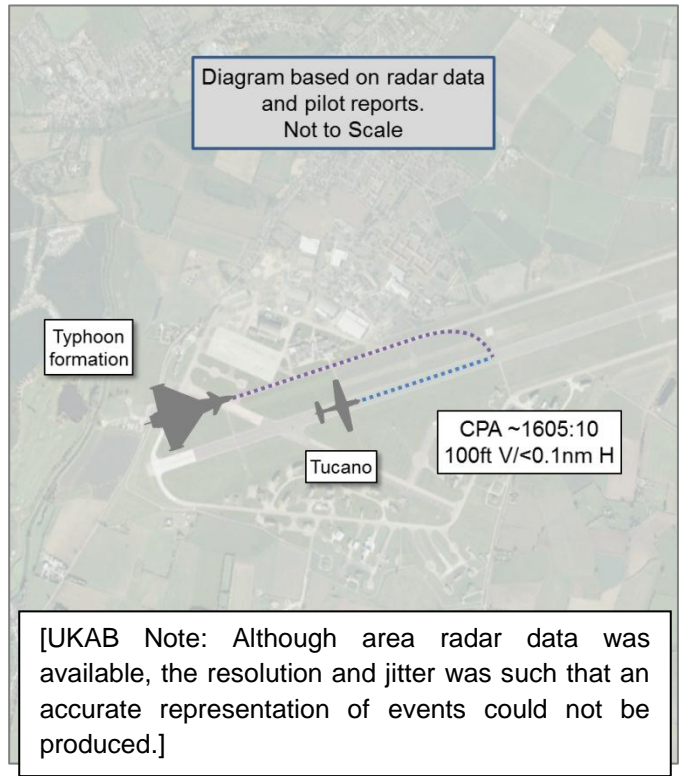


**AIRPROX REPORT No 2015021**

Date: 12 Mar 2015 Time: 1605 Z Position: 5306N 00009W Location: RAF Coningsby

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

| Recorded    | Aircraft 1       | Aircraft 2    |
|-------------|------------------|---------------|
| Aircraft    | Tucano           | Typhoon FGR4  |
| Operator    | HQ Air (Trg)     | HQ Air (Ops)  |
| Airspace    | Coningsby ATZ    | Coningsby ATZ |
| Class       | G                | G             |
| Rules       | VFR              | VFR           |
| Service     | Aerodrome        | Aerodrome     |
| Provider    | Coningsby        | Coningsby     |
| Transponder | A/C              | A/C           |
| Reported    |                  |               |
| Colours     | Black/yellow     | Grey          |
| Lighting    | Nav, strobe      | Nav, strobe   |
| Conditions  | VMC              | VMC           |
| Visibility  | 10km             | 10km          |
| Altitude/FL | 1000ft           | 1000ft        |
| Altimeter   | QFE (1021hPa)    | NK (1021hPa)  |
| Heading     | 070°             | 076°          |
| Speed       | 140kt            | 300kt         |
| ACAS/TAS    | TCAS I           | Not fitted    |
| Alert       | Nil              | N/A           |
| Separation  |                  |               |
| Reported    | 50ft V/0m H      | 100ft V/0m H  |
| Recorded    | 100ft V/<0.1nm H |               |



