The RAF Safety Magazine

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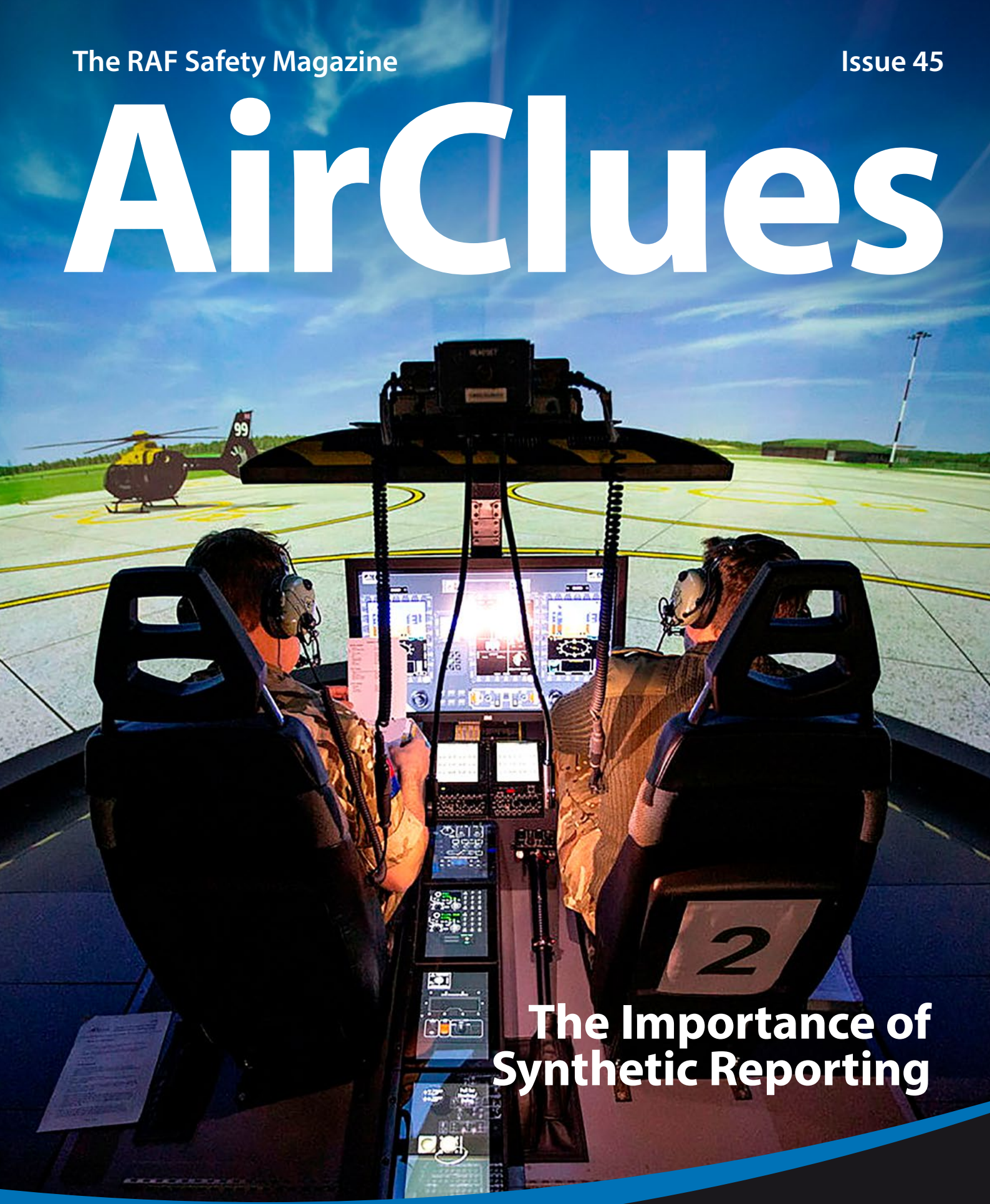
AirClues



The Importance of Synthetic Reporting

ROYAL AIR FORCE Safety Centre

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Foreword

By Gp Capt Andrew Keith, Inspector of Flight Safety (RAF)

Group Captain Andrew Keith

Although things never really slow down in Defence, with the summer leave period over and most people returned to work, it feels like the tempo is increasing again as we move into the Winter quarter.
Just remember to do the basics right - when we are busy and keen to get things done, we can sometimes miss the simple details that make all the difference to the safe and effective execution of our duties.

Once again, this edition covers a broad range of articles, both air and ground related, that will hopefully not only keep you informed of the latest activity in Air safety, but also provoke thought into areas you may not have considered or given much attention. There are some useful insights from deployed operations to leadership reflections – there may be an opportunity to learn from others rather than experience the same thing first hand!

I would like to focus on synthetic training – a topic of particular focus for Defence. In a rapidly changing defence environment where technical advances are moving at pace, we are seeing a shift in how we prepare and train for operations and this has seen an increase in the use of synthetics. This is driven by not only monetary savings but now, more often, the requirement to replicate high-end warfighting conditions not possible with the constraints of live flying. It also provides an environment where we can accurately replicate some of the challenging real-world conditions and emergencies that we may face and train these scenarios in a safe but representative way.

This shift to synthetic based training has generated a long-lasting debate on the appropriate live-synthetic flying blend and requires a rethink of some of our existing policies and international agreements (NATO / STANAGs etc). It also requires a shift in how we report simulated related incidents. The 'rules-of-the-game' with regards to the use of synthetics needs to be considered and clearly defined - this will ensure we can appropriately report our potential 'near misses' or 'mistakes' and capture valuable lessons from our synthetic training. If done effectively we can hopefully avoid repeating these mistakes in the live environment, making us more safe and more operationally effective.

> "We need your 'I learned about flying/ engineering / air traffic from that' articles. Please write to Wg Cdr Spry with your open and honest stories."

Safety Awards

On 10 January 2024, whilst undertaking an Aircraft Ground Event on a Poseidon aircraft, Mr Keith Treece noticed that the ALE7 pin and the nose wheel steering pin were fitted in the wrong locations. The pins are different, and the only way the ALE7 pin can be fitted in this manner is to fit it from the reverse direction. This, however, was very difficult to spot unless one is physically inside the nose wheel bay. Moreover, Mr Treece could not be expected to have noticed this as part of his duties, nor have the knowledge to recognise it as an issue. Mr Treece reinstalled the pins correctly and reported the issue to Poseidon line control. This resulted in a Safety Notice being issued across Poseidon Line Squadron to raise awareness of the potential for error.

Mr Keith Treece – RAF Lossiemouth – Good Show

On 23 January 2024, Air Specialist Class 1 (Technician) Millward was carrying out a Typhoon aircraft servicing when he crucially identified that the installed Litening Laser Designation Pod (LDP) was missing the required crutch pads. The LDP is mounted to the underside of the Typhoon in a very harsh aerodynamic environment, and, over time, this error could have contributed to a failure in the structure of the LDP with an associated risk to the aircraft fuselage. AS1(T) Millward liaised with the flight line supervisor and advised the Junior Engineering Officer on a time delay for the aircraft to be rectified to a safe configuration. Upon maintenance completion the pre-flight servicing was carried out and all four aircraft were made available for the planned sortie to continue in the correct configuration.

Air Specialist Class 1 (Technician) Millward – RAF Lossiemouth – Well Done

Flight Lieutenant Davies

Flying Officer Jackson

Air Specialist (Class 1) Robinson

RAF Brize Norton Air Traffic Control – Team Commendation

On 24 Dec 23, an Agusta 109 suffered an undercarriage failure which resulted in it conducting an emergency landing that was ultimately safe, albeit unconventional. RAF Brize Norton was the emergency diversion aerodrome for the aircraft and Flt Lt Davies was the ATCO i/c. Shortly afterwards the Agusta 109 reported on Flt Lt Davies' Approach frequency to report the nature of the emergency and that they required to transit directly to the airfield. The complexity of the task for Flt Lt Davies was then increased as an Aeromed flight leaving the upper airways also called on his frequency, obviously normally afforded a high level of priority in its own right. Whilst ensuring that the Tower controller, Fg Off Jackson, was ready to receive the Agusta 109 that was rapidly tracking towards the airfield, Flt Lt Davies managed to explain the nature of the situation to the Aeromed pilot and sought agreement that they would enter a temporary holding pattern whilst he dealt with the immediate emergency.

Additionally, Flt Lt Davies liaised with the DEOC to try and identify a solution of how to allow the Agusta 109 to land with an undercarriage failure, however the DEOC was unable to source or provide any support in terms of materials, such as tyres, or appropriate staff, power to assist. Thinking 'outside the box' and drawing upon his previous Fire experience, Flt Lt Davies called the Fire Crew to ask if they had anything that they could possibly use to allow the aircraft to land on, making the suggestion of rolled up hoses to create a solid base.

Liaison with the Fire Crews then proceeded through the MRE system with the Tower Assistant, AS1 Robinson, whose communication with both the Fire Crew and the Tower Controller was excellent throughout. Both Fg Off Jackson and AS1 Robinson reportedly showed excellent adaptability, to not only relay the appropriate messages to the Fire Crews and pilot, but also facilitate the response to the emergency state and to safely execute what was a non-standard solution, not least landing on fire hoses, but air taxying to a bay near the Fire Crews.

Sergeant Atkinson – RAF Leeming – Well Done

Sergeant Atkinson (Corporal Atkinson at the time of the incident) was training a candidate in the Visual Control Room (VCR) Specialist position during an extremely busy departure phase. With extensive aerodrome operating surface works ongoing, a stream of three visiting Tutors had been given clearance to taxy towards holding point GOLF 1 with the intention of crossing the active runway for further taxy towards the runway 34 threshold. A Hawk was lined up ready for departure with only the first Tutor receiving a positive clearance to cross the active runway. Once the Tutor had vacated, the Aerodrome Controller (ADC) cleared the Hawk for take-off. Positioned in a non-optimal vantage point in the VCR, Sgt Atkinson stood up to maintain his lookout when he noticed the second Tutor, without permission, cross the GOLF 1 hold bar and proceeded towards the runway. Simultaneously, the Hawk had released their brakes and had begun their take-off run. Sgt Atkinson immediately notified the Ground Controller who transmitted an abrupt message to hold the Tutor. The ADC, having been alerted to the danger, also cancelled the Hawk take-off clearance. With both aircraft now stationary on the runway, the situation had been made safe. The Tutors were then crossed, and the Hawk subsequently departed without further incident.

RAF Akrotiri – VAHS Team Commendation
Corporal Tomlinson, Air Specialist Class 1 (Technician) Bugg, Acting Corporal Perry (not pictured)

On 19 January 2024, at RAF Akrotiri, a handling team from Visiting Aircraft Handling Section was tasked to see off an RAF Envoy aircraft from the dispersal. The Envoy was tasked to carry a VVIP who had just been transported to the dispersal by Puma, which was rotors running close by, and to the rear of the stationary Envoy. As the Envoy was preparing to start engines, a Typhoon aircraft landed and dropped its brake parachute at the western end of the taxiway. The Envoy needed to make an on-time departure and would need to taxi very close to the discarded brake parachute. Recognising the safety implications, the team called ATC to report the hazardous situation. The Envoy was briefly held by VAHS until ATC confirmed that the Envoy crew had been instructed to depart the dispersal via a different exit.

Corporal Dodsworth – RAF Waddington – Well Done

On 6 March 2024, at RAF Waddington, during a routine inspection on an Airfield Snow Clearance Vehicle, Corporal Dodsworth discovered a loose bolt securing a ram on the centre brush. Upon this discovery, he proceeded to check the remaining bolts, which are used to secure the centre brush on both sides of the vehicle and found them all to be loose. He checked the other 2 Airfield Snow Clearance Vehicles within the RAF Waddington fleet and discovered them to also have loose bolts. Aware of the FOD risk these bolts could pose to aircraft when the vehicles are operated on airfield surfaces, Corporal Dodsworth immediately informed ASMT Control and Eng Ops of the discovery and quarantined the vehicles until a mitigation could be implemented.

Air Specialist (Class 1) Morgan – RAF Northolt – Commendation

Air Specialist (Class 1) Morgan of No 1 AIDU was responsible for the creation of TopSky ATC radar display mapping, as part of Programme Marshall. Creating any map is challenging but the RAF Northolt map was proving particularly difficult, due to the station's unique geographical location and requirements. When progress stalled, RAF Northolt SATCO & DSATCO were invited to visit the section to talk through their issues. During their visit AS1 Morgan demonstrated his expertise and in-depth knowledge of Programme Marshall. He articulated clearly from AS1 to SO2 what could and could not be done within the scope of the contract, thinking outside the box, offering alternative solutions, and ultimately playing a direct hand in the creation of an accurate radar picture for RAF Northolt.

Joint Movements Squadron C Shift – RAF Akrotiri – Team Commendation
Left-Right: Flight Sergeant Duffy, Corporal Dyson, Air Specialist (Class 1) Spanton, Air Specialist (Class 1) Burt

On 7 December 2023 a ministerial VVIP aircraft connection was being conducted between ECHO and CHARLIE dispersals at RAF Akrotiri. The night shift Deputy Duty Air Movements Officer noted that during that evening the area was particularly kinetic, with United States Air Force (USAF) service personnel conducting onloads / offloads and aircraft maintenance. Four aircraft were being worked on at the time, three USAF and one RAF. The eight vehicle VVIP convoy arrived on ECHO Dispersal where USAF SP were unloading an Apache Helicopter. The USAF personnel were incorrectly dressed as they had no high visibility reflective clothing or lights and the helicopter was being towed with no lights or any illumination, making it clearly difficult to see the vehicles and USAF personnel. The Movements team in the lead vehicle could have a had a potential near miss incident when the VVIPs were transiting between the aircraft to the RAF flight. To stop this from happening the decision was made to split down the team with two personnel acting as 'lookouts'. A flight safety or airfield incident could have injured USAF / VVIPs / RAF SPs, due to people not wearing reflective uniform.

