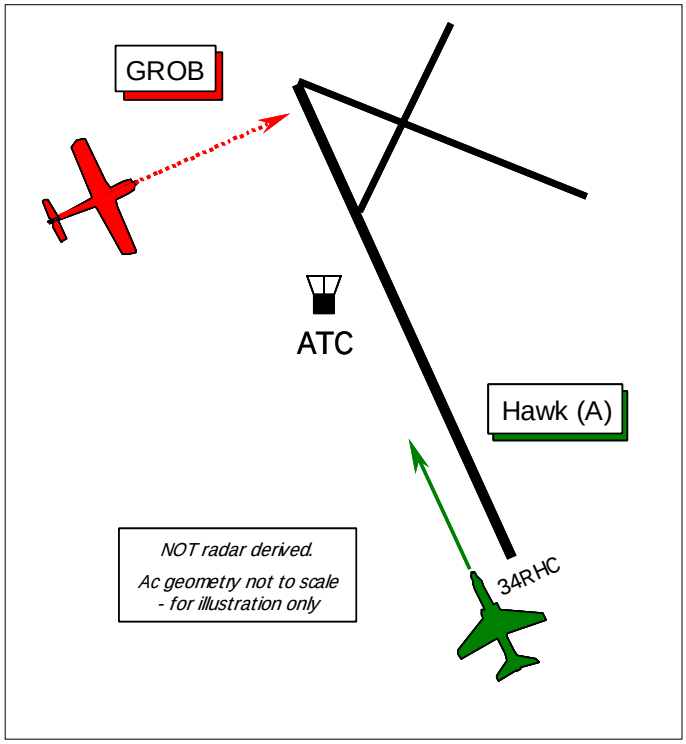
AIRPROX REPORT No 2010085

Date/Time:	29 Jun 2010 1430Z	
Position:	5418N 00132W (Visual Circuit to Leeming RW34RHC - elev 132ft)	
Airspace:	Leeming MATZ	(*Class:* G)
	Reporting Ac	*Reporting Ac*
Type:	Hawk T Mk1	Grob Tutor II
Operator:	HQ Air (Ops)	HQ Air (Trg)
Alt/FL:	500ft QFE (1012mb)	500ft QFE (1012mb)
Weather:	VMC CLOC	VMC CLOC
Visibility:	20km	NR
Reported Separation:	50ft V/Nil H	20-50ft V/Nil H
Recorded Separation:	NR	



BOTH PILOTS FILED

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE HAWK T Mk1 PILOT - HAWK (A) - reports that he was flying in a mixed traffic cct to RW34RHC at Leeming – active with his Hawk and 1 Tutor [flown by a solo student], whilst in communication with Leeming TOWER (TWR) on 368·925MHz. SSR was selected to standby.

He executed an overshoot [sic] from 200ft during the Final turn due to the runway being occupied by the solo Tutor on a Touch & Go. Positioning his ac to the Deadside and levelling at 500ft QFE, he was aware of another Hawk joining Deadside at 1000ft that had already passed through Initials. He was also aware of another Grob cleared by TWR to join the cct via an overhead join and subsequently to enter the light ac (LA) hold. His lookout was initially concentrated into the cct to gain visual contact on the other Hawk (which had passed overhead) and then to assess spacing on that traffic and the solo Tutor that had just completed its touch and go. Heading 340° at 200kt, as he transferred his lookout back to the forward sector, the joining Tutor was seen close aboard less than 50m away in the front L quadrant, crossing at the same height from L - R on a perpendicular flight path. He assessed there was a 'high' Risk of collision and initiated a maximum pull to 'break' the collision. At the same time the Tutor was seen to bunt aggressively as it passed directly underneath his ac. The separation between the 2 ac was assessed as about 50ft vertically and nil horizontally.

The ac has a black colour scheme and the landing light and HISLs were on.