**THE TUCANO PILOT** reports conducting an instructional sortie as the rear-seat Captain of the number 2 of a pair of Tucanos, getting airborne from Coningsby to return to base. Following an uneventful pairs take-off, the formation split for the number 2 to complete 3 visual circuits before following the same low-level route home, behind the formation leader, who departed immediately. The first circuit was uneventful, and on the second, they were informed by Coningsby Tower that a formation of Typhoons was joining from the north. He then heard the formation leader call for a join to RW07RH. Following an uneventful touch and go, the Tucano pilot was directed to extend upwind, which was acknowledged. The Tucano was climbed on runway track, straight ahead to 1000ft QFE, and levelled at 140kts, which is the Tucano SOP. Conscious that the Typhoon formation were approaching from behind, the instructor checked the TCAS, which did not display traffic in the rear sector. The instructor surmised that either the Typhoons were squawking standby, or the Tucano aerial was blanked due to its position on top of the engine cowling. He then looked into his left-hand mirror and saw 3 Typhoons in echelon-left about 0.5nm behind and to the left side. The front-seat student (PF) continued to fly upwind at 1000ft QFE at 140kts while the instructor monitored the position of the Typhoon formation who continued to approach with a high overtake speed. When they were about 100-200m behind, in the 7 o'clock position, the instructor saw the lead Typhoon initiate a break directly toward him. Without time to say 'I have control', he aggressively pushed forward on the control column and heard the jet noise of the Typhoon as it passed directly overhead in a right-hand breaking turn. The instructor assessed that the Typhoon's right wingtip was within 20-50ft of the Tucano. He then saw the lead Typhoon in his 4-5 o'clock in a climbing right turn; he believed as a result of 'ballooning' due to aggressive avoiding action on his part. The formation No2 then broke level in front of him, followed by the No3, several hundred metres ahead and at the same level. The instructor stated that, upon landing back at base, he discussed the incident with the authorising officer and decided that an Airprox should be filed. He noted that, with hindsight, he should have immediately declared an Airprox on the Coningsby Tower frequency.

He assessed the risk of collision as 'High'.

**THE TYPHOON PILOT** reports that upon calling to join as a 3-ship to Coningsby they were informed that a Tucano was in the circuit. He was aware that the Tucano pilot had also been informed that a 3-ship of Typhoons was joining to land. They were 5nm northwest of the field when the Tucano pilot reported "finals gear down" and Tower cleared it to touch-and-go with a subsequent instruction to extend upwind to allow the Typhoons ahead. The formation approached the field and lined up on the northern taxiway, offset deadside from the runway. From the Tower RT, all 3 formation pilots perceived that the Tucano had transited down and was past the upwind end of the runway. The flight lead scanned up and down the runway and, seeing no aircraft to affect, broke right, about halfway along the runway. The flight lead first saw the Tucano at the point at which he rolled right to break, directly below his aircraft. The pilot took immediate evasive action up and away to avoid the Tucano. Numbers 2 and 3 did not see the Tucano until the flight lead broke, at which point they had passed the Tucano and were able to break. He perceived the distance between the Tucano and the lead Typhoon as about 100 ft.

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

**THE CONINGSBY TOWER CONTROLLER** reports the Typhoon formation called to join when 10 miles north of Coningsby. At this point the Tucano had called downwind to touch-and-go. The controller asked the Typhoon formation if they required any visual circuits, and was told that all were to land. The controller's plan was for the Typhoon formation to break ahead of the Tucano, and to land ahead. When the Tucano pilot reported 'final, gear down' the controller cleared him to touch-and-go. The Typhoon formation reported 'Initial' and the controller passed the position of the Tucano. When the Tucano pilot completing his touch-and-go, the controller instructed him to extend upwind to allow the Typhoon formation to break behind him. When the formation leader commenced his break, he was extremely close to the Tucano, and the controller saw the Typhoon manoeuvre just after commencing his break. The Typhoon formation numbers 2 and 3 subsequently broke clear of the Tucano and proceeded to land in turn. The controller stated that his plan was based on all elements of the Typhoon formation being visual with the Tucano. Unfortunately, he was unaware that they were not, and additional Traffic Information was not requested.

**THE CONINGSBY SUPERVISOR** reports he was in the Radar Approach room. He was advised by the Tower controller that he had witnessed the Typhoon leader carry out what looked like a 'bunt manoeuvre' shortly after commencing the break and believed this was to avoid the Tucano. The Supervisor asked if any of the pilots had declared an Airprox or commented on the situation and the controller said they had not.

## **Factual Background**

The weather at RAF Coningsby was recorded as follows:

METAR EGXC 121550Z 15014KT CAVOK 12/M04 Q1022 BLU NOSIG

## **Analysis and Investigation**

### **Military ATM**

The incident occurred on 12 Mar 15 at 1605 between a Typhoon and a Tucano under an Aerodrome Control Service with Coningsby Tower in the RAF Coningsby visual circuit.

The Radar Analysis Cell used the NATS Ltd area radar to produce the replay, based on London QNH 1023 hPa.