Flight Lieutenant McKernan – RAFC Cranwell – Good Show

On 19 January 2024 Flight Lieutenant McKernan was part of a three-ship Prefect formation on his solo formation sortie towards the end of his Fast Jet lead-in course. After the usual departure and manoeuvring in close formation, the lead instructor informed the trainee wingmen that the tail-chase was next. On this occasion, the formation was positioned in 'VIC' with wingmen on either side of the lead aircraft and Flight Lieutenant McKernan on the left. However, before the formation was moved to the right-side echelon, the formation leader erroneously called "follow me for tail-chase" and turned sharply left towards McKernan creating an immediate risk of mid-air collision. At this point Flight Lieutenant McKernan immediately transmitted "Stop, Stop, Stop" on the radio, preventing the leader from completing his turn to the left, whilst simultaneously trying to create some vertical separation to avoid the leader. This quick thinking ensured that a mid-air collision was avoided, and the aircraft were recovered safely without any over stresses to the airframes or engines (the latter being a very real danger during aggressive handling of the Prefect).

Flying Officer Dahmen RAAF – RAF Cranwell – Good Show

On 8 April 2024, nearing the end of the Basic Flying Training Fast Jet Lead-In syllabus on the Grob 120TP Prefect, Flying Officer Dahmen (Royal Australian Air Force) was tasked with flying a solo composite sortie from/to RAF Cranwell. The sortie profile comprised of a medium to low level navigation on a bespoke route anticlockwise around RAF Coningsby, medium level general handling in the local operating area, and a visual recovery and circuits at RAF Cranwell. The sortie proceeded uneventfully for 45 minutes of the planned 60 minutes duration. Whilst flying a Slow Roll to complete his aerobatic sequence, the Master Caution illuminated. This was accompanied by a 'Check Oil' audio alert. Flying Officer Dahmen immediately recovered the aircraft to straight and level flight, manoeuvred initially to orientate towards RAF Cranwell, and actioned the Oil Chip Immediate Action Drill based on the caution caption illuminated. Without delay and aware of the potential gravity of the emergency, Flying Officer Dahmen identified that his aircraft was positioned closer (in terms of glide range) to RAF Coningsby than either RAF Cranwell or RAF Waddington and elected to divert to facilitate a 'Land As Soon As Possible' as directed in the Prefect Flight Reference Cards. Having declared a PAN radio call with Air Traffic Control, he flew a textbook recovery and precautionary forced landing to RAF Coningsby.

Air Specialist (Class 1) Newman – RAF Benson – Well Done

On 20 February 2024, whilst assisting with a rotors-running-refuel of a Chinook helicopter at RAF Benson, Air Specialist (Class 1) Newman noticed a fastening on the engine fairing that looked out of place. He immediately gained the attention of the crewman who was conducting the refuel and informed them of his concerns. The crewman initially struggled to spot the loose fairing latch as this is extremely difficult to see due to it being located on the inward facing side of the engine, situated against the fuselage. The engine noise and movement or the rotor blades during the refuelling procedure provided further distraction.

Air Specialist (Class 1) Forsyth – RAF Benson – Well Done

On 14 March 2024, at RAF Benson, Air Specialist (Class 1) Forsyth was conducting a routine maintenance task on a Chinook helicopter when he identified a fault with the forward transmission drip tray. He consulted the documentation stored on the Integrated Engineering Technical Manual laptop, which is used as a reference document when conducting engineering tasks on the aircraft. It was at that point that he noticed the manual on the laptop was out-of-date and displayed version 6A.80.0, instead of the updated version 6A.81.0 (which had been issued four months previously). It is likely that, without this quick reporting, aircraft maintenance would have been carried out in accordance with outdated technical information, potentially resulting in damage to an air system.

Corporal Law – RAF Benson – Commendation

On 20 May 2024, at Royal Air Force Benson, Corporal Law identified that a review of tool control process was required following an incident where cleaning cloths – known as 'Sky Wipes' – were found on a Chinook helicopter which had undergone important engineering work. The area of the aircraft that had been worked on should have been checked to ensure that no debris or tools had been left behind, as any item could cause significant damage to the aircraft – it was clear that the checks had not been completed correctly. This highlighted that the laid down tool control process was not being followed. Corporal Law quickly took it upon himself to implement a bespoke tally system to ensure that line management had quick access to a simple, but effective, visual aid which indicated how many cleaning cloths had been used for the task and how many had been returned on completion. This system helped eradicate issues where these cleaning cloths had been left alongside moving aircraft components. Additionally, Corporal Law completed a comprehensive review of maintenance line tools and arranged for a lockable tool cabinet to be installed to allow for improved tool control – including accounting for each cleaning cloth used. Striving to improve the systems in place, he then initiated a survey to gauge what improvements to tool control other squadron personnel would like to see and then began to initiate improvements.

Corporal Shone receives a Team Commendation on behalf of VASS – RAF Marham

On 27 July 2024, during a Friends & Families Day event at RAF Marham, Visiting Aircraft Support Section (VASS) was required to handle a large number of visiting aircraft in a very short time window. Air Specialist (Class 1) Davidson and supervisor Corporal Shone were positioned on Alpha Dispersal from where the live display aircraft would launch and recover. During the flying display, a Pitts Special aircraft had just started up and had been marshalled from its parking slot to hold at the throat of Alpha Dispersal. Three aircraft from the Global Stars display team, having completed their performance and landed, were received on to Alpha and took up the area previously occupied by the Pitts Special. Before they shut down, AS(1) Davison spotted a piece of FOD on the aircraft pan, close to one of the Global Stars aircraft, and immediately recovered the debris, then identifying it as a potential aircraft part and alerting Corporal Shone. Understanding the implications that this item could have come from any of the aircraft positioned close by, including the Pitts Special which was now taxiing towards the runway to take off and start its display, Corporal Shone contacted Air Traffic Control to insist the Pitts Special be returned to Alpha to be checked. When returned, it was quickly determined that the piece of FOD had originated from the Global Stars aircraft and so the Pitts Special was released for flight with no further delay.

Flight Lieutenant Lodder-Manning – 3FTS – Well Done

On 10 October 2022 at RAF Barkston Heath, Flight Lieutenant Lodder-Manning (Flying Officer Lodder-Manning at the time) was a Prefect aircraft trainee. Whilst the QFI reviewed the aircraft technical log prior to signing for acceptance of the aircraft, Flight Lieutenant Lodder-Manning noticed that the navigation / obstacle database update date was incorrectly recorded as a future date. The incorrect entry was identified on a previous carbon copy sheet which would not ordinarily be reviewed prior to flight. This level of scrutiny was well above that expected of an Elementary Flying Training trainee.

Flt Lt Lynch – RAF Marham – Green Endorsement

Flight Lieutenant Lynch was flying as the lead of a pair of Lightning F-35B aircraft at low-level in Wales when his aircraft suffered a major bird strike. A large bird of prey was ingested directly into the engine, having bounced off the inside of the intake before impacting the engine. Flight Lieutenant Lynch immediately flew his aircraft away from the ground and leaving the throttle in the position it was at during impact to avoid any further loads on the turbine. Immediately after impact, there was severe engine vibration and an abnormal engine sound.

Flight Lieutenant Lynch selected throttle idle at 21,000ft and focused on flying the profile through cloud. Throughout the approach, he accurately managed the energy state of his aircraft to maintain an option to convert to flameout parameters should the engine fail and positioned the aircraft to minimise the time required with power applied in the final stages in case of engine failure. Flight Lieutenant Lynch achieved visual contact with the runway approaching his nominated transition point, and then flew a modified transition manoeuvre to minimise power demands on the engine, modulating the airbrake throughout to manage his energy state and ensure he did not arrive at the runway with excess energy. Having flown a textbook approach, Flight Lieutenant Lynch applied power with less than 20 seconds before touchdown and was forced to accept the vibration and grumbling from the engine at this late stage of recovery.

Able Rate Simmons RN receives Team Commendation on behalf of 207 Sqn LTF Team - RAF Marham

On 19 Jun 24, at RAF Marham, 2 Lightning F-35B aircraft were flying as part of Operational Conversion Unit planned sorties which concluded with vertical landings on the Vertical Landing Pad. Upon successful landing, the aircraft taxied back to 207 Squadron Sun Shelters to be received by the Engineers. During rollover tyre checks, one of the Lightning Training Flight identified a cut on the nose wheel of one aircraft and a second team identified 2 cuts on the main wheel for the second aircraft. These were then later assessed to be out of limits on both aircraft and resulted in tyre changes to return them to a serviceable flying state. A tyre 'blow out' at high speed can result in loss of control or significant damage to the aircraft. The Lightning Training Flight was overseeing Dispatch and Receipt training for the returning aircraft. During the debrief they commented on the damage they observed to the tyres on each Air Vehicle.

Flight Lieutenant Dempsey – 6FTS – Well Done

On 14 April 2024, at RAF Woodvale, whilst waiting adjacent to the Tutor Aircraft Servicing Platform for their aircraft to be ready, a civilian-registered light aircraft taxied past Flight Lieutenant Dempsey on the way to the runway 26 hold. As the aircraft passed, he noticed that the pitot cover had not been removed from the pitot tube. The yellow 'dayglo' pitot cover, as fitted to the aircraft, did not stand out particularly well against the colour of the wing and fuselage. Additionally, the pitot cover was on the opposite side of the aircraft from that visual to the Air Traffic Control tower, affording ATC staffs no opportunity to observe it. Flight Lieutenant Dempsey informed his instructor who alerted ATC to the issue. A message was sent to the pilot who taxied back to the ASP where Flight Lieutenant Dempsey assisted them to remove the cover.

Sergeant Duncanson – RAF Lossiemouth – Well Done

On 5 July 2023, at RAF Lossiemouth, Sergeant Duncanson was assisting P-8 Poseidon engineers with routine engine preservation checks on an off-wing engine. One of the checks directly involved Sergeant Duncanson operating a Jet Air Start Trolley (JAST), which uses air to rotate the engine for use with maintenance activities. During this time, there were several issues, resulting in the connected hose twisting near the JAST, which in turn reduced the air flow to the engine undergoing routine engine preservation checks. On each occasion, Sergeant Duncanson did not hesitate to immediately shut down the JAST so that the hose could be corrected. At one point during the checks, the hose and the associated jubilee clip blew off the engine and struck an engineer in the face. Sergeant Duncanson, constantly alert, was extremely quick to react, pressing the emergency stop button immediately on hearing the noise from the hose disconnecting. Sergeant Duncanson had the foresight and lightning-quick reactions to act even before other engineering personnel assisting the task had had time to shout stop, crucially preventing further injury to the engineer who was struck, or damage to the associated equipment, or the aircraft engine itself.

Other Awards

Air Trooper Mercer – 905 EAW Commendation

During a station annual Major Incident Plan Exercise, Air Trooper Mercer was responsible for loading a group of medics and fire fighters to a Bristow S92A helicopter. After hand over of the IRT passengers to the crew, with rotors running and the aircraft doing its final checks before take-off, Air Trooper Mercer was walking away from the aircraft apron, when he noticed that the ramp and cargo door were still open. He got the attention of the aircraft commander and signalled that the aircraft was not in a safe configuration for flight. The crewman disembarked and closed the door and ramp before take-off.

CFIT – A Clear and Present Danger

By the RAF Safety Centre

It has been some time since the RAF experienced a Controlled Flight into Terrain (CFIT) accident, but the category remains high on most (if not all) risk registers for good reason. Like many other enduring air safety risks, we cannot afford to park them just because we think we have nailed it. CFIT occurs when an airworthy aircraft under the control of a pilot, or remote pilot, is flown into terrain (water or obstacles). Often the aircrew are not aware of the danger until it is too late. In the commercial world most CFIT accidents occur in the approach and landing phase of flight and are often associated with non-precision approaches. In the military world we have the added high-risk of flight at (very) low-level. Throw in bad weather, pilot mishandling, distraction, ALOC, altimeter setting and navigation errors, the concerns surrounding GPS jamming, and you can see why CFIT is a clear and present danger.

On 2 June 1994 there was a tragic loss of life when an RAF Chinook Helicopter crashed on the Mull of Kintyre killing all 29 on board. The subsequent inquiry was highly controversial but, nevertheless, whatever the facts about the contributory factors, the crew was clearly unaware of their actual proximity to the ground, exacerbated by the IMC conditions.

On 2 September 1995 a 120 Sqn Nimrod MR2 crashed into Lake Ontario, Canada during a flying display following a stall when turning onto the crowd line at low-level. It was determined that one of the display manoeuvre dumbbell turns was modified creating an unsafe technique; the aircraft stalled in a configuration that was irrecoverable. Seven crew were killed. Many will draw similarities to the 1994 crash of a USAFE B-52 at Fairchild Air Force Base USA.

On 15 June 1998 a 29 Sqn Tornado F3 crashed into the sea killing both crew. During a second practice intercept of a 2 v 1 sortie, the F3 commenced a descent from 14,000ft to low level to intercept a Hawk acting as a target at 2,000ft. To descend, the F3 established a 15° nose-down attitude, passing through layers of cloud between 10,000 to 7,000ft and again at 2,000ft to almost sea level. At 225ft the low altitude warning sounded and the pilot attempted recovery to no avail.

On 14 October 1999, a XV(R) Sqn Tornado GR1 encountered deteriorating weather during a Forward Air Control exercise over Spadeadam range. The pilot changed track to the East to avoid the bad weather. During a second attempt to reach Spadeadam, the pilot was again forced to pull up from low-level into cloud. This time, however, the pilot turned South and, whilst turning hard left to avoid Newcastle Airport controlled airspace, the aircraft overbanked, and the nose dropped resulting in a steep descent. The aircraft broke cloud too late to effect recovery and crashed into open farmland killing both crew.

On 22 October 1999, a 100 Sqn Hawk T1A crashed just outside the village of Shap in Cumbria. The Board of Inquiry found that there had been no control inputs during the final phase of the flight. It was also told that the pilot was fatigued and working 12-hour shifts to complete paperwork and training for the squadron. The Board later determined that the weather and mechanical failure were not to blame for the crash, and that it was most probably down to the crew being distracted by another aircraft.

On 9 April 2001, a 33 Sqn Puma crashed near to the town of Kačanik, Kosovo after hitting trees during a loss of visibility. The aircraft had just picked up a four-man patrol and on take-off had entered low cloud. The pilot descended to regain a visual of the area when the aircraft struck some trees and crashed. The pilot and navigator were killed, four of the other members of the flight were injured.

On 8 August 2007, a 33 Sqn Puma helicopter crashed into a field near Hudswell Grange, Catterick Training Area, whilst on a troop transfer flight. The aircraft had just picked up 8 troops from the Royal Regiment of Scotland and was performing a fly-over of other troops in the regiment and then went into a turn that neither pilot was qualified to attempt. The Puma crashed into a field when its tail hit the ground coming out of the manoeuvre causing the entire airframe to hit the ground. The aircraft tumbled and the cockpit canopy sheared off completely. The pilot, crewman and one of the troops were killed. The other eight occupants were injured.

