assessed as **partially effective** because Cosford ATC were only 75% effectively manned and the Tower controller had been validated only 6 days previously.

Situational Awareness and Action were assessed as **ineffective** because no action was taken when the Spitfire pilot descended below the minimum VRIAB height.

Flight Crew:

Regulations, Processes, Procedures, Instructions and Compliance were assessed as **ineffective** because the Spitfire pilot did not comply with the VRIAB procedure at Cosford.

Tactical Planning was assessed as **partially effective** because the Spitfire pilot had become normalised to his join technique of a very low break.

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

Situational Awareness and Action were assessed as **ineffective** because the Spitfire pilot did not assimilate the Traffic Information passed by the Tower controller and consequently was not aware of the presence of the Chinook on the runway.

Warning System Operation and Compliance were assessed as **ineffective** because the Spitfire SSR transponder was not operating and the Chinook TCAS could not provide appropriate SA or an alert.

See and Avoid were assessed as **partially effective** because although the Chinook co-pilot saw the Spitfire in sufficient time to afford an increase in separation at CPA, the Spitfire pilot most likely did not see the Chinook in time to afford similar action.