A portion of the Tower transcript is shown below:

| From       | To         | Transcribed Speech   | Time     |
|------------|------------|--|----------|
| Tower      | Typhoon Ld | [Typhoon formation C/S] Coningsby Tower, join runway zero seven right hand, Q F E one zero two one, one in Tucano              | 16:01:53 |
| Typhoon Ld | Tower      | One zero two one set [C/S]   | 16:01:58 |
| Tucano     | Tower      | [Tucano C/S] downwind flapless, touch and go   | 16:02:21 |
| Tower      | Tucano     | [Tucano C/S] wind one five zero one three, caution three Typhoons soon to join, currently seven miles from the field           | 16:02:24 |
| Tucano     | Tower      | Copied [Tucano C/S]  | 16:02:38 |
| Tucano     | Tower      | [Tucano C/S] finals gear down  | 16:03:33 |
| Tower      | Tucano     | [Tucano C/S] clear touch and go  | 16:03:35 |
| Tucano     | Tower      | Clear touch and go [Tucano C/S]  | 16:03:37 |
| Tower      | Typhoon Ld | [Typhoon formation C/S] are you requiring circuits   | 16:03:41 |
| Typhoon Ld | Tower      | [Typhoon formation C/S] negative   | 16:03:44 |
| Tower      | Typhoon Ld | Roger  | 16:03:45 |
| Jetstream  | Tower      | Tower [Jetstream C/S] we're erm coming to downwind left to join left base join runway zero seven, Q F E one zero two one       | 16:04:11 |
| Tower      | Jetstream  | [Jetstream C/S] Coningsby Tower roger, left base join approved, runway zero seven right hand Q F E read-back correct, four in. | 16:04:19 |
| Jetstream  | Tower      | Roger are they ahead of us.  | 16:04:28 |
| Tower      | Jetstream  | Affirm   | 16:04:29 |
| Jetstream  | Tower      | Roger I'll widen this out.   | 16:04:33 |
| Tower      | Jetstream  | [Jetstream C/S] roger, I'll keep you advised, there's three Typhoons all to land and one Tucano on penultimate circuit.        | 16:04:34 |
| Jetstream  | Tower      | OK   | 16:04:41 |
| Tower      | Tucano     | [Tucano C/S] request you extend upwind to allow the Typhoons ahead.  | 16:04:42 |
| Tucano     | Tower      | [Tucano C/S] extend upwind   | 16:04:47 |
| Jetstream  | Tower      | Upwind if you just tell us when you want us to turn  | 16:04:47 |
| Tower      | Jetstream  | [Jetstream C/S]  | 16:04:50 |
| Tucano     | Tower      | [Tucano C/S] extending upwind.   | 16:04:54 |
| Typhoon Ld | Tower      | [Typhoon Ld C/S] break land  | 16:05:10 |
| Tower      | Typhoon Ld | [Typhoon Ld C/S] wind one six zero one three   | 16:05:13 |
| Typhoon Ld | Tower      | [Typhoon Ld C/S] finals gear down  | 16:05:51 |

At 1602:24 (Figure 1), the Aerodrome Controller responded to the Tucano downwind call by informing the pilot that three Typhoons were 7nm from the field and soon to join.

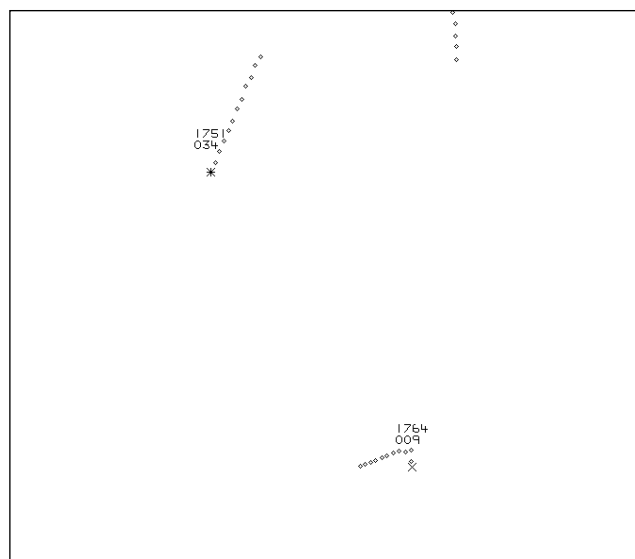


Figure 1: Geometry at 1602:24 (Typhoon lead squawking 1751; Tucano squawking 1764)

At 1603:37 (Figure 2), the Tucano was cleared to touch-and-go.