On 2 July 2009, a 43 Sqn Tornado F3 aircraft crashed into a hillside at Glen Kinglas. A second aircraft in the sortie saw the fireball and was therefore alerted to manoeuvre out of a similar profile. The investigation concluded that the Tornado suffered CFIT due to insufficient turning room in the valley to execute the desired pass the aircraft was taking.

On 20 August 2011 a Red Arrows Hawk T1 was flying as part of a display at Bournemouth Air Festival. The team were recovering to Bournemouth Airport when Red 4 crashed into a field near to the River Stour, killing its pilot. An investigation determined that the pilot had experienced ALOC (Almost Loss of Consciousness) due to the g-force that the aircraft was pulling in the circuit, and he was unable to recover from a gradual descent into fields, despite warnings radioed by his teammates. It was determined to be ALOC rather than GLOC due to some evidence of control movement just prior to impact.

If we go back earlier in years, before these (inexhaustive) incidents, the stats start to increase dramatically. Yes, we were flying more then and, yes, we now have progressive mitigation protocols and more modern technology to avoid the hazards. But, as stated in the opening narrative, we cannot afford to take our eye off the ball. CFIT is a risk that will endure until such time as we have a complete array of unmanned aircraft; having said that, the risk of collateral damage and loss of life to the general public will never go away.

Weather has to be at the top of the list as a contributor to CFIT. Pilots rely heavily on visual references to navigate and maintain situational awareness. When visibility is impaired by fog, rain, snow, or mist, the ability to judge altitude and distance from terrain becomes compromised. Low clouds can further obscure critical visual cues, hiding high terrain and other obstacles from view. The risk is heightened near airports surrounded by rising terrain, where pilots need to be especially vigilant during approach and departure phases.

Turbulence can disorient pilots and destabilize the aircraft, making it challenging to maintain control. Thunderstorms, with their severe and unpredictable weather patterns, can lead to sudden changes in altitude and attitude. Similarly, strong winds and gusts can push an aircraft off its intended course, while wind shear and microbursts can cause abrupt and dramatic shifts in wind speed and direction, potentially leading to loss of control.

Ice accumulation on an aircraft affects its performance and handling characteristics, particularly during critical phases of flight like approach and landing. The added weight and altered aerodynamics make it harder to control the aircraft, increasing the risk of inadvertent collisions with terrain.

Ambient light conditions significantly affect a pilot's ability to see and avoid terrain and obstacles. Flying at night or in low-light conditions reduces visual acuity, making it harder to discern the landscape below. Conversely, bright city lights can create illusions and be significantly disorientating.

Temperature inversions, where a layer of warm air traps cooler air below, can create unusual pressure patterns affecting altitude readings. Moreover, extreme temperatures which are can influence engine performance and the accuracy of aircraft instrumentation.

Human Factors

Loss of Situational Awareness. One of the most critical human factors in CFIT is the loss of situational awareness. Distraction, high workload, or misinterpretation of instruments is particularly hazardous. Pilots are required to make numerous decisions during a flight, particularly during approach and landing phases. Managing navigation, communicating with ATC, monitoring aircraft systems, and handling adverse weather conditions can collectively lead to cognitive overload. Factors like stress, fatigue, and pressure to meet schedules can and will impair your decision-making abilities. Clear SOPs, which must be continually reviewed, will help crew manage workload and make informed decisions. Not least, target fixation is a deadly hazard to the loss of Situational Awareness.

Communication Breakdown: Effective communication between the crew, ATC and other stakeholders is crucial for safe flight operations. Misunderstandings or miscommunications can lead to incorrect altitudes, headings, or approaches being flown. Controllers should insist on correct and clear readbacks.

High Workload and Stress: During critical phases of flight, such as approach and landing, pilots often experience high workloads. Managing navigation, communicating with ATC, monitoring aircraft systems, and handling adverse weather conditions simultaneously can lead to cognitive overload. The debrief, post-flight or post-sim, is a good place to articulate periods of cognitive overload to highlight common ground and aid subsequent analysis.

Crew Fatigue: Fatigue significantly affects a pilot's cognitive functions, including attention, reaction times, and decision-making abilities. Long duty hours, insufficient rest, and crossing multiple time zones contribute to fatigue, making it more challenging for pilots to maintain situational awareness and respond appropriately to potential hazards. A strongly endorsed fatigue-management programme and ensuring adequate rest periods can help reduce pilot fatigue and its associated risks.

Inadequate Training and Experience: Pilots with insufficient training or experience may not be fully prepared to handle complex or unexpected situations. Training gaps can lead to improper handling of the aircraft in challenging conditions. Experienced pilots are generally better equipped to recognize and respond to CFIT risks. Regular and comprehensive training, including simulator sessions that replicate challenging scenarios, can help pilots improve their situational awareness, decision-making, and manual flying skills. Significantly, reporting Situational Awareness and other CFIT close calls, or accidents experienced in the synthetic environment provides real value to the wider aircrew fraternity.

Overreliance on Automation: Modern aircraft are equipped with advanced automation systems designed to assist pilots. However, overreliance on these systems can lead to complacency and skill fade, particularly in the VFR environment.

Cognitive Biases: Human cognitive biases, such as confirmation bias and overconfidence, can influence pilot judgment and actions. For instance, a pilot might ignore conflicting information that suggests they are off course, sticking to an initial incorrect assessment. Overconfidence in their abilities or in the aircraft's systems can lead to risky decisions.

Organizational Factors: Organization cultures can impact pilot behaviour. A culture that prioritizes strict adherence to schedules over safety may pressure pilots to continue an unsafe approach. Additionally, a strong cockpit cross-gradient may inhibit junior crew members from questioning or challenging decisions made by senior pilots, even if they notice something wrong. Effective CRM training emphasizes teamwork, communication, and the use of all available resources, including the skills and knowledge of every crew member.

Synthetic Training Opportunity

The RAF is getting better at reporting incidents from the synthetic world that will translate to actual flight and that has lessons for others. You are strongly encouraged to continually improve this trend, and not just for CFIT incidents. See the article on page 32.

'DASOR - Typhoon CFIT During Emergency Simulator Trg:
"During a routine emergency simulator to regain currency, the instructor initiated a Double Engine Flame Out. The aircraft was at 35,000 ft with an under-cast cloud layer from 5,000ft to 700ft. The Student Pilot diagnosed the emergency correctly, noting that both engines were winding down with associated loss of primary cockpit displays. The boldface actions were correctly started, setting 30 degrees nose down to attain 450KDAS whilst minimizing flying control inputs. The flying attitude was set using the standby instrument. When attempting to check the aircraft speed using the GUH instruments, the pilot noticed that the GUH ASI was not functioning. This distraction resulted in no further boldface being conducted, and the aircraft attitude maintained at 30 degrees nose down. The simulator was put into flight freeze as the aircraft exited cloud at 700ft with neither engine re-lit. This incident serves to highlight numerous fundamental lessons. Firstly, the dangers of distraction, which in this instance, accounted for both the pilot failing to complete the boldface actions, or make a timely ejection decision. The second lesson, specific to this emergency is prioritisation, and the necessity to complete the boldface actions regardless of whether 450 KDAS is achieved or not. By failing to complete the boldface, the engines were never given a chance to re-light. The final lesson is to treat synthetic training as you would the live environment. Synthetic training loses its value if pilots change their habit patterns dependant on whether they are in the actual aircraft or simulator."

DASOR - Lightning CFIT Synthetic Event:
"I was #2 in an OCU BFM synthetic training sortie. During BFM I committed aggressively nose low with far too high an airspeed to successfully achieve the manoeuvre above the hard deck. This led to a significant nose low hard deck bust and the Automatic Ground Collision Avoidance System activating to prevent CFIT. Full Motion Simulator visibility, an overcast cloud layer at 6,000ft and the poor FMS Helmet Mounted Display symbology and lack of 'seat of the pants' feel were factors in the disorientation, but ultimately the unsafe occurrence was a result of target fixation and committing nose low with a disregard for energy package. Of note, there was a recent similar disorientation event during synthetic BFM with different aircrew."

Report today for a Safer Tomorrow

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Safety II, Exposing the 95%

Are Safety Investigations Over-rated?

By Sqn Ldr Ian James, RAF Safety Centre

In the 'old days' some drivers used to carry toolboxes in cars in expectation of a break down. But, over time, cars became much more reliable. Designers focused on bits of cars that broke, looking at cause and effect, and making improvements to designs of each component. The concept of continually finding and 'fixing' the unreliable bits of a system is a basic principle of engineering. By the 1970's, something similar became a principle for safety in the workplace; it's why we promote a reporting safety culture so we can identify moments when our systems don't work as expected and then try to fix them.
In today's terminology, we call this Safety I (Safety One). Despite being recognised as a key safety principle in ~ 1970s, it took until 2010 and ASIMS roll-out before the MOD really indoctrinated in-depth aviation safety reporting and investigation of system issues. That's a 40-year timeline to get from a theory being documented all the way through to day-to-day engrained ways of working.

But there are three big issues with this principle.

1. Being reliable isn't the same as performing effectively and meeting a need. My first car had a very reliable cassette player, but todays Bluetooth and Android Auto enabled entertainment systems are much more capable, intuitive and better sounding and perform much better at a task.

2. As we get fewer 'incidents' we also get fewer opportunities to learn from system failure (Safety I) investigations. We stop seeing the warning signs of potential future failure causes.

3. Most engineered components have just one job for their life, working within fixed criteria, and can be designed to flawlessly perform. But workplaces are often hugely complex, involve unavoidable variability in the tasks required, and utilise humans whose ability to be agile also bring unavoidable variability in their own performance. It is impossible to link simple cause and effect on many occasions because people can do the same things every day but get different results. So, there are limits as to how far you can apply engineering principles for reliability before they lose effect, and potentially start negatively impacting performance. By way of example, if you introduce additional supervisor checks to a specific task to prevent a simple mistake re-occurring again, you slow down the time taken to complete the task and also reduce the capacity for the supervisor to look out for other more serious workplace issues that might now go un-noticed.

Whether it be logistic moves of goods, aircraft maintenance tasks or co-ordination of flying activity, even though our workplace appears to stay consistent we always find ourselves having different levels of success and encountering different challenges on each occasion. Most of the time, our performance is at a 'satisfactory' level and normal everyday performance challenges go largely ignored as the success level varies but is acceptable. Occasionally it's a '#fail' (safety investigation or one-way chat) and occasionally it is so good it deserves a pat on the back and maybe even a commendation. If we drew a graph to illustrate this point it might be like the one in Figure 1.

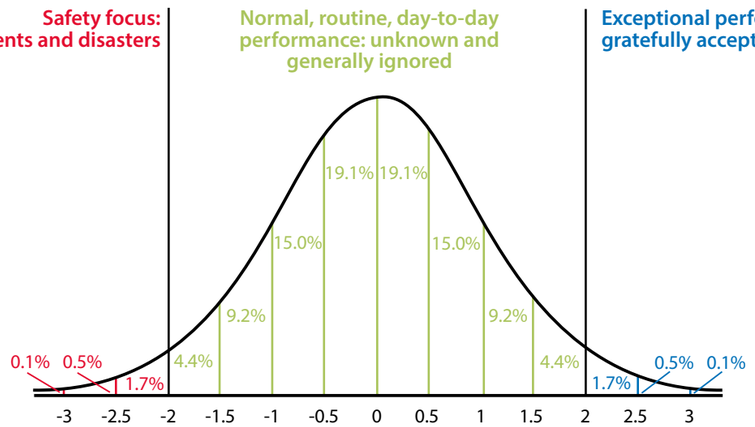

Figure 1: The concept of repetitive tasks having variable successes despite inputs appearing the same. Credit: 'Eurocontrol From Safety I to Safety II : A white paper', 2013, Hollnagal, E & Leonhardt, J.

Around 20 years ago, safety engineers (yes, they actually do exist) started realising that to improve workplace safety in complex environments, people needed to look at not just the cause and effect of what went occasionally wrong, but rather they needed to understand why things went right approximately 95% of the time and went amazingly about 2.5% of the time. The principle was really simple: if we use some of this untapped knowledge to identify the 'stuff' we do that gets the acceptable or good results, and then we do more of that 'stuff', we will increase workplace performance and inevitably have less safety events. This concept of 'learning from everyday performance' was called Safety II ('Safety Two') and means understanding what was good, as well as what was bad.

Is Safety II also going to again take 40 years to get normalised into the RAF mindset? Here's the good news: the military does it well already in some areas. In 1993, the US Army published doctrine on how to learn from routine and unusual events, labelling the process an 'After-Action Review', and which is still quoted today by Human Factor professionals as good practice. In our own phase 1 training, it's normalised to hold self-reflection debriefs after each activity. And as an engineer, it pains me to say that our aircrew have nailed this already and arguably were decades ahead of the safety engineers…. the post-flight debrief covers the good, bad, and the average. Aircrew reflect on every flight and share with peers their experiences to enable better preparation for similar circumstances on future flights and perform to a level that is either as good as before or better. Similarly, Flight Data Monitoring looks at how we use aircraft routinely, identifying where variations occur and probing the reasons why.
Away from military aviation, high performance sports teams will be familiar with marginal gains, where good performance is looked at in detail to improve it further. But the reality is that some 20-ish years after Safety II as a concept was born, the RAF have not widely embraced this key opportunity for improving safety and performance. This isn't a surprise – it's hard to dedicate time to debrief when things seem to have gone okay and other work is pressing. But if we want 'as many things to go right as possible' we do need to intelligently continue learning from adverse events (which is time consuming and potentially emotional) whist also embracing learning from everyday performance (quick and easy).

But why focus on the 'average' 98% of good stuff? Well, if we choose to only learn from rare events, then learning will only happen rarely. Individuals routinely adjust their decisions to match the current demands, resources and constraints or when they encounter a surprise (google Resilience Engineering for more info). But reported safety events are the exception and thus by definition do not represent everyday operations. If we also understand how we and our peers successfully dealt with unanticipated events, we are more likely to build resilience capability for the future. And the uncomfortable truth is that in meeting Defence's need for agility and flexibility to undertake broad and sometimes rapidly changing unexpected tasks, it would be impossible to provide a complete description of every work activity or to specify what an operator should do even for all commonly occurring situations. Since performance cannot be completely prescribed, some degree of variability, flexibility, or adaptivity is required for the system to work. That means our workplace systems will not always be used in the way that people assumed; 'Work-As-Done' within a highly complex environment with constant shifting priorities and limited resources is often significantly different from 'Work-As-Imagined' where processes are often designed in isolation.

