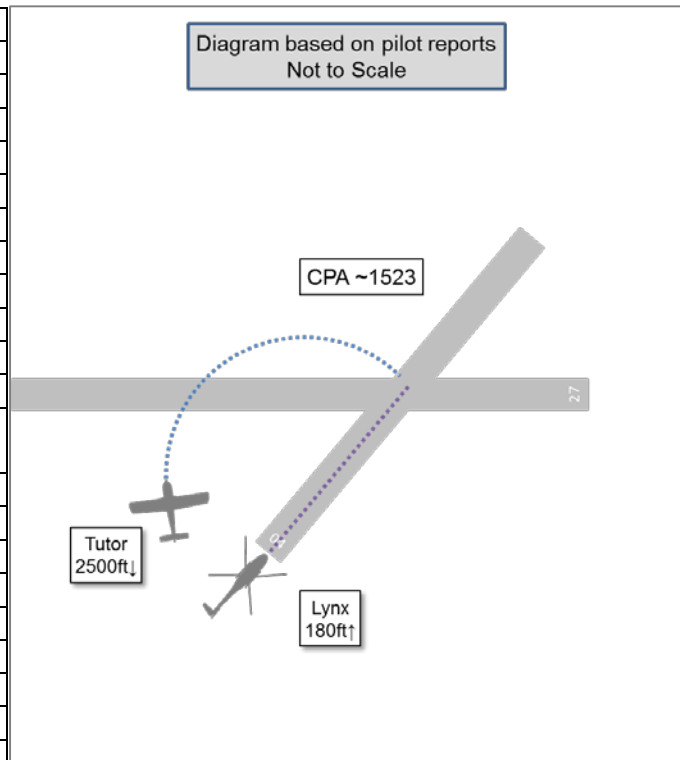


**AIRPROX REPORT No 2015184**

Date: 14 Oct 2015 Time: 1523Z Position: 5101N 00237W Location: RNAS Yeovilton – elev 75ft

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

Recorded	Aircraft 1	Aircraft 2
Aircraft	Tutor(A)	Lynx
Operator	RN	RN
Airspace	Yeovilton MATZ	Yeovilton MATZ
Class	G	G
Rules	VFR	IFR
Service	Aerodrome	Traffic
Provider	Tower	Approach
Altitude/FL	NK	NK
Transponder	A, C, S	A, C, S
<b>Reported</b>		
Colours	White	Grey
Lighting	Strobes, nav	Red anti-col, landing, nav
Conditions	VMC	VMC
Visibility	20km	25km
Altitude/FL	2000ft	1500ft
Altimeter	QFE (1020hPa)	QNH (1023hPa)
Heading	040°	040°
Speed	75kt	80kt
ACAS/TAS	TAS	Not fitted
Alert	None	N/A
<b>Separation</b>		
Reported	'just below' V 200ft H	50ft V/75yd H
Recorded	NK <sup>1</sup>	



**THE TUTOR (A) PILOT** reports conducting a visual PFL to RW04RH from 2500ft QFE. At High-Key, ATC informed him that there were 2 aircraft ahead. He was visual with one Tutor, turning downwind, and the other aircraft was assumed to be a previously called rotary-wing (RW) on radar finals. Just beyond High-Key, the student (handling pilot) commenced a turn to crosswind at 2000ft. As he banked right, a Lynx helicopter was spotted just behind the right wing, slightly below and about 200ft displaced to the right. The student immediately turned hard to the left and they declared an Airprox.

He assessed the risk of collision as 'Medium'.

**THE LYNX PILOT** reports conducting a PAR to RW04 at Yeovilton. During the approach, the Talkdown controller told the pilot he was cleared for a low-approach and go-around with 'two in'. No aircraft types or further location in the circuit was given. The non-handling pilot (NHP) looked out to attempt to identify the other two aircraft and spotted one Tutor turning from the crosswind leg onto the downwind leg. The other aircraft was not identified. The approach was continued with the NHP continuing to try to identify the second aircraft. The Lynx reached decision height and conducted the missed approach procedure, during which 2 way RT was established with Approach. At about 1500ft (QNH) the NHP alerted the handling pilot (HP) to the presence of a Tutor in the left 10 o'clock position, slightly below the aircraft and at about 75yd range. The Tutor was in a gentle right turn towards the Lynx and then conducted a rapid steep turn to the left, away from the Lynx. The HP called the Approach controller and stated that a Tutor had come within close proximity and asked where it had come from. The Approach controller replied that it was in the visual circuit to which the HP queried how this could be at 1500ft. The Approach controller replied that the Tutor was

<sup>1</sup> Area radar did not show radar returns from the subject aircraft from shortly before CPA until shortly after CPA.

descending from High-Key. Both HP and NHP agreed that an Airprox should be raised, which was done on the radio. The Lynx pilot commented that the description of 'two in' from the Talkdown controller led the HP and NHP to believe that both other aircraft would be at 1000ft or below.