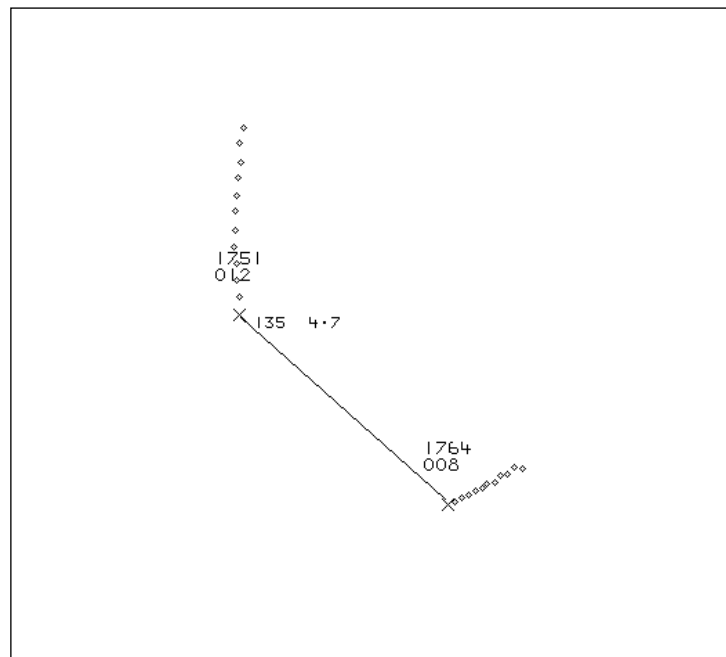


Figure 2: Tucano cleared to touch-and-go at 1603:37

At 1604:11 (Figure 3), the Jetstream pilot called the Aerodrome Controller at the approximate point for the Typhoon Initials call at 3nm finals offset by 0.5 nm to the north.

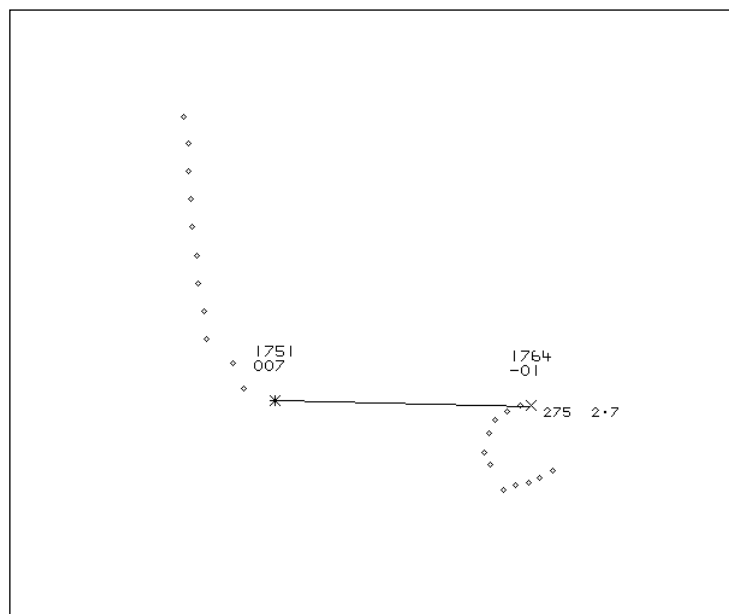


Figure 3: 1604:11: Jetstream called Tower as Typhoon at Initials Point

At 1604:42 (Figure 4), The Aerodrome Controller transmitted, “[Tucano C/S] request you extend upwind to allow the Typhoons ahead.”