THE GROB TUTOR II PILOT (GROB) reports he was conducting a student instructional sortie and as the Captain of the ac he was occupying the LH seat. Returning to his base at Leeming from the NW he had requested a visual rejoin whereupon APPROACH (APP) requested that he maintain FL40 due to an IFR departure from RW34 that would not be above FL30. He maintained FL40, as requested, and became visual with the departing traffic [an HS125]. The controller then asked if he was visual with further traffic on recovery into the cct, to which he responded, 'negative'. Still maintaining FL40, he then contacted TWR and requested an overhead join - part of his instructional sortie profile - although he explained to his student that they would probably not be able to complete the overhead join due to other traffic. To his surprise, TWR cleared them to join from the overhead and asked him to report Deadside descending. He positioned his ac to cross over the threshold to RW34 at 1800ft

QFE and called "Deadside descending". When halfway along the Deadside in the descent to circuit height, TWR advised that there was a fast-jet joining the cct and instructed the other Tutor pilot in the cct [a solo student] to fly not above 500ft. As a second Hawk crew called to join, he was descending through approximately 1100ft QFE. TWR then requested that he join the LA hold (500ft on the live side). This is an abnormal procedure as ATC would normally usually ask LA to join the LA hold from the live side. The RT was busy at this stage, and he was unsure of how to achieve the transition from the Deadside through the RW34RHC centreline to the LA hold on the Liveside; he assumed that ATC wished him to be at 500ft crossing the upwind end of RW34RHC (instead of the normal 800ft for an overhead join) and then fly straight into the LA hold. Therefore, he continued his descent on the Deadside to achieve this. At the same time, the Hawk already established in the cct went around from Final, it's pilot declaring that he was remaining at 500ft Deadside (he assumed to provide vertical separation against the Hawk joining). Immediately, he warned his student that there was a possible conflict and to lookout to the R, the 'threat' being to starboard behind his student and canopy arch. Still in the descent aiming to cross the upwind end of RW34RHC at 500ft QFE, heading 090° at 100kt, he became aware of a Hawk in his peripheral vision at less than 200yd away; he instinctively bunted and pushed -2g to break the collision. The Hawk pilot appeared to pull at the same time and both ac separated as he passed 20-50ft vertically beneath the Hawk with a 'very high' Risk of collision. He did not declare an Airprox to ATC at the time as he did not wish to alarm his ab-initio student. However, once he had landed he contacted ATC and the Hawk pilot in order to discuss the occurrence.

THE LEEMING AERODROME CONTROLLER (ADC) reports that the weather conditions were Colour Code BLU and he conducted a routine hand-over with the outgoing ADC. Before 1330Z, the traffic intensity in the visual circuit to RW34RHC had been low. At about 1325Z, a Tutor flown by a solo student pilot was in the visual circuit [not the subject Grob Tutor], the student's instructor being present in the VCR. The solo Tutor student was given as much priority as possible with the intention of causing the least disruption to his sortie, within the extant rules. The crew of an HS125 then requested departure, but was subject to a release call from APP, so the crew was initially instructed to line-up and wait, whilst a release was requested from APP. During the same landline call with APP, the subject Grob and another Hawk [Hawk (C)] were pre-noted as recovering visually. The HS125 crew was passed a climb-out restriction of FL30 against the ac in the overhead not below FL40 [the subject Grob] and was subsequently cleared for take off, conducting a normal departure before being transferred to APP.

The solo Tutor student was instructed to operate not above 500ft QFE due to the inbound fast jet traffic. Then the crew of Hawk (A) executed a join through Initials, requesting a low-break. The low-break was denied due to the presence of the solo Tutor already in the visual circuit and the crew of Hawk (A) was passed the position of the cct traffic. The Hawk (A) crew reported on the break for a Touch & Go and was informed they had 1 ac ahead, the solo Tutor student who then reported Finals and was given a clearance for a Touch & Go. The subject Grob crew then called requesting an overhead join and were asked their height, which was 4000ft descending, so they were instructed to report deadside descending and passed the visual cct state. [UKAB Note (1): The TWR transcript reflects that at 1330:11, the ADC cleared the Grob crew to *"..join overhead runway 3-4 right-hand Q-F-E 1-0-1-1..",* before requesting their height.] Reporting Final, Hawk (A) was initially instructed to Continue, but a short time later was given a clearance for a low approach not below 200ft, but the pilot subsequently reported going around.