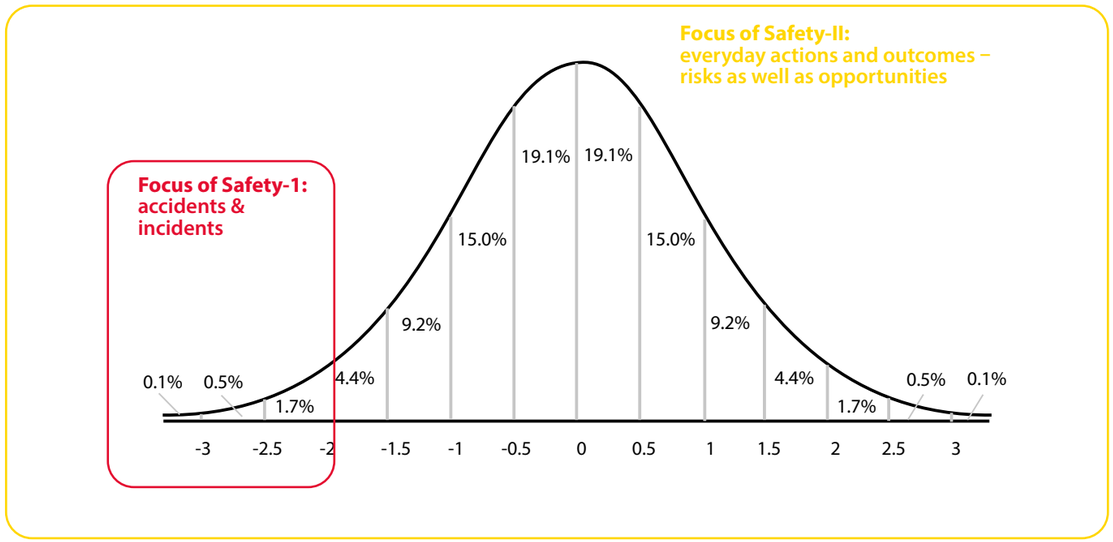

Fig 2: Safety II thinking says we should continue to learn from adverse events, but we should also learn from everyday performance. Credit: Eurocontrol.

If Defence work was truly repetitive and predictable, we wouldn't need months/years of phase 2 training. Thankfully, our people are agile, adaptable and they are the ones interfacing between the multiple complex and fragile systems to make it (normally) all come together nicely (whilst staying within published policies of course). The more we can share that knowledge and experience, the more we can improve typical workplace performance.

So enough of the safety history babble, lets skip to the good stuff…… If you work in a complicated or complex system (systems are categorised in modern Human Factors terms as either simple, complicated or complex) and you want to improve workplace performance by learning from normal work via an After-Action-Review type conversation, here's some principles to follow:

a. **Normalise** learning from everyday performance by debriefing regularly, either as part of your routine battle rhythm or after any event when you have a few minutes spare. It can be as short as a 5 minute chat, - just do it!

b. **Define** what activity you are reviewing – what did you expect to happen and what actually happened? This is about identifying unexpected outcomes both positive and negative, it's irrelevant as to who actually did certain actions.

c. **Identify** the differences between the intended and actual outcomes, the reasons why and what can be learned – should the outcomes be avoided, or aimed for, in the future? Be politely confident to speak inconvenient opinions, hold hard conversations and give painful reflections. The environment and climate must be one in which the everyone honestly discusses what actually transpired in sufficient detail and clarity that not only will everyone understand what did and did not occur and why, but most importantly will have a strong desire to seek the opportunity to practice the task again.

d. **Consider** if how you did the job (work-as-done) matches how those outside your group think the job is done. If it doesn't match, identify where you need to request a procedure change.

e. **Agree** what you will do differently next time. Make it happen!

For more reading about safety II, I suggest the following links….

Learning from normal work – How to proactively reduce risk when nothing goes wrong by Marcin Nazaruk, Professional Safety Journal, November 2023.
https://www.assp.org/docs/default-source/psj-articles/f1nazaruk_1123.pdf?sfvrsn=7ba96a46_0

Eurocontrol – From Safety I to Safety II : A white paper. 2013. https://skybrary.aero/sites/default/files/bookshelf/2437.pdf

Eurocontrol Systems Thinking for Safety: Ten Principles: Moving towards Safety-II
A White Paper . 2014 https://skybrary.aero/sites/default/files/bookshelf/2882.pdf

The Flight Safety Foundation : Learning from all Operations.
Learning-from-All-Operations-FINAL.pdf (flightsafety.org)

Other References:
Dept of the Army, TC 25-20, A leaders Guide to After Action Reviews, published 30 Sep 1993.
https://www.hsdl.org/c/view?docid=775082

Hollnagel, E, (2015) From Safety-I to Safety-II: A White Paper.

Leveson, N. G. (2004). A new accident model for engineering safer systems. Safety Science, 42(4), 237-270.

Sqn Ldr Ian James is the RAF Safety Centre's Human Factors Strategy lead, tasked to modernise Human Factors training and doctrine, and the former head of the RAF Safety Investigation Team.

I learned About Leadership From That...

By Major Jill Sicard, RCAF (Retd)

Image Credit: Master Corporal David Singleton-Browne RCAF

Back in 2011, during my first-ever deployment as a brand-new co-pilot on the CH124 Sea King, I found myself thrust into a challenging environment. Fresh off my type course, I found myself rushed onboard a ship, tasked with mastering the art of landing a giant helicopter on a tiny 3-D moving pad, with a hangar door a mere ten feet from my rotor blades! Despite the steep learning curve of being a new co-pilot, compounded by the operational challenges of ship life, I relished every moment. My crew was amazing, and I became instant friends with my bunk mate. Everything was dandy. I had a mentor who had several hundred hours more than me on the aircraft, and I trusted his competency whole-heartedly, as any "newbie" would. As time went on in the deployment, our routine became just that—a routine; every day we knew what to expect, and as I was taught, I familiarized myself with those missions among the many other tasks we had to do while on the ship.

One evening, my mentor and Crew Commander (CC) told our crew that we would be landing the aircraft ashore to practise some qualifications that were about to expire for both pilots and other crew members. I had never landed in a foreign country, let alone a different airport than my home base and the ship, so this was all very new to me. However, I studied the flips and the map, and had both at the ready prior to departure. *This was my first indication of what kind of leader I wanted to be when I had enough hours under my belt. Although my crew was great, I felt very much alone in my preparations. In hindsight, I should have asked my mentor to go over everything with me to ensure we were on the same page, but I didn't want to be a burden either. Now with more experience under my belt, I feel that a mentor should spend the time teaching the junior pilot and making sure that both are comfortable with the situation, especially since neither of us had landed at this location before—and more importantly, it was in a foreign language as well, so that didn't help!*

So off we went, departing the ship like everything was normal. The airfield was not a long transit, and it was VFR which made things a lot easier—or so I thought. As we approached land, it was a bit hazy, and the CC says, "do you have a visual on the airfield?" and I said, "no visual—I see the area and lights but not the actual landing strip." Then I say, "If you want to take control, I can just look at the flips so I can orientate myself." Both my Air Combat Systems Officer (ACSO) and I noticed that morning that our CC was a bit off; he didn't explain anything, and to this day we do not know if something was bothering him, but he had a very short fuse and got quite upset that I did not, for some reason, memorize my flips or "prepare properly." I advised him that we were taught not to memorize because they are supposed to be available to reference and if we make a mistake while memorizing, then that can lead to accidents with altitudes, etc. *Indication number 2 of leadership style that I learned—if something is wrong, be open with your team in a general sense, you don't have to give details but if everyone knows what head space you are in then that can help when a problem arises; your team is your support system. I always tell my husband and children when I am having a tough day, it gives them a heads up and it allows me to check in with myself before I lose my temper.*

This is not the first time he had lost patience with the crew members and not the first time it created a hostile environment that was not conducive to learning or working together for that matter. Making the crew feel as though they were walking on eggshells was not a good way to conduct a flight. I proceeded along "in control" of the helo after some yelling about the airfield situation and then the CC stated he would talk to ATC while I circled waiting for a clearance for landing. As I am flying, monitoring both outside, as we were VFR, and inside at the dials (and the CC is having a very difficult time trying to communicate to ATC his intentions due to language barriers) I noticed that the Primary hydraulic system was fluctuating quite dramatically. I immediately mentioned this to the CC; however, every time he seemed to look at the gauge, the fluctuation would disappear. He told me impatiently to just, "monitor it." At this point I got the feeling he was stressed; the cockpit became silent because everyone was afraid to speak up in fear they would be yelled at, but I had the duty of monitoring the gauge and flying and again, the gauge starting fluctuating. This time down to zero then back up to normal, so again, I mention it to the CC; he was still busy trying to talk to ATC, but acknowledged my concern, before he could say anything I then point out that we had completely lost primary hydraulics—as the gauge dropped down to zero and the warning light went on and stayed on.

Aviate - Navigate - Communicate

At this point, he took control without verbalizing and continued to proceed with the in-flight emergency—all the while not verbally communicating anything. I was so angry that I too verbally shut down but pulled out my checklist and followed it to make sure we were completing the checklist items in order. The checklist ended with a land as soon as possible warning. As I ran through the options quickly in my mind, we were only 2 miles out from a perfectly serviceable landing strip, and a taxiway and other usable surfaces that we were in line for anyway, so I thought he would just ask to expedite as we had an in-flight emergency but to my surprise, he spoke with ATC and accepted another 5-minute wait for other aircraft to land. So, he gave me back control and we sat there circling for five minutes. I brought up the land as soon as possible instruction for clarification and his response was "just fly the (expletive) aircraft" and I responded in anger, "I am!" Needless to say, it was a silent five minutes, followed by a normal landing without further incident. Oddly enough, as soon as we touched down, he yelled out "Emergency shutdown evacuate the aircraft" and he seemed in panic mode. Now we were all very confused and, when he saw the crew in the back were not moving fast enough, he yelled at them to "get out of the (expletive) helo". *Indication number 3 on leadership style; communication and patience are key. First, I think everyone can say communication is the most important thing you can do when working with a crew (besides flying the aircraft of course); if your team is not aware of the situation, you are no longer on the same team. Make sure everyone understands the scenario and what to expect. Patience is a virtue; in this case, it is so important as a leader to stay cool under pressure; you need your team to have confidence in your decisions and your capability and they do that when you are calm, and you communicate effectively.*

Once we were outside the helo, we confirmed that it did, in fact, lose all primary hydraulics because it was splattered all over the exterior. Although the crew discussed this event afterwards, there was a lot of blame passed around. *Indication number 4 of a good leader, never pass blame; if your team fails, it's because you failed as a leader. Something was missing from the mission; was it your communication? Was it your direction? No matter what caused the failure, it leads back to the person in charge. A good leader takes the blame for the failures and celebrates the wins as a team.*

On a Flight Safety note—I also learned over time that I believe a great addition to both pilot and ACSO training would be a short class on how and when to file Flight Safety Reports. Both the ACSO and I thought this situation was quite unsafe and obviously something happened with the aircraft for it to lose all the hydraulics, so we recommended we file a flight safety… Not really knowing the procedure as a junior pilot right out of training—we left it to the CC to submit it, which was never done. To this day, I regret not pushing

Image Credit: Corporal Jennifer Kusche, RCAF

that up to someone else, perhaps someone at the squadron would have followed through.

We were very lucky we landed safely, and after a "cool down period" we talked about the incident again, to try and piece together where all the breakdown happened. The long and short of it is the basic three principles; **Aviate**—first, fly the aircraft safely, since we were so close to the airfield we should have just landed right away, apparently the CC was worried about not being able to re-embark the helicopter on the ship in time for our departure, and was therefore considering the ship (which was not a safe landing area for such an emergency), a nearby beach location was also mentioned, and of course the airstrip, as possible landing sites. Next, **navigate**; clearly, the airstrip was the safest and fastest way to land, and we were already in contact with ATC, we should have turned towards the airfield. Lastly, **communicate**, and although it is last on the list it is still very important because this is where things became much worse. The communication between us and ATC was stressful; however, declaring an emergency to land is universal and so that should have been mentioned. Communication between the pilots should have been better—leave the judgment and emotions on the ground and work as a team! Forget ATC for a minute and deal with the emergency as a crew. This includes informing the people in the back; they too can help with checklist items, or comms with ATC and take some of the burden, as well as being all on the same page so everyone knows what to expect and can react appropriately.

You might have a small emergency that turns into something much bigger if you don't work together and focus on the task at hand. Seeing the "big picture" of landing safely was most important here and I feel that it got lost in all of the other small things—never put your crew in jeopardy because you can't see the big picture. My big lesson learned about leadership happened early on in my career, and I try to carry it with me in every situation.

Originally published in 'Flight Comment' Magazine, Issue 2, 2024. Images and text reproduced by kind permission, Royal Canadian Air Force.

Insights From the UK Flight Safety Committee

How is Artificial Intelligence Being Used to Improve Safety and Efficiency in Airport Ground Operations?

By Rob Holliday, CEO UKFSC

It seems like artificial intelligence is a relatively new term, but it is already being used at airports in a variety of ways and the future uses are only limited by our imagination.

Some of the areas include aircraft taxiing, ground handling, gate monitoring, security and equipment maintenance. Manual processes and human expertise are increasingly stretched in managing complex airside operations. AI offers solutions in many areas of ground operations. Here we look at examples where AI has been effectively implemented as well as research into new possibilities.

Autonomous Taxiing
Taxiing aircraft burn fuel, is time consuming and carries the risk of ground collision. Ground collisions are consistently in the top 3 of most frequent accidents in the Flight Safety Foundations, Air Safety Network Statistics. (asn.flightsafety.org)

Taxiing efficiency has been discussed using bots or onboard electric motors. Imagine if this technology was deployed with AI algorithms using sensor data to taxi to and from runways without human intervention. The potential is there to reduce fuel consumption, minimizes delays, and improves safety by optimizing routes and avoiding collisions. SESAR (Single European Sky ATM Research) program is carrying out research into these ideas. The program has shown that AI can reduce taxiing times by up to 20%, with associated cost saving and environmental benefit.