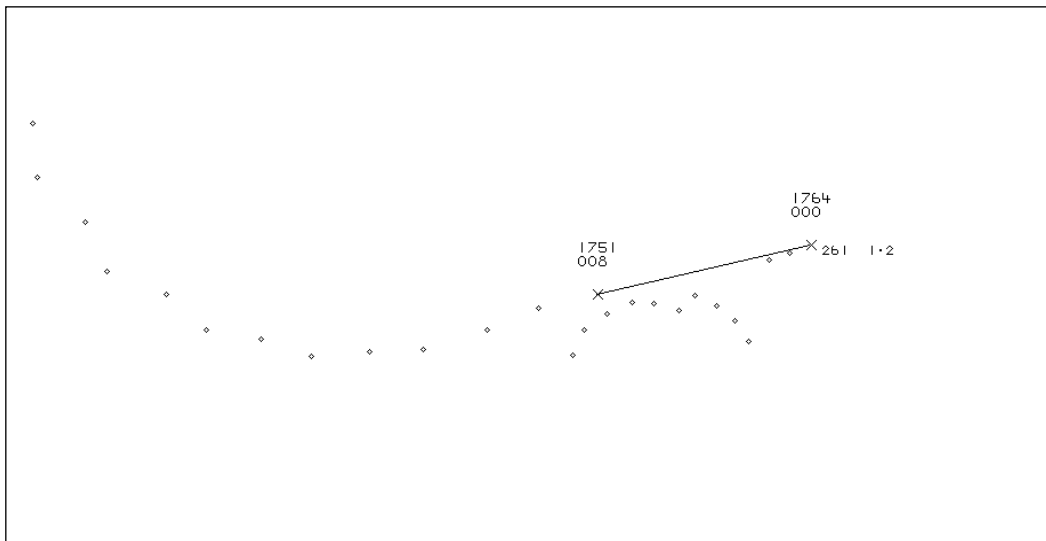


Figure 4: Geometry at 1604:42 as Tucano instructed to extend upwind

The Tucano pilot confirmed extending upwind at 1604:54 (Figure 5).

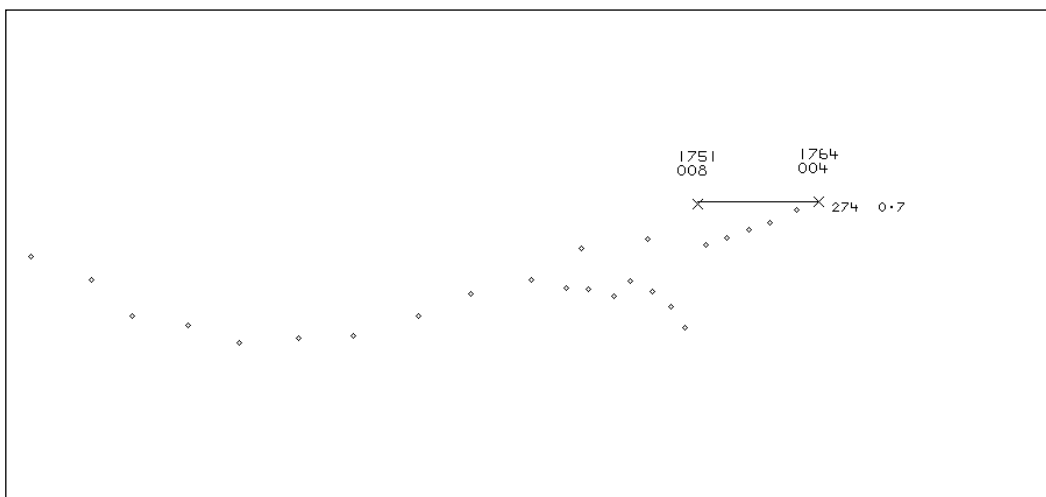


Figure 5: Geometry at 1604:54

The CPA was estimated between 1605:03 (Figure 6) and 1605:10 with 0.1nm horizontal and 100ft vertical separation.