He assessed the risk of collision as 'High'.

**THE YEOVILTON TOWER CONTROLLER** reports controlling during a busy recovery period of several Tutor aircraft, combined with multiple RW PAR recoveries, along with RW visual recoveries to the duty runway - 04RH. He was pre-noted that a Lynx was conducting a PAR to a low-approach for further to RW04RH. A Grob Tutor pilot called, joining for a visual PFL. The controller passed the standard joining instructions for High-Key. When the Tutor pilot reported High-Key, the controller again passed the standard information, including the visual circuit state. He believed he also informed the Tutor pilot of the Lynx radar traffic, with its pilot's intentions to perform a low-approach for further to RW04RH. The Lynx pilot completed his approach and commenced his climb out with radar. As he commenced the climb out, both the Tower and Ground controllers observed a Tutor appear from above the tower, heading on approximate runway track, either over the runway or very close to the right of it. The Tower controller commented that he would not expect to see a fixed-wing (FW) aircraft descending from High-Key to be this close to the runway at its relatively low height; he would normally expect to see it appear from the top of the tower, well over to the right on descending from High-Key and positioning for Low-Key. Both controllers observed the Tutor pass extremely close to the climbing Lynx and rapidly descend beneath it. At this point, the Tutor pilot called an Airprox, stating he had come very close to the Lynx whilst descending from High-Key. The controller commented that this was a very busy and confusing short period of activity with some callsign confusion due to dual transmissions from all parties but at no time did he lose situational awareness.

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

**THE YEOVILTON SUPERVISOR** reports that the workload for the aerodrome controller at the time of the incident was medium-to-high with multiple IFR/VFR, FW and RW sorties being conducted. As a result, all VCR personnel were conducting lookout, a normal occurrence during busy periods with Grob Tutors in the visual circuit, due to their difficulty in being seen. From recollection, 2 Tutors had joined the visual circuit, both for visual PFLs. There were 2 occasions where aircraft in the visual circuit stepped on each other over the RT, and the Tower controller replied to the wrong one, which was an RT issue only and not a positioning one. Just prior to the incident, the Supervisor witnessed the Lynx pilot begin his low-approach and turned his attention behind the Tower to assist in lookout and situational awareness for the Tower controller, regarding the remaining Tutors and inbound instrument traffic. The Supervisor did not witness the Airprox.

## Factual Background

The weather at Yeovilton was recorded as follows:

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METAR EGDY 141550Z 34006KT 9999 FEW028 BKN045 12/06 Q1023 BLU NOSIG=
METAR EGDY 141450Z 34006KT 9999 FEW028 BKN042 12/06 Q1023 BLU NOSIG=
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The Airprox involved Tutor (A) and a Lynx helicopter. Other Tutor aircraft were in the vicinity; those directly relevant to the Airprox have been identified as Tutor (B) and Tutor(C), those not directly relevant, or where an incorrect callsign was used, have been labelled Tutor X and Y. A transcript of the Yeovilton Approach frequency was provided, as follows:

From	To	Speech Transcription	Time
App	Lynx	[Lynx C/S] turn left heading 050 degrees	15:17:39
Lynx	App	Left turn 050 degrees [Lynx C/S]	15:17:42
Tutor(B)	App	Yeovil Approach [Tutor(B) C/S] request visual recovery for practice force landing	15:17:52
App	Lynx	Practice Pan [Lynx C/S] eight, turn left heading 040 degrees	15:17:59