Optimising Taxiing
AI can predict the most efficient taxi routings from data. Machine learning algorithms analyse traffic, weather, and gates to determine the best taxi routes. Optimising aircraft taxiing routes, reduces congestion and decreases delays. Heathrow has trialled using AI analysis of taxiing data to reduce overall taxi time using.

Avoiding Ground Collisions
As the dramatic video circulating this week of an A350 wing tip striking the tail off a CRJ (Atlanta Airport 10/09/20204) ground collisions are a serious safety issue.

Dubai has taken steps to eliminate collisions by implementing an AI collision avoidance system. The system monitors the position of aircraft, vehicles, and personnel and provides alerts of potential collisions. Data from sensors, cameras, and radar feeds the system that predicts potential conflicts.

Predictive Maintenance
Ground handling equipment is in constant use and requires frequent maintenance. AI can be used to interpret sensor data to identify patterns that indicate when maintenance interventions are appropriate. Munich Airport has adopted AI predictive maintenance on its ground handling equipment, resulting in a 15% reduction in downtime. An IATA study concluded that predictive maintenance reduces equipment downtime by up to 50% and cut maintenance costs by 30% (IATA, 2022). It can also program maintenance at off peak times.

Automated Baggage Handling
Changi in Singapore, use AI and machine learning to analyse baggage tracking data from sensors and cameras to improve the sorting and routing of luggage, reducing errors and speeding processing. Back in 2021 John Holland-Kaye, CEO of Heathrow Airport, said "AI helps us track every piece of luggage in real time, ensuring it reaches its destination on time."

Security Surveillance and Anomaly Detection
AI algorithms can analyse video from surveillance cameras to detect anomalies such as unusual behaviour or unauthorized access. Thia allows security personnel to respond to potential threats. Such AI-driven surveillance has been introduced Los Angeles International Airport, leading to a reduction in security breaches.

Monitoring Compliance with Safety Procedures
AI is also used to monitor aircraft parking gates for compliance with safety procedures. CCTV cameras, integrated with AI, can automatically identify and flag non-compliances, such as missing wing walkers or ground staff not wearing high-visibility jackets. CCTV video feeds connected to AI detects reports violations and can provide alerts.

Hong Kong International looking into AI-powered surveillance for safety improvements at parking gates. This technology not only helps maintain high safety standards but also reduces the risk of accidents and operational disruptions.

A study in the Journal of Air Transport Management, claimed that AI-based safety monitoring would reduce ramp accidents by 40%, that would save the industry $1 billion annually (JATM, 2022).

Ground Equipment Monitoring and Collision Risk Assessment
AI can track the positioning of ground equipment around parked aircraft and determine when it is too close to an aircraft or is not parked in designated areas or poses risk of collision with the aircraft. Proactively preventing collisions and providing data for improvements to turn-around processes, reducing damage and delays. London Gatwick Airport has implemented AI-driven systems that monitor ground equipment placement, significantly reducing the risk of collisions.

Turn-around optimisation
Research from MIT highlights that AI can reduce turnaround time by up to 20%. By analysing data from multiple sources, including ground handling, baggage, cargo, fuelling, and catering AI can suggest efficiencies (MIT, 2023). AI even has the capability to determine if it is safe to commence a pushback. AI systems can monitor that ground equipment and personnel are where they should be, confirming that the aircraft is ready for pushback, issuing a signal to ground crew.

This technology has been deployed at airports, including Frankfurt Airport, reducing delays and improving safety.

Energy Efficiency
Schiphol Airport in Amsterdam is using AI to manage airport lighting, heating, and cooling systems, reducing energy consumption and contributing to a reduction in carbon emissions. Schiphol is one of the most sustainable airports in the world.

Military
In the military context the U.S. Department of Defence (DoD) is integrating AI into operations. AI tools are being trialled to automate routine tasks and enhance decision-making, and operational planning, Task Force Lima, is exploring how AI, can be used in different mission areas (Military Embedded Systems, 2023). In the UK, the Ministry of Defence are looking at AI and automated systems to support ground operations, to relieve personnel of dangerous or repetitive tasks

Conclusion
This may seem like science fiction. Ground operations safety and sustainability is being enhanced by this technology. Whether optimising taxiing, improving safety and compliance of ground handling AI is driving significant improvements in how airports operate. As technology evolves, the role of AI in airside operations is likely to expand and provide further benefits to the industry.

The Live: Synthetic Balance –
A Recent Survey by Aviation Medical Officers

By Flt Lt Matt Landells, Speciality Registrar in Aviation & Space Medicine, RAF CAM

Thank you to everyone who provided feedback regarding your experiences of both live and synthetic flying training in response to a recent survey request on behalf of the Command Flight Medical Officer.

Simulation (or synthetic) training technology needs little introduction due to its widespread use throughout the aircrew training system. Since its introduction in the 1930s, successive technological advances have allowed simulation to reduce risk to life, environmental impact and cost, as well as enhancing capability by simulating complex tactical or emergency scenarios that cannot be flown in the live aircraft. However, we know that concerns exist regarding the implications of shifting this balance, in terms of human performance, aeromedical risk and flight safety: these are what we are keen to better understand from the user perspective.

Figure 1 summarises some of the considerations and terminology for synthetic training. As Aviation Medicine doctors we are most interested in the physiological and psychological aspects, but achieving high fidelity (a synthetic experience of sufficiently high standard to retain the correct knowledge and skills) and safety relies on carefully matching the simulator capability, operator requirements and human performance aspects to reduce any risks associated with increased use of simulation.

One of the difficulties of quantifying any potential risks in this area is that it's not just the balance of live to synthetic training that matters: there are other factors involved, including a general reduction in flying hours and changing operational demands. There is very limited high-quality evidence, but recent findings may help us to identify some areas for further focus. For example, in the recent RAF CAM G-Survey, lack of

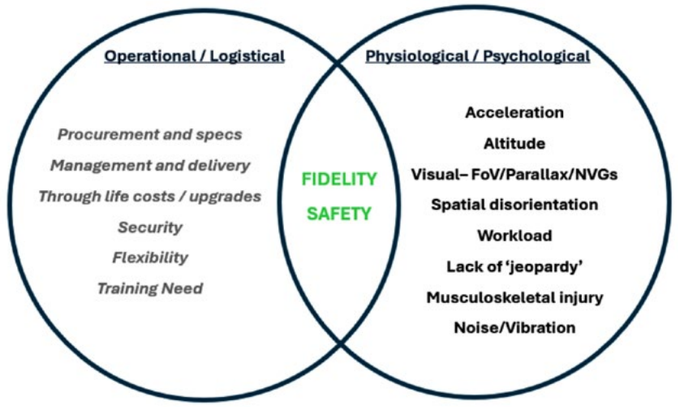

Figure 1: Considerations for synthetic or simulator training environments

recent exposure to the high-G environment was rated by respondents as the most important factor affecting G-induced loss of consciousness (GLOC) risk. Increased simulator use was also mentioned in a recent flight-related neck pain (FRNP) study which found a significant inverse correlation between live flying hours and risk of FRNP. DASORs have also identified a number of scenarios, in both the live and simulated environments, where a shift in LSB was mentioned as a potential contributory factor.

Initial Survey

As part of the Programme of Operational Aviation Medicine (POAM) No. 56, a group of medical officers (representing all three services and international colleagues from Australia) carried out an initial survey to canvas the opinions of aircrew on how the use of simulation/synthetic technology was impacting their duties, particularly in the context of their physical and psychological "readiness".

379 tri-service responses were received, representing personnel across platforms, roles and experience levels. Respondents across all platforms recognised the value, utility and necessity of synthetic flying training in modern military aviation, but the results indicate that significant differences in opinion exist and that more research evidence is needed.

As shown in Figure 2, the average proportion of synthetic training reported varied between 30-45%. The highest proportions of synthetic training were seen in the fast jet and multi-engine fleets. On average the "perceived optimal" proportion of synthetic flying was lower for all platforms, but there was a large variation in responses between individuals.

Figure 3 shows that, with the exception of the RPAS community, the majority of respondents felt that their live flying hours were not sufficient to maintain currency in terms of the mental and physiological stressors of the live flight

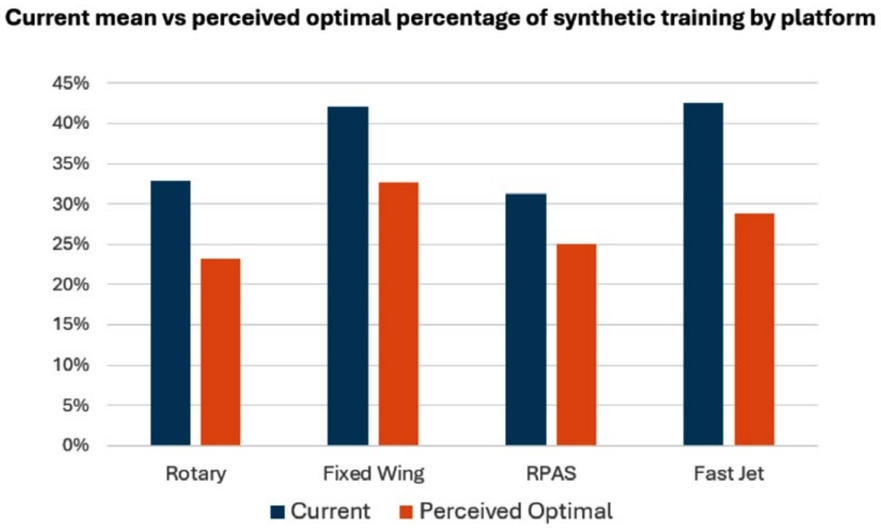

Figure 2: Current Mean vs Perceived Optimal LSB

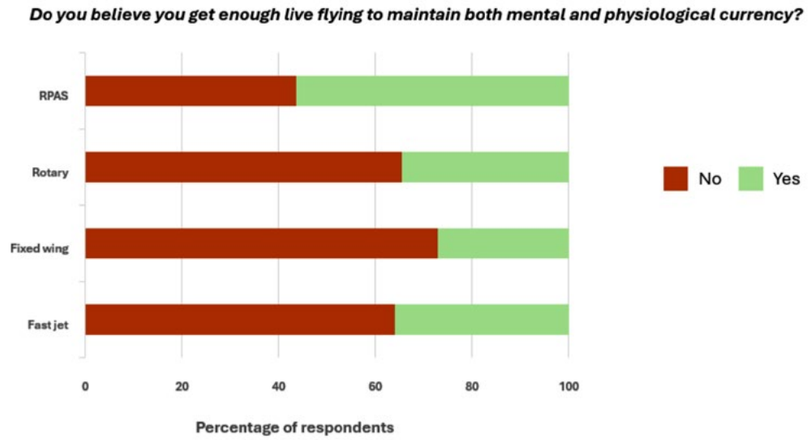

Figure 3: Mental and Physiological Currency

environment. The explanatory comments suggest that this is mainly due to the challenges of the live environment which are currently impossible to reproduce synthetically, and the need to gain, maintain and exploit an operational advantage. Generally, the feedback provided indicates that aircrew feel use of simulation technology is necessary to maintain safety, baseline competencies and train for specific complex capabilities, but several comments highlight aircrew not feeling robustly prepared for frontline operational duties that would stretch them both mentally and physiologically.

This survey highlights that, aside from the physiological and operational aspects of the question, we also need to consider how changing the balance of live to simulator flying impacts aircrew wellbeing and individuals' sense of identify and purpose.

Example comments

- FJ Instructor: "There is a notable degradation in the live flying ability of junior pilots now we have reduced the amount of "live mandatory" training we do to mitigate for the lack of live resource."
- "I am aware that the amount of live flying will reduce in my future courses, and I believe it could mean a lack of continuous airmanship and may have an impact on being physically 'flying fit.'"

Conclusions and what next?

We realise that you are a highly surveyed population, and so we wanted to take this opportunity to share our preliminary findings and assure you that your valuable input will continue to be used in combination with DASORs, scientific research and other information streams to provide accurate advice to the chain of command.

The preliminary findings have already been shared at 1* level as well as being fed back to Senior Operators. Future distribution and ongoing work is planned to help understand the complexities of this topic and allow for a more in-depth scientific analysis of the comments provided.

Synthetic training remains a critical capability for the future of Air Power across Defence, and we hope that this collaboration will assist in safely and effectively employing it to its maximum potential.

Comment by the Command Flight Medical Officer, Wg Cdr Felicity Leaming: Doctors who treat aircrew in the military are trained as Military Aviation Medical Examiners at RAF CAM. This is the initial introduction into Aerospace Medicine. Doctors who will become SMOs of flying stations, consultants in Aerospace Medicine or doctors with a specialist interest in Aerospace Medicine may be lucky enough to gain a space on the Diploma of Aerospace Medicine course which is run jointly by RAF CAM and Kings College London. This is an intense 6-month course which teaches us about the effects of flying on aircrew, their AEA and how medical conditions can be affected by flight. Once they have passed the exam at the end of the course, the military students will then attend the Programme of Operational Aviation Medicine Course. This is designed to put the book learning into context and the students visit tri-S flying Stations to better understand the requirements from the Operators and their equipment. As part of the POAM course, the group are asked to produce a presentation based on a topic chosen by the CFMO (me) and AH Aerospace Medicine. This is usually based on something topical for Aerospace Medicine. The course then presents their finding to Head RAFMS and representatives from the tri-S Aircrew world. The discussion above outlines the research one group did during their course in 2024.

Survey team: Wg Cdr Charlotte Street, Wg Cdr Rebecca Bassett, Surg Lt Cdr John Norsworthy, Dr Clare Shaw, Sqn Ldr Thomas Kennedy, Sqn Ldr Daniel Hendriksen, Sqn Ldr Catherine Pathak, Flt Lt Matt Landells (author).

Mental Health Matters

How can you support others?

DSM
DEFENCE SAFETY MATTERS

IDENTIFY

Here are some of the ways you might identify someone who is struggling to cope:

- A normally outgoing person becoming withdrawn
- Missing parades or being late when they are normally punctual
- A loss of personal discipline
- Drinking more than usual or on their own
- Appearing distracted and not present
- Missing group activities or meals
- Having less energy
- Finding it hard to manage day-to-day life
- Using negative statements about themselves

SUPPORT

You do not have to wait until a person is in danger to intervene. You can help someone just by giving them the opportunity to talk. Helping them secure longer-term support can save a life.