Another Hawk crew [Hawk (B)] reported ready for departure, but was instructed to line-up & wait behind the solo Tutor student conducting a Touch & Go. As the solo student climbed away, he was instructed to operate not above 500ft QFE on his next cct because of the jets, which he acknowledged. Hawk (A) crew reported Downwind for a Touch & Go and the subject Grob crew reported Deadside descending in quick succession. Just after the Grob crew was passed the position of all the visual circuit traffic [UKAB Note (2): At 1351:55 TWR advised the Grob Crew *"..one downwind, one upwind, one on for departure"*] a third Hawk crew [Hawk (C)] requested to join the cct. Following Hawk (B)'s clearance to take-off, the Grob crew was asked if they would accept entry into the LA Hold, which was agreed and to report established. During this time, a broadcast was made of the new QFE – 1012mb. The crew of Hawk (A) reported Finals and was instructed to Continue

against the departing Hawk (B). At this point, the third Hawk [Hawk (C)] reported at Initials requesting a Low-Break; this was also denied due to the Tutor traffic, the position of visual circuit traffic and that on the runway for departure being given. As Hawk (B) departed, the crew of Hawk (A) was issued a clearance for a Touch & Go but shortly afterwards reported going around [maintaining 500ft], followed by the solo student reporting downwind low-level for a Touch & Go. Hawk (B) was transferred to APP before the crew of Hawk (C) reported on the Break for a Touch & Go and was passed 1 ac ahead. The Grob crew reported entering the LA Hold and Hawk (C) subsequently reported going around. The crew of Hawk (A) reported downwind to land and subsequently did so following a normal clearance. At no stage did either Hawk (A) or the Grob crews report any incident or concerns on RT to TWR during the period.

UKAB Note (3): This Airprox occurred outwith recorded radar coverage.

SATCO LEEMING comments that in parallel with the Ops Wg review of the Leeming Flying Order Book (FOB), the current rules with respect to multi-type ops within the visual cct have been re-briefed to all controllers. Whilst the visual cct is operated on a 'see & avoid' basis, Unit controllers have been directed to review the levels of TI offered to crews operating in the visual cct.

OC OPS WG LEEMING reports that the Unit conducted a full investigation into this Airprox. The following contributory factors were identified:

The Grob pilot was flying an overhead join, a procedure rarely practised at Leeming, which, whilst acknowledged, was not detailed in the FOB. Lacking defined geographical references, it proved difficult for FJ aircrew unfamiliar with the procedure to anticipate the subject Grob's positioning.

Given the disparity in speed and height profiles, the FOB limits the number of ac in the visual circuit to 3 when there is mixed FJ/Piston traffic. On this occasion the ADC permitted a fourth ac [Hawk (C)] to join the visual circuit.

It is conceivable that both the pressure to complete the recovery profile and the imminent arrival of the fourth ac into the visual circuit distracted aircrew from the primary task of ensuring safe separation.

It was noted that the FOB currently requires fast-jet crews recovering to Leeming to call APP at a range of 20nm; the ADC's action range to address visual circuit traffic is 15 miles. There are circuit diagrams in the FOB, but no geographical depiction of the visual circuit and light aircraft hold.

Following the investigation of this Airprox the following actions have been implemented at Leeming:

Overhead Join. The overhead join procedure offers no material training benefit to UAS/AEF students. Given the identified shortfalls in the procedure, it has been suspended forthwith and the FOB amended accordingly.

Deconfliction. The SFSO has been tasked to brief every flying unit on the specific responsibilities for de-confliction within the visual circuit.

1. The ADC is responsible for providing information and instructions to achieve a safe, orderly and expeditious flow of traffic and assist pilots in preventing collision between aircraft flying within the visual circuit area.
2. Aircrew, particularly when joining and flying the visual circuit, are responsible for spatial de-confliction and must maintain full SA.

FOB. The FOB was amended to include:

An additional Annex detailing the geographic position of the visual circuit, the light aircraft hold and the local avoid areas.

Clarification of a maximum of two dissimilar types allowed in the visual circuit at any one time.

Instruction that FJ ac on recovery are to call APP by 15nm, consistent with the ADC's action range for the assessment of the visual circuit.