From	To	Speech Transcription	Time
Lynx	App	Left turn 040 [Lynx C/S]	15:18:03
App	Lynx	Practice Pan [Lynx C/S] eight miles contact Yeovil Talkdown channel five	15:18:05
Lynx	App	Channel five [Lynx C/S]	15:18:09
		[No relevant transmissions]	
App	Tutor(B)	[Tutor (B) C/S] is that you for visual recovery?	15:18:29
Tutor(B)	App	Affirm visual recovery for PFL please	15:18:31
App	Tutor(B)	[Tutor(B) C/S] roger duty runway 04 right hand QFE 1020 report visual with the aerodrome, instrument traffic currently at six er seven miles	15:18:34
Tutor(B)	App	04 04 runway 04 1021 er roger [Tutor(B) C/S]	15:18:44
App	Tutor(B)	[Tutor(B) C/S] QFE is 1020	15:18:51
Tutor(B)	App	1020 [Tutor(B) C/S]	15:18:55
		[No relevant transmissions]	
Tutor(A)	App	[Tutor(A) C/S] five miles to the South East will be for visual join through high key	15:19:54
App	Tutor(A)	[Tutor(A) C/S] duty runway 04 right hand QFE 1020 instrument traffic at five miles	15:20:00
Tutor(A)	App	1020 [Tutor(A) C/S] over	15:20:08
Tutor(B)	App	[Tutor(B) C/S] visual with the field channel one	15:20:15
App	Tutor(B)	[Tutor(B) C/S] roger instrument traffic now four miles	15:20:19
Tutor(B)	App	[Tutor(B) C/S]	15:20:21
App	Tutor(A)	[Tutor(A) C/S] traffic South West four miles one Tutor Grob returning visually to the aerodrome via high key 1000 feet above	15:20:29
Tutor(A)	App	[Tutor(A) C/S] looking	15:20:38
		[No relevant transmissions]	
App	Tutor(A)	[Tutor(A) C/S] instrument traffic now two and a half miles	15:21:22
Tutor(A)	App	[Tutor(A) C/S] visual	15:21:27
App	Tutor(A)	[Tutor(A) C/S] er Grob joining for high key now South West two miles tracking North 1000 feet above	15:21:30
Tutor(A)	App	[Tutor(A) C/S] confirm he's number one	15:21:39
App	Tutor(A)	[Tutor(A) C/S] negative he's joining high key	15:21:43
Tutor(A)	App	[Tutor(A) C/S] er looking	15:21:49
Tutor(A)	App	[Tutor(A) C/S] believe we are ahead of [Tutor(B) C/S] and to channel one	15:21:54
App	Tutor(A)	[Tutor(A) C/S] affirm channel one	15:21:58
		[No relevant transmissions]	
Lynx	App	Approach [Lynx C/S] conducting low approach runway 04	15:22:42
App	Lynx	[Lynx C/S] Yeovil Approach identified climb to altitude 3000 feet Portland 1016 on passing 1700 feet turn left own navigation for IF area one	15:22:50
Lynx	App	1016 set climbing to 3000 feet on passing 1700 feet left turn for IF area one [Lynx C/S]	15:23:00
Lynx	App	Er approach [Lynx C/S] er just had to break late for a Grob er just now passing beneath us ( <i>unintelligible</i> )	15:23:27
App	Lynx	[Lynx C/S] roger is that Grob was it in the visual circuit	15:23:37
Lynx	App	Er just passing 1500 feet ( <i>unintelligible</i> )	15:23:42
App	Lynx	[Lynx C/S] that that aircraft has just joined the visual circuit through initials at 1500 feet	15:23:45
Lynx	App	Yeah I would like to file an Airprox for that	15:23:54
App	Lynx	[Lynx C/S] roger request you contact the radar supervisor	15:23:57
Lynx	App	Wilco [Lynx C/S] ( <i>unintelligible</i> )	15:24:00

A transcript of the Yeovilton Tower frequency was provided, as follows:

From	To	Speech Transcription	Time
Radar Clearance	All	IRT Practice Pan Lynx six miles low approach runway 04	15:19:17
Tower	Wildcat	Yeovil Tower [Wildcat C/S] Wildcat MATZ boundary North East to join 1020 set request join for threshold 27	15:19:29
		[No relevant transmissions]	
Tutor(C)	Tower	[Tutor(C) C/S] request low level	15:19:43
Tower	Tutor(C)	[Tutor(C) C/S] er negative low level one in bound from the South	15:19:46
Tutor(C)	Tower	[Tutor(C) C/S]	15:19:50
Tower	Other ac	[C/S] Yeovil Tower roger join Runway er 27 threshold runway 04 right hand QFE 1020 one in Grob	15:19:52
Tutor(C)	Tower	[Tutor(C) C/S] downwind full stop	15:20:02
Tower	Tutor(C)	[Tutor(C) C/S] surface wind northerly at five	15:20:07
Tutor(C)	Tower	[Tutor(C) C/S] am I number one?	15:20:08
Wildcat	Tower	Tower [Wildcat C/S] MATZ boundary north east ( <i>broken</i> ) request join threshold 27	15:20:12
Tower	Wildcat	[Wildcat C/S] Yeovil Tower roger join for 27 threshold QFE is correct duty runway 04 right hand one in Grob	15:20:22
Wildcat	Tower	Join threshold 27 one in [Wildcat C/S]	15:20:30
Tower	Tutor(C)	[Tutor(C) C/S] you'll be number two the rotary wing aircraft is approaching four miles on an IRT to low approach	15:20:33
Tutor(C)	Tower	Er roger going around [Tutor(C) C/S]	15:20:40
Tower	Tutor(C)	Roger	15:20:43
Tutor(B)	Tower	Yeovil Tower [Tutor(B) C/S] visual recovery for PFL	15:20:46
Tower	Tutor(B)	[Tutor(B) C/S] Yeovil Tower join runway 04 right hand QFE 1020 one in Grob with rotary radar traffic 4 miles report high key with intentions	15:20:50
Tutor(B)	Tower	04 right hand 1020 set wilco [Tutor(B) C/S]	15:20:59
Radar Clearance	All	Radar two miles runway 04	15:21:06
Tower	All	Radar [Lynx C/S] clear low approach runway 04 two in Grobs	15:21:09
Tutor X	Tower	[C/S X] downwind full stop	15:22:05
Tower	Tutor X or Y	[C/S Y] roger one ahead rotary wing traffic one mile	15:22:08
Unknown	Tower	<i>(unintelligible)</i> [C/S Y] <i>(unintelligible)</i> join high key	15:22:15
Tower	Tutor(B)	[Tutor(B) C/S] surface wind 350 six knots one ahead	15:22:19
Tutor(A)	Tower	That was [Tutor(A) C/S] join high key	15:22:23
Tower	Tutor(A)	Apologies [Tutor(A) C/S] Yeovil Tower join runway 04 right hand QFE 1020 two in Grobs report high key with intentions	15:22:27
Tutor(A)	Tower	[Tutor(A) C/S]	15:22:35
Wildcat	Tower	[Wildcat C/S] final 27 threshold	15:22:37
Tower	Wildcat	[Wildcat C/S] cleared to land 27 threshold surface wind northerly at six	15:22:40
Wildcat	Tower	Cleared to land 27 threshold [Wildcat C/S]	15:22:44
Other helo	Tower	Er [C/S] established on the north south for hover manoeuvres	15:22:47
Tower	Other helo	[C/S] roger surface wind ( <i>interrupted</i> ) northerly at six report complete	15:22:51
Other helo	Tower	[C/S]	15:22:56
Tutor(A)	Tower	[Tutor(A) C/S] high key touch and go	15:22:58
Tower	Tutor(A)	[Tutor(A) C/S] two ahead	15:23:02
Tutor(C)	Tower	[Tutor(C) C/S] final	15:23:04

From	To	Speech Transcription	Time
Tower	Tutor(C)	[Tutor(C) C/S] cleared to land	15:23:09
Tutor(C)	Tower	Land [Tutor(C) C/S]	15:23:10
Tower	Wildcat	[Wildcat C/S] you complete?	15:23:12
Wildcat	Tower	Affirm er request channel two ( <i>unintelligible</i> )	15:23:13
Tower	Wildcat	Roger vacate left for point Zulu continue with Ground channel two	15:23:16
Wildcat	Tower	Ground channel two ( <i>unintelligible</i> )	15:23:19
Radar Clearance	All	Wildcat six miles low approach runway 04	15:23:24
Tutor(B)	Tower	[Tutor(B) C/S] orbiting high key for ( <i>unintelligible</i> )	15:23:31
Tutor(A)	Tower	[Tutor(A) C/S] declaring Airprox	15:23:35
Tutor(A)	Tower	Tower [Tutor(A) C/S] is declaring Airprox on the Wildcat that climbed out on the radar	15:23:49
Tower	Tutor(A)	[Other Tutor C/S] roger copied	15:23:54
Tutor(A)	Tower	That's [partial Tutor(A) C/S]	15:23:56
Tower	Tutor(A)	[Tutor(A) C/S] roger copied	15:23:58
Tower	Tutor(C)	[Tutor(C) C/S] continue along and vacate along runway 09 for [interrupted] vacate 09 threshold	15:24:14
Tutor(C)	Tower	Wilco [Tutor(C) C/S]	15:24:21
Unknown	Unknown	( <i>unintelligible</i> )	15:24:23
Radar Clearance	All	Wildcat four miles low approach runway 04	15:24:25
Tutor(A)	Tower	[Tutor(A) C/S] climb for high key	15:24:36
Tower	Tutor(A)	[Tutor(A) C/S] high key approved report high key with intentions	15:24:38
Tower	Tutor(A)	Approved [Tutor(A) C/S]	15:24:41
Tutor(C)	Tower	[Tutor(C) C/S] has vacated runway 04	15:24:45
Tower	Tutor(C)	[Tutor(C) C/S]	15:24:47
Tower	Tutor(A)	[Tutor(A) C/S] copied your Airprox and we've got the details	15:24:49
Tutor(A)	Tower	Roger	15:24:52

## Analysis and Investigation

### UKAB Secretariat

The Tutor (A) and Lynx pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard<sup>2</sup>. 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<sup>3</sup>.