- Choose a time and place where you can approach them privately and without interruption.
- Encourage them to talk, focus on listening and be patient.
- If needed, suggest that they seek professional support within your unit such as with the medical officer, welfare staff, chaplain, or a senior individual they trust.

UNDERSTAND

Suicide is complex, there is rarely only one reason why someone might take their own life. This list shows some potential reasons by there are many more:

- Recent loss of a friend or loved one
- The break-up of a relationship
- Losing custody of a child
- Heavy use of alcohol or drugs
- Mental ill-health
- Painful or debilitating injuries or illness
- Financial or legal problems
- Long-term separation
- Feeling isolated or loneliness
- Homesickness


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Doc's Corner:
Cold Showers for Aircrew

By Dr Prashini Naidoo CMP, SMC RAF Benson

When you hear the words "take a cold shower mate" thrown across the crew room, you may want to stifle that teenage desire to smirk and perhaps reconsider the advice with an open mind. While cold water therapy has increased in popularity (1, 2), the science explaining its benefits is not there yet. However, there is a very interesting discussion around cold water showers improving 'brain plasticity'. Improved 'brain plasticity' could help with aspects of aircrew training, such as G-tolerance.

In recent years, the image of eccentric middle-aged, middle-class women splashing around in frightfully frigid rivers in frightfully unfashionable bathing costumes, has been replaced by images of Wim Hof, the Dutch extreme athlete, stroking his way into mainstream waters. But what ,you may ask, is the tenuous link between cold showers and (outdoor) cold water immersion? Also, it is hard to aspire to Wim Hof or Ross Edgley lifestyles. It may be difficult to schedule time for wild swimming into the usual grind. Let's face it, Netflix is such a temptation after the irritations and responsibilities of life.

The Dutch (3) studied whether the health benefits from cold water swimming could be obtained from cold showers. Buijze and colleagues asked "whether perceived illness could be modulated after repeated pragmatic cold exposure by taking a cold shower for at least 30 consecutive days. Secondary objectives were to determine whether there was any effect on quality of life, work productivity and anxiety as well as adverse reactions." They recruited 3018 adults (age 18 -65) and ran the study from Jan to Mar 2015 (winter). They had four groups (warm shower; end with 30s cold shower, 60s cold shower, 90s cold shower), with average cold-water temperatures of 10 – 12°C. All three cold shower groups had less sick leave (a 29% reduction). During the winter flu season, the cold shower groups had less intense illness rather than a shorter duration of illness. What was evenmore interesting was that the combination of routine (hot-to-) cold shower and regular physical activity was even better, with a 54% reduction of sickness absence compared to people who don't do either. The researchers, trying to explain why the longer shower group (90s) doesn't seem to do much better than the shorter shower group (30s), suggest that the beneficial effect to the immune system may come from nerve (4) pathways rather than circulating hormones.

Other studies (5, 6) also show that cold water exposure may boost the immune and cardiovascular systems. Bristol scientists (7) are researching whether cold-water swimmers, who regularly undergo 'recreational hypothermia' produce more cold shock proteins, such as RBM3 and RTN3, which protect and repair nerve tissue. But could a cold shower induce 'hypothermia' – unlikely at 10°C, even allowing for antiquated MOD heating systems. While the exact mechanism by which cold showers boost health is not fully understood, it may be fun to postulate that they improve physiological and/or psychological adaptability. Perhaps we learn to manage discomfort, anxiety, stress (and man-flu) by being plunged into cold showers. Returning to Buijze's study, despite the misery of cold showers on a January morning in the Netherlands, 91% of the study participants said they'd continue the practice and two-thirds actually did continue. So, ending with a 30s cold shower can be incorporated into busy lifestyles.

There has been an increase in deaths associated with 'cold shock' arising from cold water immersion (8), from outdoor cold-water swimming or indoor ice-baths. The rapid fall in skin temperature produces gasping, hyperventilation, the release of stress hormones, hypertension and arrhythmias. The Dutch cold shower study, on the other hand, only reported mild, transient discomforts amongst the 3018 participants, with 196 complaining of persistent cold body sensation; 257 said their hands and/or feet felt cold, specifically the 3 participants with Raynaud's phenomenon. Eight reported muscle ache or cramps; six had itch, four had insomnia (related to cold showers in the evening), four had dizziness; two had backache; one each had head ache, nose bleeding, diarrhoea, palpitations and transient swelling and redness of three fingers of one hand after the cold showers. So cold showers seem safer than cold water immersion. Perhaps it is the mini-'cold shock' that is the greatest health benefit?

So how could this mini –'cold shock' be doing its thing? Scientists postulate that it may be down to the increasingly brain (and cardiovascular) plasticity and adaptability, the very thing they want future functional MRI studies to explore. This is discussed in the Dutch study's closing paragraph: "Considering the mild effect of a routine cold shower on hormonal and cytokine modulation, these alone are unlikely to play a significant role… Perhaps neuroimaging technologies such as functional MRI could be used to assess any potential neurobiologic immunostimulatory effect." I can just imagine some Vitamin D deprived researcher staring into the MRI images emerging onto their screen, recording the brain activity, as study subjects take showers of increasing coolness.

But why would increasing brain or nerve plasticity be helpful to aircrew? Would better 'plasticity' help with altitude training and G-tolerance? Have cold-showering exercisers inadvertently trained their 'neurobiologic immunostimulatory' systems more efficiently? Well, the science is not there yet and I, for one, am looking forward to the emerging research. More mature aircrew may also be interested in exploring the research into cold shock proteins, which repair nerve tissue, and dementia.

Take home points:

- Ending your usual warm shower with 30 seconds of cold-water showering (at 10 – 12°C) reduces winter sickness absence.
- Cold water showers could boost your immunity, perhaps by increasing your neural plasticity.
- Improved neural plasticity could improve G tolerance and altitude training.
- 30-second cold showers can be incorporated into busy lifestyles, becoming a healthy habit.

References

1. https://www.forbes.com/health/wellness/cold-water-therapy/
2. https://www.psychologytoday.com/gb/blog/a-different-kind-of-therapy/202312/a-chilling-way-to-boost-mental-health
3. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0161749
4. https://doi.org/10.1073/pnas.1322174111
5. https://theconversation.com/cold-showers-a-scientist-explains-if-they-are-as-good-for-you-as-wim-hof-the-iceman-suggests-181678
6. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0161749
7. https://www.hra.nhs.uk/planning-and-improving-research/application-summaries/research-summaries/the-cold-shock-response-induced-by-cold-water-swimming/
8. Cold water therapies: minimising risks | British Journal of Sports Medicine (bmj.com)

The Importance of Synthetic Training and Synthetic Occurrence Reporting in the Royal Air Force

By RAF Safety Centre

Enhancing Safety and Operational Readiness

In the ever-evolving landscape of modern warfare, the Royal Air Force (RAF) has continually adapted to new technologies and methodologies to maintain its edge. One such advancement is the incorporation of synthetic training, which provides realistic, immersive experiences without the risks associated with live training.

While synthetic training is an invaluable and increasingly important part of our training, it is equally crucial to ensure that the lessons from these environments are effectively reported and embraced by our personnel. This article delves into the significance of synthetic training, and the importance of improving reporting and learning from synthetic 'occurrences' and seeks to give some better direction on when and what to report.

The Role of Synthetic Training and Impact on Flying Training and Operations

The RAF employs synthetic training across several aircraft types and includes Fast Jet, Multi Engine, Helicopter and Remotely Pilots Air Systems (RPAS); all with the aim to enhance the proficiency and readiness of our pilots.

These simulators in their many forms can recreate realistic flight scenarios, allowing pilots to practice manoeuvres, emergency procedures and SOPs without the risks and costs associated with live flying. They enable pilots to train in immersive environments, ensuring that they can experience a wide range of situations, from routine airfield procedures to complex multi-domain combat missions. This not only improves skill retention and operational effectiveness but also supports safer, more efficient training. This is particularly beneficial for training in high-stakes situations such as combat, emergency procedures, and adverse weather conditions and significantly improves preparation for warfighting whilst on operations.

Repetition and standardisation of training is another key benefit of synthetic training. Trainees can repeatedly practice specific scenarios within a synthetic training environment without the complexities and time penalties of setting this up in the real world, enabling pilots to train repetitively until they achieve proficiency in the task. This helps ensure a standardised level of training across the RAF and within Defence.

In addition to improving the operational context, synthetic training can also be cost effective. It minimises fuel consumption, reduces wear and tear on aircraft, and lowers logistics costs. Synthetic training also aligns with the RAF's commitment to environmental sustainability by reducing flight hours, lowering carbon emissions, and decreasing noise pollution; this isn't why we do it, but it is a considerable benefit.

Now that we have covered the reasons why synthetic training is becoming more of a feature in our training and why Defence is committed to supporting it, we will review why reporting incidents that occur in this environment are invaluable in improving the safety of our live flying.

Reporting: A Key Component of Synthetic Training

While the benefits of synthetic training are clear, its effectiveness is significantly enhanced when paired with robust incident (DASOR) reporting. Reporting from synthetic training involves documenting incidents, near-misses, and other critical observations so we can inform safety and operational protocols. However, reporting rates in synthetic environments have historically lagged behind those in live training which is something the Safety Centre is acutely aware of and the reason for this article. This gap must be addressed to fully leverage the advantages of synthetic training and ensure we make the most out of all the opportunities it offers.

Why Reporting Matters

Synthetic training now often represents the majority of training delivery. For example, the basic mission qualification for a pilot on the A400M consists of 108 hours of synthetic

training and 10 hours of live flying – 91% of potential safety lessons could occur in the synthetic environment.

To make sure we utilise the full benefit of synthetic training we need to assess and pass on the lessons we generate and reflect on the lessons of others. Reporting is used to identify trends, and regular reporting helps identify patterns of errors or near-misses that may not be immediately apparent.

If people consistently make mistakes in the simulator, then they are likely to make the same mistake in the air – a synthetic report is a free lesson where no one was at risk. Continuing to report omissions and mistakes that would have or could have caused an incident on a real sortie ensures that we maintain a proactive safety culture and don't lose the opportunity to learn.

As well as early identification of potential safety hazards, synthetic training reporting allows us to improve training protocols, and feedback from synthetic training reports can

highlight areas where training may need adjustment or enhancement, ensuring that simulations remain as realistic and beneficial as possible.

The final and most important aspect is sharing the lessons learned. If synthetic occurrences are not reported, then the learning stays within the simulator and we have lost the opportunity to learn the lessons collectively. If we are to foster a culture of continuous improvement and collective learning, we can't ignore the free gift of synthetic reporting!

Challenges in Reporting from Synthetic Training
Despite its importance, several factors contribute to underreporting in synthetic training environments and we would like you to reflect on this. The perceived relevance of reports within the synthetic environment may not be clear and you may perceive incidents that take place in a synthetic environment as less critical or less worthy of reporting compared to those in live training. With comments such as "it's just a sim" or "I'll try that again" regularly being shared when discussing synthetic training.

Many personnel will see the errors they make in the sim as the entire reason/point of the synthetic environment, we've probably all heard that phrase "whoops, lets reset the sim there" followed by a second attempt to fly the sortie to the correct standard. We must shift this mindset to recognise that the synthetic experience is an integral part of training and must be treated appropriately to gain the most benefit.

I think we can all agree that it is much safer to make the mistake in the sim, but this is why we are highlighting the importance of reporting what happens there. We can't afford to miss the lessons where a repeat in the live environment could result in an incident or even an accident.

A DASOR report from a Typhoon simulated tactical night sortie highlights the importance of flying the aircraft first and foremost. After the first run of the sortie was completed, the pilot turned attention to making notes on a kneeboard for the debrief rather than continuing to fly the sortie as if it were live. Upon hearing an aural warning, the pilot quickly realised there was no longer enough time to recover the simulated aircraft or eject, leading to a simulated crash. The investigation noted that this occurrence could have easily occurred in the live environment and could have ultimately led to a loss of life and aircraft. The report shows how we must all respect the synthetic environment for what it can teach us and what it can let us walk away from.

The major lesson here may be obvious, but the report also resulted in other contributory factors such as difficulty in using a touch screen to set a warning which will be used for future sim development.

What to report and when?
To maximise the benefits of synthetic training, it is essential to report deviations, unexpected system behaviours, and the trainee responses that can indicate potential weaknesses in training protocols or simulator fidelity. All of these can have real world implications in live training and operations and through robust reporting we will be in the best place to ensure safety in all contexts.

The first question you must ask yourself, before stepping into the simulator is, "What am I trying to achieve in the simulated environment?". Are you replicating a live sortie or are you using the simulator as a part-task trainer? Each scenario will have its nuances in when and what occurrences you should consider reporting. There are various scenarios – a few examples are below - but ultimately, it is up to you, the reporter, to submit what you believe is relevant and what others can gain benefit from. If in doubt, a quick check with STANEVAL should provide clarity, strengthen the reporting culture, and improve training.

- A part task trainer and you keep on getting one aspect wrong - is it your fault (just need practice or are you new to the task?) or is it that you've identified an ergonomic or HF issue? Report the latter certainly, but no need to report the former unless you believe others would benefit from your mistakes.

- Emergency simulation - no need to report the engine fire, but if you shut down the wrong one then we absolutely need to investigate why as it could transfer to a real emergency.

- The simulator training differs from live flying experience - reporting could help improve simulator experience.

The above examples are in no way exhaustive, but we would encourage all those that are using synthetic training to reflect on their role in the reporting chain. Sharing lessons can only improve the flying training system and by submitting that near miss or SOP issue, you will give the system the opportunity to fix things for you and colleagues. Reports should be made whenever an anomaly occurs that you believe is significant or could impact future live or synthetic training. Even minor issues can uncover underlying systemic problems that might have broader implications for safety and training efficiency.

Improving Reporting Rates: Guidance and Best Practice
To enhance the reporting culture within synthetic training environments, the following guidance and best practice are recommended:

1. Education and Awareness
- **Training Sessions:** Conduct training review sessions which highlight the importance of reporting in synthetic training; seek out synthetic training reporting and review how this can impact your individual training. Instructors should emphasise how reports contribute to safety for their trainees, and how it impacts operational readiness.