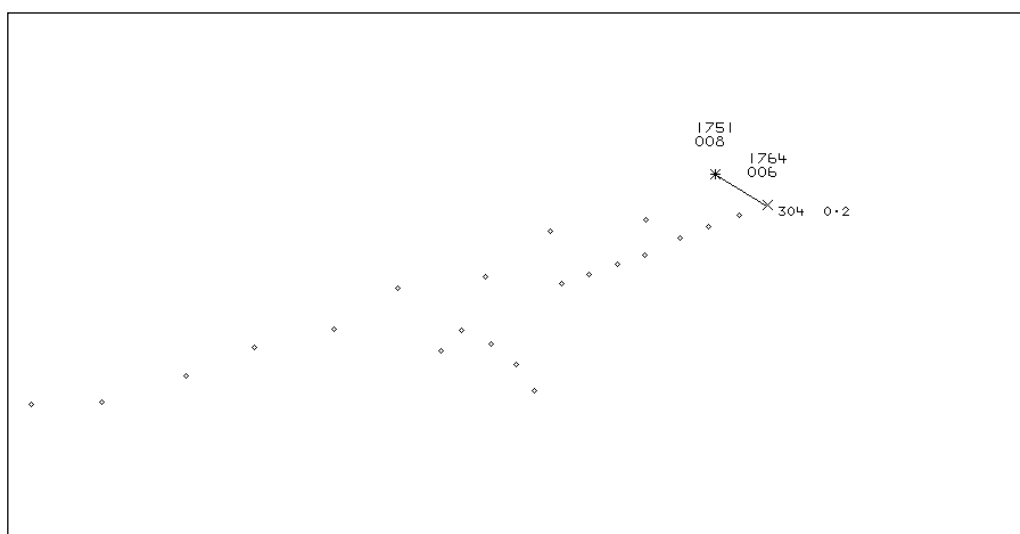


Figure 6: Immediately prior to CPA at 1605:03

An in-depth Occurrence Safety Investigation was conducted at the unit to establish causal factors and to produce recommendations to prevent re-occurrence. The Tucano pilot was unable to detect the Typhoons on TCAS but did see the approaching Typhoons in echelon formation in his mirror. He had prepared to over-ride the student, which he did so with a push forward on the control column; as the lead Typhoon aircraft broke; the Tucano instructor reacted and bunted to provide separation. The instructor was aware that his aircraft might be difficult to see from the rear and that the Tucano was climbing to 1000ft and slightly converging with the Typhoons, due to a strong southerly wind pushing the Tucano over the grass to the north of the runway.

The Typhoon lead had called his formation into echelon left and had positioned for the northern taxiway, on the deadside. The Typhoon crews were aware of the Tucano in the visual circuit and knew that visual acquisition had to occur when closer to the airfield. As the Typhoons approached the Initial Point, a Jetstream arrived on frequency and all Typhoon crews commented on the long and verbose phraseology between the Jetstream and the Aerodrome Controller. The Typhoons could not call Initials because of the busy RT, and the pilot had to scan the runway to detect the Tucano. ATC would need to update the position of the Tucano (on short final) when the Typhoon formation called at Initials. As the controller informed the Tucano to 'extend upwind to allow the Typhoons ahead', the Typhoon pilots assumed that the Tucano was already upwind and no longer a factor. A break was initiated over the runway without the lead being visual with the Tucano. The break position is at the pilot's discretion and the break can be conducted between 800-1000ft. The Typhoon is not TCAS equipped; a review of the radar picture found that the Tucano was in a position to be highlighted on radar but SOP was for the crews to use visual lookout and ATC information in the visual circuit. The Typhoon had an overtake speed of 190kt and echelon formation meant that the lead was responsible for the lookout as the others were concentrating on maintaining formation. The lead Typhoon pilot rolled right, pulled and immediately saw the Tucano; the Typhoon pilot initiated a 6.4g pull with a nose-up attitude to climb above the Tucano.

The Controller recalled a low workload environment and did not require the Ground Controller in position. The ATC Supervisor was in the Approach Control Room at the time of the incident. The controller asked the Typhoons if they required visual circuits and, following confirmation that the Typhoons were on the break to land, the controller planned to extend the Tucano upwind, to allow the Typhoons to break behind and land in turn. The civilian Jetstream was going to hold-off until the jets were on the ground. The controller's duties, as stated in MAA Regulatory Article 3261: Aerodrome Service, are as follows:

'Controllers should issue information and instructions to Air Systems to achieve a safe, orderly and expeditious flow of air traffic in order to assist in preventing collisions. Controllers should sequence VFR traffic flying in the circuit.'