### Yeovilton Occurrence Safety Investigation

A complex sequence of events led to aircrew and controllers building a false or incomplete mental picture of the situation that prevailed in the vicinity of the Yeovilton circuit. In order to understand this sequence it is necessary to dovetail a number of extended R/T exchanges on the Approach and Visual Control Room (Tower) frequencies. In describing the sequence of events, the following narrative only summarises these R/T exchanges, picking out key points and timings. Precise detail of the timing and content of messages can be found in the Telecommunications Transcripts at the attachments to this report. Reference is made to the Tower Control Status Board, known colloquially as the Pin-Board. This is a graphic of the airfield with the position of aircraft in the vicinity of the airfield circuit represented by hand-annotated markers; it is used by the Local controller as an aid to Situational Awareness (SA). Reference is also made to the Tutor

<sup>2</sup> SERA.3205 Proximity.

<sup>3</sup> SERA.3225 Operation on and in the Vicinity of an Aerodrome.

visual PFL profile. The initial aiming point for a PFL is approximately 1/3 into the runway; the aircraft is positioned at a height of 2500ft to 3500ft on the deadside with the aiming point just ahead of the forward wing root. This position is known as 'Position 1' and 'High-Key', at this point a "High-Key (with intentions)" R/T call is made, the throttle is closed and the aircraft is decelerated to 75kts in a glide descent. Runway track is maintained until the aiming point appears just behind the rear wing root. This is known as 'Position 2', at which point a turn is made to track initially at 90° across the runway. A further turn is then made to intercept a point downwind abeam the aiming point at 1500ft; this is known as Low-Key. From the tower, it is common for Tutor aircraft joining for High-Key to remain unseen until a relatively late stage of the PFL profile. Tutor aircraft are difficult to spot, especially against an overcast grey sky as was the case on the day of the occurrence; when joining in the normal 2500-3500ft PFL bracket they become hidden from view by the solid roof of the tower whilst still some miles distant from the airfield. It is normal for Tutor PFL aircraft to drop back into the tower field of view as they are approaching Low-Key.

The situation leading up to the occurrence saw Tutor (B) general handling southwest of Yeovilton, Tutor (A) general handling southeast and the Lynx marshalling for PAR to RW04, the duty runway. Initially, all 3 aircraft are working the Approach frequency, both Tutors were manoeuvring towards the airfield for visual recovery through High-Key for PFL. The Lynx crew elected to fly their approach at 120kt for timing considerations; Tutor (A) was transiting at 120kt at 2500ft. A further Tutor, Tutor(C), was established in the right-hand visual circuit to RW04 at 800ft. At 15:17:52, Tutor (B) called Approach for a visual recovery for PFL. The response was delayed slightly whilst ATC dealt with other traffic, including passing the Lynx to Talkdown at 8nm. Relevant airfield details were passed and, at the end of the exchange, the Lynx was reported at 6-7nm finals. The crew of Tutor (A) do not recall hearing the R/T exchange between Approach and Tutor (B).

At 15:19:17, Radar Clearance broadcast "IRT Practice Pan Lynx 6 miles low approach to RW04" on the Tower frequency. It is clear that the Local controller perceives this message because he subsequently refuses a Tutor(C) request for a low-level circuit owing to "one in-bound from the south". At 15:20:33, he went on to inform Tutor(C) that he was "No2, the rotary wing aircraft is approaching 4 miles on an IRT to low approach". At 15:19:54, Tutor (A) called Approach, reporting at 5nm to the southeast, for a visual join through High-Key. Relevant airfield details were passed and instrument traffic (Lynx) was reported at 5nm finals. At this point Tutor (A) was tracking northwest at 120kt and 2500ft. Very shortly after this, Tutor (B) reported visual with the airfield and changing to Tower frequency. Approach acknowledged this and reported instrument traffic (the Lynx) at 4nm. Tutor (B) checked in with Tower at 15:20:46, airfield details were passed and traffic was reported as "one in, Grob, with rotary radar traffic 4 miles..." At this point, the Local controller placed a tally for Tutor (B) on the pin-board, indicating the aircraft to the southwest but not yet established in the circuit. Tutor(C) already featured on the pin-board in the circuit; the Lynx also featured on the pin-board in the RW04 approach sector. The Local controller did not gain visual contact with Tutor (B), but this was not unusual owing to the tower roof blocking line of sight.