- **Success Stories:** Share success stories where reports from synthetic training have led to significant improvements or prevented potential incidents. Share these with the Safety Centre and other units. The more lessons we share the more impact synthetic training will have.

2. Integrating Reporting into Training Culture
- **Debrief Reporting:** Both instructors and trainees should strive to review synthetic sorties and submit any relevant DASOR reporting post sortie and make this part of the debriefing process.

- **Leadership Involvement:** We must ensure that at all levels we champion the importance of synthetic reporting and considers its benefit across our training schemes.

Case Studies
Rivet Joint. During a handling check sortie for a newly qualified pilot, the instructor initiated a simulated left hydraulic system return line leak shortly after departure. This led to the rapid loss of the left hydraulic system. As part of the crew's analysis, they referenced the LANDING WITHOUT NORMAL LEFT AND/OR RIGHT HYDRAULIC SYSTEM PRESSURE checklist that has a table describing which systems have been affected. One element in this table is labelled as 'FORWARD BODY PUMPS'. Having read this the crew agreed that they could not dump fuel from the forward body tank. Although the profile was a Handling Check it was decided by the instructor to interject to correct what appeared to be a misunderstanding.

Having lost the left hydraulic system, the aircraft had lost the 'forward' pumps in each body tank rather than both the pumps in the 'forward body tank'. The incorrect assumption led to the erroneous belief that the fuel in that tank could not be used or dumped. This could affect aircraft centre of gravity management and implications for fuel calculations.

The RC-135 Digital Flight Manual (DFM) was ambiguous in its description which led to the error in interpretation. After consultation with RJ STANEVAL and the Chief Ground Instructor, it was agreed that the language used in the DFM was ambiguous and should be changed. This resulted in an amendment to the DFM to avoid future confusion interpreting the checklist during that emergency procedure.

Lightning. At the end of a night Annual Handling Check the pilot was recovering to the airfield. A simulated engine fire resulted in engine shutdown and an attempt to fly a flameout profile to the runway. The pilot found themselves very low on energy and although the correct decision would have been to eject, they elected to stretch the glide which was unsuccessful.

It was noted during the report review that the simulator will never present the same sense of jeopardy as the experience of live flying which can lead to pushing the boundaries or 'testing' in the simulated environment. The pilot however did comment that it was a timely reminder to 'train as you would fight' and is a good example of where the simulator sortie training rules should be appropriately defined. This should make it clear when the sortie should be flown as per the live environment and when the 'safe' simulator environment can be used to explore the boundaries of the performance envelope.

Conclusion
Synthetic training is a cornerstone of modern RAF training programs and increasingly represents a significant proportion of the training experience. Its full potential can only be realised through a robust reporting culture that captures and disseminates the valuable lessons learnt within these environments. By improving reporting rates and ensuring that incidents, observations and lessons are documented and shared, we can enhance our training protocols, bolster safety and maintain the operational excellence that defines the Royal Air Force.

AirClues

I learned about FRCs from that…

By Flt Lt Mike Green, 7 Sqn RAF Odiham

"My happy place…" I remarked to the Captain, as I strapped into the left-hand seat of the Chinook. It was my first operational deployment, but after three weeks of tasking I was becoming very comfortable operating the battlefield helicopter in its natural environment. "A state of flow", he replied. Well, my flow was about to be slightly disrupted.

We departed the Main Operating Base (MOB) at low level, leading another Chinook and conducted a tactical climb above the small arms threat band. We had flown this profile multiple times now, only this time it was daylight, so for a moment we took in the impressive mountainous scenery. Once at altitude the Captain accelerated the aircraft progressively, pausing at 100kts and 120kts to collect vibration data for the engineers, which I did through the Health and Usage Monitoring System (HUMS) Cockpit Control Unit on the centre console. As the Captain gradually topped the speed up to 140kts for the final data collect, he remarked the aircraft was working hard. After all, we were in a relatively hot and high environment and this Mk 6A was older than one of the crewmen operating in the cabin!" On condition" he called, "acquiring data" I responded. However, as I drew my eyes up from the HUMS, my attention was drawn by the caption on the Caution Advisory Panel. "Captain, crew, XMSN DETR" I announced without thinking twice.

Of note, the XMSN DETR caption in a Chinook means ferrous particles have contaminated one, or more, of the critical transmissions, an early warning that the transmission may be breaking up. Indeed, the successful operation of these combining, forward and aft transmissions (and the connecting shafts) are essential for the transfer of power from the engines to the synchronised contra-rotating tandem rotors. The crew instinctively began the WADFIR process (Warn the crew, Achieve safe flight, Diagnose, FRCs, Intentions, Radio call) practiced countless times during training. As the Captain achieved safe flight (reducing speed, initiating a descent and turning back to the MOB), the crewmen and I conducted the other Immediate Actions: checking the Maintenance Panel (in the cabin) and the transmission temperatures and pressures, Ts and Ps, (in the cockpit). The diagnosis confirmed particles in the forward transmission oil system but normal Ts and Ps. The result from the FRCs: "Land As Soon As Possible" (*Do not continue flight for longer than is necessary to achieve a safe, but unhurried, landing at the nearest site*) left me almost doubting myself as I said it on the intercom.

On routine training flights this would result in the crew making a precautionary landing in a suitable, accessible field (if no hard standing was available), close to habitation and roads to facilitate the subsequent engineering investigation and rectification work, and possibly the recovery of the aircraft by road if it proved impossible to fix in place. However, the nature of the threat we currently faced precluded all of these actions. Now 30nm away from the MOB, it dawned on me that my baseline assumptions, grounded in years of peacetime training, regarding *a safe but unhurried landing*, were invalid. Indeed, as we descended in the mountainous terrain, the Captain announced his intentions: return to the MOB at low level to provide options for an immediate landing in the event of abnormal Ts and Ps or unusual noise, vibration or smell. This, and our progress, was relayed to Ops.

As we settled at low level, regularly monitoring the aircraft, we discussed our route back to the MOB, blockaded by a multiple thousand-foot ridgeline and a large city. Initially we stayed in the low ground, with large green fields offering the usual comfort to offer options for landing. We also routed clear of towns and roads which would give us, and our passengers, some time to secure the aircraft and contact Ops should we need to land. At the appropriate moment we asked a little more of the transmission and climbed over the final ridgeline via the shortest route, despite the lack of available landing options. Clearing the ridge, we just had the large urban area separating us from the MOB. Remaining at low level, we picked the most expeditious and clearest path to ultimately achieve a safe landing at the MOB.

Debriefing, we took some time to reflect as a formation on the key lessons, particularly for junior crewmembers embarking on their first deployment.

1. Whilst the content of the FRCs does not change, the nature of the threat and the imperative of the task may fundamentally cause you to re-assess your normal thought process.
2. Take some extra time to consider emergency handling before you deploy and before you get airborne.
3. Trust your training during the countless practise and simulated emergencies exercised live or in the simulator, especially when your flow is unexpectedly interrupted.

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Illegal Tyres...
A Serious Road Safety Issue

By Air Support MT

There has been an ongoing trend in the number of RAF vehicles being found to have illegal tyres. Illegal tyres are a serious road safety issue that can increase the potential for a Road Traffic Collision (RTC) and injury to vehicle occupants.

It is the driver's responsibility to ensure the vehicle they are operating is legal to drive so the liability for any defects found if stopped by police or after an accident sits with the driver.

What are illegal tyres?
- Below legal limit for tread depth
- Damaged tyres
- Incorrect tyre pressure
- Incorrect or mixed tyre type
- Incorrect tyre size or load and speed rating

Tread Depth
Legally the tread depth should be no less than 1.6mm across the central ¾ of the tyres and around the entire circumference. A lack of tread reduces the grip available to tyres and causes an increased risk of poor handling and skidding. This risk is increased when driving in wet conditions and on poor road surfaces.

Ways to check tyre tread:
- Tread depth gauge.
- '20p test' – place a 20p into the grooves of the tyre tread and if the outer band of the coin is obscured then the tread is over 1.6mm.
- Tread wear indicators – all tyres have marks in the groove of the tread that only become visible at 1.6mm.

The RAC have a useful video on YouTube (How to check your car's tyre tread – expert advice from the RAC) that demonstrates these techniques.

For motorbikes, the regulations are different with motorbikes over 50cc needing 1mm of tread depth cross the central ¾ of the tyres and around the entire circumference and for mopeds only the original tread has to be visible.

Damaged Tyres
Illegal damage to tyres includes cracks, cuts, bulging of the tyre wall and exposed cord which all increase the risk of a tyre blowout while driving, particularly at higher speeds.

Tyre Pressures
The correct tyre pressure is another legal requirement and has effects on road safety. Both over and under inflation can cause uneven tread wear and poor handling. Underinflated tyres can also increase both fuel consumption and braking distances, whereas overinflated tyres can cause poor traction and increase braking difficulties.

Correct Tyres for the Vehicle
Although this shouldn't be an issue with MOD vehicles supplied by MT, for personal vehicles a driver should also be aware that it is illegal to have incorrect type of tyres for the vehicle or have a mix of different types of tyres, which leads to uneven wearing and can compromise vehicle handling and stability. The tyres also need to be the correct size for the vehicle as well as be the correct load and speed rating for the vehicle.

Information on what a vehicle should be fitted with can be found in the vehicle handbook and all tyres have markings on the side to note their specifications.

Repercussions
This issue is highlighted when illegal tyres are found on vehicles being collected for routine maintenance and repair. This leads to rejections by the collecting agency which reduces the availability of a Unit's vehicle fleet while the tyres are replaced and then a new maintenance date is booked.
If a vehicle is found by the Police to have illegal tyres, then the following actions could be taken against the driver:

- Fixed Penalty Notice which involves a fine and points on the driver's licence.
- Prohibition Notice on the use of the vehicles until the tyres are changed.
- Vehicle impoundment.
- Court proceedings for extreme or repeat cases where the driver could receive an increased fine and penalty points and/or disqualification from driving.

Conclusion
A vehicle's tyres must be checked as part of the pre-use check so any deficiencies should be evident before departing. If in doubt, speak to your Unit MT who will advise you.

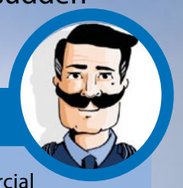
Remember the driver is liable for any tyre deficiencies found by Police!

Airframe Icing –

The Buck Stops With You

By Nigel Williams

> The failure to remove contamination from an airframe and/or to protect it from acquiring further contamination before it becomes airborne may result in sudden loss of control at or shortly after take-off.



Wg Cdr Spry's Comment:

In this article, Nigel Williams of Lextel Aviation shares some analysis of airframe icing from a commercial operator point of view. Air Clues readers are of course a military audience and military operations, including data and SOPs, must apply. However, you might find some useful background information here and be able to cross-refer your own procedures with those detailed here. ■

The ground de-ice and anti-ice of large aircraft is a massive subject and the limitations of producing this article precludes an in-depth study of all the procedures. As the European Summer comes to an end and the Autumn and Winter seasons draws near, I hope this article will provide some reminders of limitations, warnings and other useful information about aircraft ground anti- and de-ice operations. This article does not profess to be an all-encompassing guide to the subject. For commercial operators, the Aircraft Flight Manual (AFM), the Manufacturer's Flight Crew Operating Manual (FCOM), the National Aviation Authorities (NAA), and the De/Anti-ice fluid manufacturers should always be regarded as the official source of information and where a discrepancy exists, they shall be the official arbiter and will take precedent.

Let's put the foundations down and build a case that will remind us why ground de / anti-ice is so important. It is often called the **Clean Aircraft Concept**.

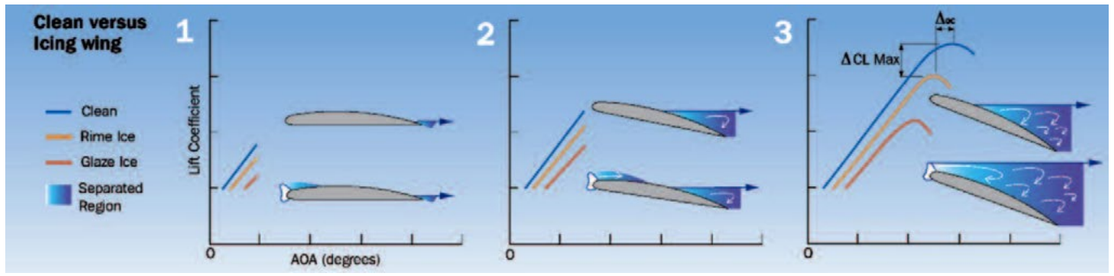


Fig 1. Clean v Icing Wing

Fig 1 shows the typical effect of ice accretion on the airflow and lift of unprotected aerofoils. The result is a reduction of lift at any given Angle of Attack (AOA) leading to a substantial degradation in maximum lift and maximum AOA.
The degradation is generally more pronounced with glaze ice shapes. Large amounts of ice build-up on an unprotected aerofoil may reduce the maximum lift by 30 to 40%, increasing the stall speed by 20 kts or more!

Even slight surface roughness, often referred to as 'sandpaper' ice, can result in large lift and drag penalties. The majority of maximum lift degradation often occurs with the first 1/4 to1/2 inch of ice accretion (6 to 13 mm). Obviously for take-off our lift and drag coefficient ratios need to be in the clean wing portions of the diagram.

To achieve this, we need to abide by the Clean Aircraft Concept. It is accepted that the AFM of a particular type of aircraft may offer certain alleviations that allow frost up to a certain depth to be present for take-off on certain areas of the aircraft, typically the underside of the wings around the fuel tank area and the fuselage, but in these cases the AFM may well require a reduction to the take-off weight.
Significant deposits of clear ice can form in the vicinity of fuel tanks, on both upper and underwing surfaces. This form of icing can easily form when the wing skin temperatures are well below 0°C during a turnaround when the ambient temperatures could be anywhere between -02°C and +15°C!

Cold fuel can cause the wing skin temperatures to remain low. Additionally, on the ground significant amounts of clear ice can also form below a layer of snow or slush on any part of the aircraft surface, including the areas around the wing fuel tanks. It's vital, therefore, to check that the surfaces are properly clear of all contaminants following a de-icing operation.

Contaminant Removal and Airframe Protection
A thorough inspection of the aircraft is vital. We need to check not just the main wing surfaces but when and however possible, the flight control gaps, drain holes, areas around the windscreens, elevators, horizontal stabilisers and landing gear (there may be proximity sensors etc in the gear bays).
If large accumulations have settled on the aircraft, then it may be necessary to remove the contaminant manually.