The prolonged conversation with the Jetstream pilot meant that the Typhoons were 0.5nm from the RW07 threshold prior to the controller requesting that the Tucano extend upwind. MAA Regulatory Article 3225(1) 1.b states that controllers and pilots should consider ATC instructions as mandatory within a MATZ.

The investigation commented on a number of contributory factors:

- a. See-and-avoid. Coarse modelling suggested that the Tucano could be visually acquired from the Typhoon but it did offer a poor aspect from astern and the Tucano lighting was optimized for the forward sector.
- b. Communications. The seven transmissions between the controller and Jetstream were at a crucial time for the Typhoon formation to get an update on the Tucano's position. The Typhoon pilots interpreted the ATC instruction for the Tucano to extend upwind as the Tucano was already upwind and not a factor.

- c. Individual factors. The lead Typhoon pilot was experienced but had not flown in a circuit with a Tucano previously. The pilot understood his responsibility to see other circuit traffic but believed that the Tucano was not a factor.
- d. Circuit management. SMEs assessed that the controller chose a suitable course of sequencing; however, the Coningsby Flying Order Book did not provide specific guidance on sequencing Tucanos or Jetstreams with Typhoons. A local Safety Survey had acknowledged the difficulties with Typhoons visually acquiring King Airs but there was no mention of Tucanos.
- e. Equipment. Typhoon is not fitted with ACAS and the Tucano experienced difficulty with acquiring a TCAS contact from aircraft approaching from the 6 o'clock position. The Typhoon radar remained in extended scale and the pilot was using lookout and ATC information to gain situational awareness.
- f. Procedures. The Cranwell MATZ position results in a relatively tight turn-in prior to Initials for RW07, with less time to assimilate information on circuit traffic. A break at 800ft would have been below the Tucano climbing to 1000ft and may have sky-lined the black Tucano.
- g. Resources. The Tucanos had limited options for their training sortie in terms of suitable locations and weather on the day, Coningsby was effectively the only option available to them.

The investigations made numerous recommendations that have been allocated to various units by the RAF Safety Centre.

### **UKAB Secretariat**

The Tucano and Typhoon 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>1</sup>.

### **Comments**

#### **HQ Air Command**

This incident prompted a high-profile investigation on the unit and a number of recommendations have been made. The visual circuit remains a 'see-and-avoid' environment and it is clear that one cannot avoid that which one cannot see. A wide-ranging review of circuit procedures has been instigated by the RAF.

### **Summary**

An Airprox was reported when a Tucano and a Typhoon flew into proximity at 1605 on Thursday 12<sup>th</sup> March 2015. Both pilots were operating under VFR in VMC, both in receipt of an Aerodrome Service from Coningsby Tower.

### **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 noted the level of investigation which had already been undertaken, and remarked that this incident had been thoroughly examined with a number of resulting actions and contributory factors already identified. In noting these, members therefore quickly agreed that the cause had been that the Typhoon pilot had flown into conflict with the Tucano, that separation had been reduced to the minimum, and that chance had played a major part in the aircraft not colliding.

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<sup>1</sup> SERA.3205 Proximity.

Expanding on the HQ Air Command comments regarding the primacy of see-and-avoid in the visual circuit, they also commented that the premise of a safe run-in and break was that all other traffic in the circuit should be visually identified before the break was commenced; if this was not possible, or there was any lack of certainty about the location of other aircraft and their intentions, the formation should simply continue to fly through on the deadside to reposition for another break, using Traffic Information from the Tower if necessary to visually identify the other traffic. This procedure created a fail-safe system, whereas making assumptions and breaking into the circuit without visual identification could result in an unsafe situation, as was the case in this incident. Rather than simply accept that one cannot avoid that which one cannot see, the Board were at pains to emphasise that a positive 'plan B' was required when one could not see other aircraft of which one was aware. The Board therefore agreed that the fact that the Typhoon pilot did not gain visual contact with the Tucano before breaking into the circuit was contributory to the Airprox.

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

Cause: The Typhoon pilot flew into conflict with the Tucano.

Contributory Factors: The Typhoon pilot did not gain visual contact with the Tucano before breaking into the circuit.

Degree of Risk: A.