Although Tutor (B) had changed to Tower first, the Approach controller realised that Tutor (A) was some 3-4nm closer to the airfield. The Approach controller did not state this directly but passed increased Traffic Information on Tutor (B) and, over a 90-second period, Tutor (A) established that he was ahead. During this R/T exchange, the Aircraft Commander Non-Handling Pilot (NHP) of Tutor (A) established visual contact with the Lynx, now at 2.5nm finals. At 15:21:06, Radar Clearance reported "Radar 2 miles RW04", the Local controller responded immediately with "Radar [Lynx C/S] clear low approach RW04, 2 in, Grobs". The "2 in" was based on pin-board indications of Tutor(C), which could be seen in the circuit, and Tutor(B) which was understood to be approaching High-Key. At this point the local controller moved the tally for the Lynx from the approach sector to the RW04 section of the pin-board. At 15:21:54, Tutor (A) reported changing to Tower frequency; therefore the crew of Tutor (A) did not hear Tower clearing the Lynx low approach. At this point Tutor (A) was at 2500ft and only some 3nm from the overhead, still some 3-4nm ahead of Tutor (B). At 15:22:15, two simultaneous transmissions were heard on the Tower frequency, this is assessed to be Tutor (A) calling to join and Tutor(C) responding to circuit

information (or possibly another rotary aircraft calling finals). The messages were garbled but the local controller picked out the words "High-Key" and assumed that this was Tutor (B) reporting at High-Key. He responded to Tutor (B) and moved the aircraft pin-board tally to the High-Key position. Tutor (A) attempted to correct this misunderstanding by calling again with "That was Tutor (A) join High-Key". The local controller appeared to partially acknowledge the misunderstanding in his response to Tutor (A); however he incorrectly reported "2 in, Grobs...." The local controller believes that his report of 2 in was based on Tutor(C), which could be seen downwind, and Tutor (B) which the pin-board now indicated to be at High-Key. Information on the position of the Lynx, now approaching the Missed Approach Point (MAP), was not included in either of the ATC responses to aircraft at High-Key.

After this, the local controller's attention was diverted by a rotary aircraft on finals to threshold RW27, this physically required the local controller to turn their back on the approach to RW04. Although the NHP of Tutor (A) had sighted the Lynx low and to the left earlier, visual contact was lost as both aircraft converged on the airfield and the Lynx drifted beneath the left wing and belly of the Tutor. The Handling Pilot (HP) in the right seat had not seen the Lynx but he was content that the NHP had a tally on it. From the Lynx, throughout the final approach Tutor (A) was always very high in the forward right quadrant. The HP in the right seat was flying on instruments under an IF hood, the view of the NHP in the left seat was blanked by the cockpit frame and overhead console. The crew of the Lynx did not acquire visual contact with Tutor (A) at any stage during the approach. Approximately 1 minute before the Airprox both aircraft were established on runway track at 120kt, with Tutor (A) slightly ahead and to the left on the dead side.

At approximately 15:22:35 (+/- 5 seconds), the Lynx reached DH at 180ft and 0.5nm finals and executed an overshoot. This involves a simultaneous deceleration and application of full power which results in an initially high rate of climb before the aircraft is stabilised in a standard climbing configuration at 80kt and 1000fpm; the 120kt approach speed resulted in a longer period at a higher rate of climb. Distance from the MAP to the reported Airprox position is 0.95nm, using the lowest aircrew height assessment of 1500ft and assuming an instantaneous speed reduction to 80kt, the minimum average rate of climb of the Lynx was in the region of 1850fpm. In reality, the actual rate of climb, especially in the early stages of the overshoot, will have been higher. At 15:22:58, Tutor (A) called "High-Key touch and go". The local controller responded with "2 ahead". Again, this was based on visually sighting Tutor(C) late downwind and an incorrect understanding that Tutor(B) was ahead of Tutor(A), somewhere between High-Key and Low-Key but still blanked from view in the tower overhead. Again the position of the Lynx, now established in the climb, was not mentioned. At High-Key, Tutor (A) initiated the descending/decelerating PFL profile.

In the final moments leading up to the Airprox, the Lynx was climbing on the runway centreline and reducing speed from 120kt to 80kt, Tutor(A) was tracking parallel to the runway, displaced slightly to the left, descending from 2500ft and reducing speed from 120kt to 75kt. It is assessed that at this stage the Lynx was low in the 5 o'clock of the Tutor, out of the field of view of either pilot; the Tutor was high in the 11 o'clock of the Lynx, hidden from view behind the cockpit roof frame. Initially Tutor (A) was very slightly ahead of the Lynx but the Lynx gained a marginal overtake as the relative speeds of the aircraft changed. In Tutor(A), the Traffic Advisory System (TAS) was on but the crew do not recall the audio alert sounding immediately before the Airprox; both crew were eyes-out, relying upon traffic reporting and lookout as the primary means of collision avoidance. The HP of Tutor (A) was aware of the Lynx on approach but could not recall whether or not the Lynx was landing or overshooting, in any case, he did not consider that there was any potential for conflict with the Lynx at the current height, approaching 2000ft in the overhead. He could see a Tutor downwind and was busy looking for the second Tutor, incorrectly reported earlier. The NHP of Tutor (A) was aware of the confusion regarding the relative positions of Tutor (A) and Tutor (B), he assumed that the "2 in" previously reported were the Tutor downwind and the Lynx on instrument approach. Although he knew that the Lynx was overshooting, his assessment based on previous sightings was that he would be clear ahead of the Lynx. Irrespective of the relative tracks of the aircraft, he also did not consider that there was any potential for conflict with the Lynx at such a height in the airfield overhead, therefore he was content to allow the PFL to continue.