HQ AIR BM ATM SAFETY MANAGEMENT reports that Leeming undertook a wide-ranging investigation following this Airprox. As stated in OC Ops Wg's report, given the disparity in speed and height profile of the jet and piston ac in the visual cct at Leeming, the FOB limits the number of ac in the visual cct to 3 when mixed FJ/piston flying is taking place. On this occasion, the ADC permitted a 4th AC, Hawk (C), to join the visual cct.

OC Ops Wg states that although the overhead join procedure was rarely practised, it was acknowledged as a Leeming procedure yet did not appear in the FOB. This lack of information relating to overhead joins and specifically how to route from Deadside to Liveside, forced the Grob pilot to adopt a course of action that he considered best. This included a further descent to 500ft QFE, arguably to mirror the height of the solo Tutor student who had been restricted by TWR to 500ft because of the imminent arrival of the next recovering Hawk (C). However, the arrival of Hawk (C) caused the pilot of Hawk (A) to remain at 500ft QFE on the Deadside to provide vertical de-confliction, which, having executed a go-around from his approach, placed the Hawk in confliction with the subject Grob crossing at the upwind threshold.

The use of an overhead join can be viewed as a system induced violation, where the ADC was placed in a situation where the controller was expected to provide a service to ac joining through the overhead, yet the procedure itself had not been integrated into the wider visual cct operation. Furthermore, SATCO Leeming confirmed that the Controllers' Order Book contained no reference to overhead joins or how to manage an ac transitioning from Deadside to Liveside, nor were there any specific training objectives related to such.

The ADC correctly restricted the two Hawks from conducting a low-break due to the presence of the solo Tutor student in the low-level cct, but did not recognise the potential risk for a confliction between the subject Hawk and Grob once the former crew had stated that they would remain at 500ft QFE on the Deadside.

Best practice would suggest that as the Grob pilot had not reported established in the LA hold at the point that the crew of Hawk (A) had reported at 1332:49, *"..going around maintaining 5 hundred feet",* that TWR should have broadcast a warning about the presence of the subject Grob, whose pilot had earlier reported at 1331:52, *"..deadside descending."* The fact that TWR did not broadcast such a warning suggests that the ADC felt no need to do so, or that the controller had lost SA as to the position of the Grob and did not perceive the risk of a confliction. Comments from SATCO Leeming support this view insofar as from the ADC's operating position in the VCR the controller is unsighted on ac routeing W - E across the upwind end of RW34 as they pass through a 'blind spot' above the Tower. Given the lack of visual cues and the system induced lack of familiarity with the procedure, specifically the movement of the Grob from the Deadside to the Liveside, the ADC was unable to recognise the Risk of confliction between the subject ac and was ill-equipped to deal with the situation.

This occurrence is a classic example of a series of latent failures awaiting an active trigger – the acceptance by the ADC of the 4th ac into the cct – Hawk (C).

HQ AIR (OPS) comments that the non-standard actions of both incident pilots attempting to be helpful unfortunately contributed to this AIRPROX. Hawk (A) should have flown a standard go around and subsequent circuit pattern. Hawk (C) had the responsibility to integrate into the circuit and avoid established circuit traffic, this is much easier if established circuit traffic follows normal

procedures, Hawk (A)'s unpredictable action could have had adverse effects on Hawk (C)'s joining profile. The Tutor's chosen method of circuit join (not in the flying order book) and his subsequent decision to cross to the LA hold at 500 combined with Hawk (A)'s non-standard actions brought the 2 ac into confliction. Prohibition of overhead joins at Leeming will prevent a recurrence.

HQ AIR (TRG) comments that this incident was so serious the Unit conducted an investigation into this Airprox that revealed several areas where things could have been done better and subsequently has taken appropriate action to reduce the risk of this incident happening again. The ADC accepting the 4th ac into the circuit contributed to the Airprox but there is also a responsibility on the aircrew in the cct to maintain the cct pattern and separation with other ac in the cct, likewise joining ac are to integrate into the cct pattern safely.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac, transcripts of the relevant RT frequency, reports from the air traffic controllers involved and reports from the appropriate ATC and operating authorities.