In the Lynx, as the overshoot was initiated the NHP was looking for the “2 in, Grobs” previously reported. He could see one Tutor downwind in the circuit but was not visual with the other aircraft; however, the airspace ahead and above the Lynx was clear as far as he could tell. At 15:22:42, the Lynx checked in with Approach and reported conducting a low approach. Over the next 18 seconds Approach passed relevant climb out information, including clearance to turn left for IF Area 1. At approximately 1500ft the NHP was looking up and left to clear the turn when he perceived movement to his left and saw Tutor(A) in close proximity, above but moving rapidly down relative to the Lynx. As he watched, the Tutor entered a steep left turn away. In response to an exclamation by the NHP, the HP looked across to see the Tutor slightly below and turning away. Neither pilot had time to take effective avoiding action before the conflict had passed.

In Tutor(A), as the aircraft reached ‘Position 2’ the HP was still not visual with the second aircraft in the circuit but he reasoned that it would become visual as he rolled into the right turn and opened his field of view down and to the right into the circuit. In taking time to look for the reported traffic he considers that he may have extended slightly beyond Position 2 before rolling into a 15-20° bank right turn. Almost as soon as the turn was initiated, the HP saw the Lynx low behind the right wing and he immediately banked steeply to the left. Once the conflict had passed he reversed the turn to pass behind and beneath the Lynx in an attempt to continue with the PFL. The NHP looked across as the HP took avoiding action and saw the Lynx approximately 200ft below and 200ft to the right. He recalls checking the altimeter and seeing 2000ft indicated. Pilot recollections are broadly coherent with SSR recordings of the event, which show the aircraft to be around 1700ft at the closest point.

In the tower, the DATCO and Ground controller were assisting with lookout to help the Local controller maintain SA, this is normal procedure during busy periods. The DATCO saw the Lynx initiate the low approach, and then focused attention to the south, looking for the other Tutor joining for PFL and further instrument traffic. The Ground controller was watching the Lynx in the climb on runway centreline and was then very surprised to see Tutor (A) drop into the field of view below the tower roofline in an unusual position, in close proximity to the Lynx, apparently very low for a PFL profile and to the right of the runway centreline. He alerted the Local controller who was also very surprised to see Tutor (A) in such an unusual position in the field of view, some 45° in azimuth earlier than expected. It is considered most likely that these sightings occurred a few seconds after the Airprox, by which time Tutor (A) had reversed to pass beneath and behind the Lynx. The possible extension beyond Position 2 would have put Tutor (A) slightly lower than usual but the relatively large amount of height lost during the avoiding action would explain why Tutor (A) appeared in such an unexpected position. Both crews reported the Airprox on their respective frequencies.

## Comments

### Navy HQ

Navy Command have nothing to add to the conclusions of the Safety Investigation which are fully supported. As a direct result of this occurrence, the practise-PFL procedure at RNAS Yeovilton was immediately amended and a wider review (due to complete mid-March 2016) is underway of all Yeovilton IFR/VFR procedures and traffic integration.

## Summary

An Airprox was reported when a Tutor and a Lynx flew into proximity at about 1523 on Wednesday 14<sup>th</sup> October 2015. Both pilots were operating in VMC, the Tutor pilot under VFR in receipt of an Aerodrome Control Service from Yeovilton Tower and the Lynx pilot under IFR in receipt of a Traffic Service from Yeovilton Approach.



## **PART B: SUMMARY OF THE BOARD'S DISCUSSIONS**

Information available consisted of reports from both pilots, transcripts of the relevant RT frequencies, radar photographs/video recordings (which did not depict the geometry at CPA), reports from the air traffic controllers involved and reports from the appropriate operating authorities.