The HQ 22Gp pilot Member explained that whilst the Unit might consider that the overhead join procedure offered no material training benefit to UAS/AEF students, that was not the Command's view. Whilst its use was not commonplace at operational fast-jet units, the overhead join is in common usage at civilian aerodromes and when flown correctly is another valuable and recognised cct joining method, enabling pilots to join high and sight all the other cct ac before descending to cct height on the deadside and entering the cct via the upwind threshold. Whilst military fast-jet pilots would have been taught an overhead join at some stage in their training, the HQ Air fast-jet pilot Member agreed that it would have been used little operationally and pilots might therefore not be particularly familiar with it, especially if no detail was available in the Unit FOB – see AP3456 extract within the Post Meeting Note below. Therefore, military pilot Members understood why the pilot of Hawk (A) might not have been intimately familiar with the Grob pilot's positioning to join from overhead and then transit through to the LA hold in accord with the ADC's instructions. There was, therefore, potential for confusion, but it seemed to the Board that the crew of Hawk (A) was more concerned about the fast-jet joining through Initials behind them – Hawk (C) – rather than the slower piston-engine Grob joining from overhead.

The fast-jet pilot Member explained that the Grob pilot was responsible for gaining visual contact on all notified cct traffic before he descended on the deadside or crossed at the upwind end, crossing the approach end well above any cct traffic. Therefore, the Grob pilot should have been visual with Hawk (A) before crossing the upwind end and should not have committed to crossing into the liveside before he was. In his view, the pilot of Hawk (A) could reasonably expect that joining pilots will not join the cct until visual with all of the cct traffic. A CAT pilot Member concurred that the Grob pilot joining the cct must give way to ac already established in the cct and it was emphasised that this was a visual cct, which demanded that all pilots look-out and sequence themselves in the pattern with due consideration for other traffic. The lesson to aircrew here is that you must give the circuit a wide berth until visual contact is obtained with all traffic established in the pattern.

This also applied to the pilot of the Hawk (C) joining through initials who was responsible for visually identifying all cct traffic before entering the pattern and maintaining his own separation accordingly. In the Board's view, the pilot of Hawk (A) should not have levelled his ac at 500ft because of Hawk (C) joining behind him, which unknown to the pilot of Hawk (A) at the time, placed his ac in conflict with the Grob, whose pilot had elected to descend to 500ft, unannounced, because he perceived that was what the ADC wanted him to do to join the LA hold on the liveside. Whilst accepting this was a busy traffic situation, because the ADC had elected to permit a 4th ac to join, if the Grob pilot was at all confused as to what was required of him he could have asked. However, the Grob pilot could not have anticipated that the Hawk pilot would also level his ac at 500ft QFE and it was providential that the Grob pilot heard the RT call and was alerted to look out for Hawk (A). This resulted in the conflict at the upwind end of the runway with the Grob about to cross on to the live side because both the

Grob pilot and the pilot of Hawk (A) were flying non-standard cct procedures. The laudably candid account from the pilot of Hawk (A) revealed that he was looking for Hawk (C) joining rather than the Grob ahead, which he only spotted 50m away when he transferred his scan forward, which the Board agreed was a late sighting on his part. Furthermore, the Grob pilot was not well placed to see Hawk (A) at this point – cross-cockpit behind his student and the canopy arch – he only became aware of a Hawk in his peripheral vision he reports less than 200yd away - and a late sighting on his part also. The Board concluded, therefore, that this Airprox had resulted from late sightings by the crews of both aircraft.

Turning to the inherent risk, it was fortunate that the Grob pilot elected to bunt to -2g to avoid the Hawk, whose pilot fortunately pulled when the Grob was seen close aboard at the same height. This instinctive avoiding action only achieved a reported separation of 50ft, which convinced several members that an actual Risk of collision had existed. However, the overwhelming view of the Members was that each crew had seen the other ac just in time to take action that whilst robust, was effective in forestalling a collision, but at these distances the Board agreed safety had indeed been compromised.

Post meeting Note: Extract from AP3456 - The Circuit – Overhead Join.

The airfield should be approached at a height of 1000ft above circuit height, and circuit speed should be achieved before reaching the airfield boundary. The pilot should cross onto the deadside of the airfield from a position overhead the runway threshold, and commence a descending curved let-down on the deadside of the airfield, aiming to re-cross the runway over the upwind end, at circuit height and circuit speed. During the curved descent, particular attention should be given to lookout.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late sightings by the crews of both aircraft.

Degree of Risk: B.