Members first commended the comprehensive and thorough Yeovilton Occurrence Safety Investigation and noted that the work done in the Investigation had been key in developing the correct understanding of causal factors and risk. Members were briefed at length by the RN Operations member, and discussed the train of events in detail; the Board concluded that, ultimately, the event stemmed from personnel forming incorrect mental models of the positions of the aircraft and/or intentions of the pilots involved. The key aspects of the incident that the Board discussed were:

- The Approach controller had informed both Tutor(A) and Tutor(B) pilots of the Lynx ('instrument traffic') with 7, 5 and 4 track miles to run and had passed Traffic Information to the Tutor(A) pilot on the Lynx at 2½ miles, to which the Tutor(A) pilot called 'visual'.
- The Approach controller also passed Traffic Information on Tutor (B) to the Tutor (A) pilot, who realised that he would recover through High-Key ahead of Tutor (B).
- The Tutor (A) pilot called for join and was transferred to Tower frequency after Tutor (B) pilot, but was in fact closer to the airfield than Tutor (B). The Tower controller, on hearing Tutor (B) first, formed the model that it was closer to the airfield than Tutor (A) and would therefore join first.
- Tutor(B) pilot contacted Tower first and was given airfield information and Traffic Information on the Lynx at 4 miles; however, when Tutor(A) pilot contacted Tower, about 1½min later, he was not given a Traffic Information update on the Lynx, and had not been on frequency when the Talkdown controller had earlier made the Lynx 'low-overshoot' broadcast call. Although the Tutor (A) pilot had previously been aware of the Lynx, and had seen it during his recovery, the lack of any subsequent positive cues as to its position caused members to wonder whether he had discounted it from his mental model.
- Members opined that the Lynx pilot was not given sufficient Traffic Information regarding the number and position of aircraft in the visual circuit as he overshot and flew through what was a busy pattern. There was an expectation that visual circuit traffic would avoid 'IFR aircraft' in the radar pattern, but IFR aircraft also had a responsibility to avoid collisions and could only do so if the information they were given was comprehensive and accurate. In particular, members discussed at length whether aircraft that were at High-Key, or routeing to Low-Key, should be referred to as 'in the circuit' because this could give a misleading impression as to their heights and positions.
- Members wondered whether much of the confusion on the part of the Tower controller as to the order to arrival of Tutor (A) and Tutor (B) was because the controller had not been best served by the ATC team at Yeovilton. Some members felt that if the Approach controller had informed the Tower controller that the Tutor (A) was ahead of Tutor (B), this would have helped resolve the apparent confusion when Tutor (A) contacted Tower.

The circuit environment was undoubtedly busy and complex, and the Board were informed that RW04RH was rarely used as the duty runway, leading to additional workload in ATC. It was unfortunate that the ATC tower was positioned such that circuit traffic joining overhead could not be seen, but ATC personnel were aware of the limitation and were acting in mitigation accordingly. Having called visual with the Lynx previously, it was apparent to the Board that the Tutor (A) pilot had then lost SA on its position, although members noted the Tutor is equipped with TAS, which could have indicated and alerted the Lynx's position depending on the functionality selected. The Board was unable to determine whether the loss of Tutor (A) pilot's SA was due to cockpit workload, confusing RT, or mis-identification of a Wildcat in the circuit as the Lynx radar traffic but, whatever the

reason, members agreed that it was for visual circuit traffic pilots, operating under VFR, to remain sufficiently clear of radar traffic, in this case operating under IFR. Therefore, they determined that the cause of the Airprox was that the Tutor (A) pilot had flown into conflict with the Lynx, and that this had occurred in the absence of sufficient Traffic Information from ATC. Members discussed at great length the contributory factors leading up to the Airprox and agreed that the Tutor(A) pilot's delayed joining call to Tower had played the biggest part in the Tower controller's subsequent confusion and had also unfortunately resulted in Tutor(A) pilot missing the Talkdown controller's call that the Lynx would be overshooting through the circuit. A more timely joining call at greater range would probably have allowed all involved to assimilate what was going on and have helped mitigate the ensuing conflict. As for the risk, with unfortunately no radar picture available for the geometry at CPA, the Board had to rely on the pilots' perceived separation. Notwithstanding, members were satisfied that, although the Tutor(A) pilot had taken effective avoiding action, the aircraft had passed sufficiently close to each other that safety margins had been much reduced below normal.

As an aside, the Board also noted that both Tutor pilots had planned to join through High-Key for a PFL. However, whilst the Tutor (B) pilot stated his intentions explicitly, Tutor (A) pilot stated he would conduct a "visual join through high-key". Whilst some members felt this had no bearing on later events, others felt that adherence to RT phraseology was critical, and that lack of explicit intentions could lead to ambiguity or misunderstanding, especially in a busy and complex circuit environment.

### **PART C: ASSESSMENT OF CAUSE AND RISK**

<u>Cause:</u>	In the absence of sufficient Traffic Information from ATC the Tutor (A) pilot flew into conflict with the Lynx.
<u>Contributory Factor:</u>	The Tutor (A) pilot's delayed joining call to Tower.
<u>Degree of Risk:</u>	B.