Ice accretion on landing gear

We can use brooms and hot and cold air. If hot air is used ensure the surface is dry after cleaning otherwise thawed water may re-freeze.

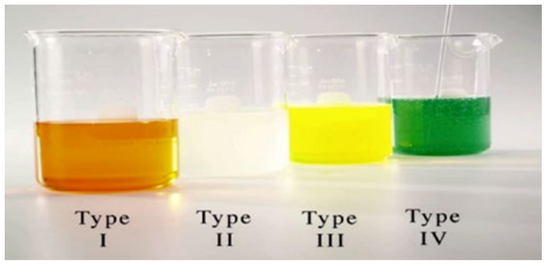
Don't forget to check the engine intakes. It may be necessary to manually clear the intake or use warm air in accordance with the AFM/FCOM/De-Icing Manual. Ensure that ice has not formed in 'difficult to see' areas – typically the back of the fan blades. In extremely cold temperatures (typically -20°C and below) you may have to consider engine pre-heat. Again the FCOM/AFM/De-Icing manual should provide the 'when and how to' information for your type of aircraft.

Anti-icing residue in the leading edge of the elevator trim tab

Preparing to De-ice or Anti-ice

- Before commencing a De/Anti-ice operation it is important to ensure that the ground personnel conducting the operation have been trained and are qualified on your particular type of aircraft.
- Ensure you have an agreed method of communication with the ground crew.
- Consider the aircraft configuration for the operation, for example engines running or shutdown / APU shutdown / engine air bleeds and cabin conditioning on or off, flap and spoiler configuration, and possibly brake fans on or off
- Use a De/Anti-ice checklist if available.
- Establish whether they are going to carry out a one or two step operation with the agreed fluids. Ensure they understand what you require.
- You should ideally make a note of the time the operation begins, type and mix of fluid, temperature, and time that the operation is complete. Remember if using a one-step operation then HOT begins when the operation commences. When using a two-step, then timing begins when the second step commences. This step must be commenced within three minutes of starting the first step.

De-ice & Anti-ice Fluids and their Application



Type I. Unthickened. Good for de-icing and removal. Minimal effect for anti-icing. Used for a two-step procedure.

Type II. Thickened. Stays on airframe longer. Good hold over time. Designed to flow off wings on take-off so has no effect on control feel.

Type III. Thickened. Type III fluids reduce in viscosity faster than type II and type IV fluids and thus provide anti-icing protection for a shorter period. Often used for aircraft with low take-off speeds.

Type IV. Thickened. Good Hold Over Times (HOTs). These fluids have been known to create residues on drying out which re-freeze and restrict control movement and/or feel. May have VR speed restrictions.

Fluids can be applied cold, unheated, heated, neat or mixed. It is VITALLY IMPORTANT to check your FCOM, AFM, Company De / Anti - icing Manual or Aircraft Maintenance Manual (AMM) to ascertain the approved fluids and methods of use, and any restrictions that may have to be applied. Ensure that the agent or airfield supporting your De/Anti-icing has your choice of fluids available. Many civilian airports may only be able to supply just one of the thickened fluids.

Also, check that the fluid to be used is approved by both the aircraft and the fluid manufacturer.

De-Icing Fluids

- Heated water (but check whether there is a minimum OAT limit).
- Heated concentrates or mixtures of water and Type I fluid.
- Heated concentrates or mixtures of water and Type II fluid.
- Heated concentrates or mixtures of water and Type III fluid.
- Heated concentrates or mixtures of water and Type IV fluid.

Anti-Icing Fluids

The choice of anti-icing fluid will depend on the length of the HOT (Hold Over Time). HOT tables can be obtained and downloaded from the FAA or Transport Canada websites. The Transport Canada information is extremely helpful and even provides HOTs for the different wing skin types.

Examples of Transport Canada HOT tables for normal operations, anti-icing a wing when the spoilers or flaps have been extended prior to de-icing / anti-icing and treating a composite wing rather than one of standard aluminium construction.

Ascertain and respect the LOUT (Lowest Operational Use Temperature) for the chosen fluid.

CAUTION! *Under no circumstances may an aircraft that has been anti-iced receive a further coating of anti-icing fluid directly on top of the contaminated film. If an additional treatment is required before flight, for example the HOT is close to, or has expired, a complete de-icing/anti-icing process must be performed to ensure that any residues from the previous treatment have been removed. Anti-icing only is not permitted.*

Anti-Icing can be performed using one of two processes – the 'One-Step' or 'Two-Step' Process.

One-Step Process:

Anti-ice using heated SAE Type II, III or IV fluid OR hot diluted SAE Type II, III or IV fluid (in accordance with manufacturer's instructions). HOT timing starts as the procedure starts.

Two-Step Process:

1. De-ice with either hot water or hot diluted de-icing fluid
2. Anti-ice using SAE Type II, III or IV fluid or mixture dependent on holdover required and the local weather conditions. This step must be commenced within three minutes of starting the first step.

Procedure Complete

The aircraft should be carefully inspected by an authorised member of the ground crew.

- All critical surfaces, upper and lower wing, vents, drains and pitot and static ports.
- With high T-tail aircraft the stabiliser and elevators should ideally be inspected from a high lift 'Cherry Picker'.
- In certain conditions of OAT and contamination, it may be necessary to do a tactile check of the wing leading edges and upper surface of the wing.
- Note the time, fluid used, mixture and temperature.
- Use the aircraft checklist to set the configuration for take-off. For example, the checklist may stipulate that the flaps which were fully retracted for the De/Anti-ice procedure, should remain retracted until lining up on the runway. This can be easily forgotten at busy times and so a final control configuration check is vital.
- Some major airports provide the facility to carry out a pre-take-off contamination check near the runway holding point – do use this if you can. (Some civilian operators and National Aviation Authorities make this a legal requirement).

We now come to a classic Human Factors predicament! Typically, when De/Anti-ice operations are under way, the weather will be such that delays both on the ground and in the air can be expected. This could result in sitting in falling snow in a long queue for an extended period.

The HOT expires in 13 minutes. ATC have told you that you can expect departure in 10 minutes and you are number three for departure. As far as you can tell there is no snow settling on the airframe but you can't be absolutely sure. Will you 'chance' it and hope that you will just be within your HOT, or will you make discretion the better part of valour and return to the ramp for a further Anti-Ice procedure? Sit in the De-Ice queue again, lose the ATC slot, re-protect and taxi out again? At least an hour or more delay!

In 55 years of flying I found that this was always one of the toughest decisions to make. The Buck has just stopped with you! Go back, re-protect and accept the delays – it's the safe thing to do. The people in the back may not thank you for all these potential delays but at least you will not end the flight seconds after rotation as the Challenger Business Jet N90AG at Birmingham UK sadly did in January 2002. See UK AAIB report 5/2004.

I'm sure you will agree that the causal factors of this accident will provide some severe 'Witches Warnings' to us all when planning a departure in conditions of Snow, Ice, Snow Pellets, Frost and Freezing Drizzle or Freezing Rain.

Just to round off – some of the basic 'non - technical' risks we face when decide whether or not to De/Anti-ice:

- Commercial or Operational pressures to cut corners.
- Delays and missed ATC slot times.
- Difficulty getting reliable information on the contaminant state of the aircraft especially at night or at outstations.
- Lack of suitable viewing equipment to check the upper surfaces.
- The need to rely on assurances from other personnel that your aircraft is clear of contaminants, especially at remote de-icing stands.
- Inadequate personnel training especially at remote airfields.
- Crew complacency regarding the need to De-Ice/Anti-ice (B737 on the Potomac Jan 1982).
- Speaking up when you don't like something!

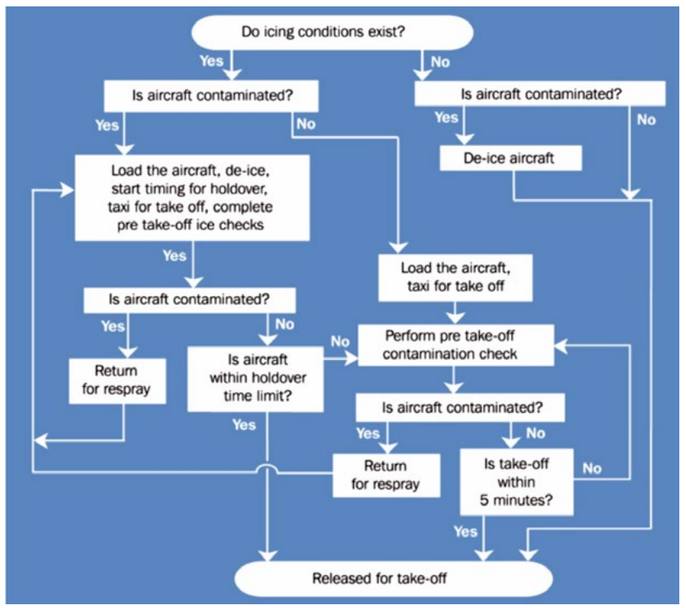


Fig 2. Steps in preparing your aircraft for a departure in icing conditions.

Thanks for your attention and please Fly Safely! Thanks to BAE Systems Regional Aircraft for allowing me to use certain excerpts and photographs from their 'house' magazine 'Think Ice'. Further suggested reading; FAA, Transport Canada and Skybrary websites.

Nigel Williams was a BAE 146 Synthetic Trg QFI on No. 32 (The Royal) Squadron for over 13 years. As lead synthetic instructor, Nigel has developed and delivered ground school and synthetic training to every member of the Squadron, including initial type ratings, recurrent packages and bespoke environmental & tactical training.

The Curlew Head Start Project

By Neil Durrance, RAF Safety Centre

In 2019, the CESO(RAF) EP Team co-ordinated RAF participation in a conservation initiative, which aimed to remove curlew eggs from active airfields, where curlews posed a flight safety risk. On 4 June 2024, a team from the RAF Safety Centre visited Pensthorpe Nature Park, where our curlew eggs were incubated and the chicks reared, pending release, to witness the fantastic work being done.

The Eurasian Curlew is a red listed Bird of Conservation Concern and a Priority Species under Section 41 of the Natural Environment & Rural Communities (NERC) Act 2006. Curlews, however, can pose a significant flight safety risk, as a fully grown curlew can weigh 1kg, with a 1m wingspan and a preference to inhabit our airfields. Six Aerodrome Wildlife Control Units obtain annual licences which enable the legal destruction of Curlew eggs from nests discovered to maintain flight safety. It is a sobering realisation that more nests/clutches were destroyed, under license on our airfields in 2018, than are known to have successfully occurred in southern England. Natural England are undertaking urgent action to stop the disappearance of curlews from Central and Southern England, which is why the airfield locations are so important to the project.

The Curlew Head Start Project, led by Natural England aimed to remove eggs that would be destroyed, incubate them, and relocate the chicks elsewhere in the UK, where their populations are under threat. Successful execution of the project on RAF flying stations required collaboration between Flight Safety, Environmental Protection specialists, Defence Infrastructure Organisation, their contractors and external stakeholders, namely Natural England and Wildfowl and Wetlands Trust (WWF) located at Slimbridge in Gloucestershire. The delivery of the project saw equally close collaboration and teamwork between Station air traffic controllers, flight safety, wildlife control teams, grounds maintenance, Station EP staff and Natural England officers.

2019 saw 54 eggs being relocated. Since then, notwithstanding an enforced pause in 2020, due to COVID, the project has gone from strength to strength, becoming an annual programme, expanding to a wider number of locations. In 2020 the project was recognised with a prestigious MOD Sanctuary Award, winning the Environmental Protection and Enhancement category. The project has received wider exposure from the BBC, both locally and on Countryfile. 'RAF' curlews have been taken on

by His Majesty the King, being released on his Sandringham estate. The Pensthorpe Nature Park hosts one of the project's key partners, incubating and rearing our curlews for other sites, such as Sandringham, and locations on the North Norfolk coast.

In 2023 129 eggs were collected between 22nd April and 7th June 2023. This compares with 96 eggs being collected between 27th April and 10th June during the 2022 season. The most productive airfield during 2023 was Barkston Heath, which produced considerably more eggs than the other airfields. Fledged birds from Pensthorpe had once again been released on the Sandringham Estate and Wild Ken Hill. However, staff at Pensthorpe faced difficult rearing challenges and multiple health issues, particularly in relation to feather development. The Pensthorpe team worked closely with the Zoological Society of London's (ZSL) disease risk veterinary specialists to identify the cause. If evidence was needed, this confirms the fragility of nature, even with our intervention. Chrissie Kelly, the head of the project at Pensthorpe and her team monitor the eggs from receipt, recording their weight and moisture content, through to hatching. Once hatched, the young chicks are transferred to a tightly controlled environment where, again they are monitored until they are large enough to be transferred to outdoor pens. All aspects of the young birds' health,

Image: The RAF Safety Centre Team on the 4 Jun 24 visit.

condition and environment is meticulously monitored and controlled to maximise their chances of being successfully released into the wild.

Due to the large potential breeding areas, their capacity to travel away from their release site and breeding potentially not occurring until the birds are five years old, it is perhaps too early to comment on how successful the project has been in supporting breeding curlew populations. Birds released in 2019, from Slimbridge in Gloucestershire have been reported as far away as NW France. To learn more about their movements, the British Trust for Ornithology (BTO) have been fitting birds with GPS tags. GPS tags provide project stakeholders with valuable new information that would not be available without the GPS investment. This is primarily because of the difficulties associated with tagging wild birds of a similar age. The project provides a unique opportunity to learn about the movements of juvenile birds after they've dispersed from their natal release sites, in addition to being able to monitor the group dynamics. In 2023, the BTO fitted a further 20 birds with GPS tags.

Visiting Pensthorpe gave us an opportunity to gain a greater understanding of 'our' curlews' journey and witness the realisation of the RAF's contribution to this nationally critical conservation work. The project crossover with Flight Safety is never far from our minds. However, projects such as this also show, in terms of the red-listed curlew, that safety protocols can co-exist with conservation to great effect. This is what makes this a uniquely special opportunity. The RAF's Head of Safety, Air Commodore Sam Sansome, summed up everyone's feelings when describing this as a fantastic example of how RAF flight safety and environmental protection on our stations can be brought together. Seeing the eggs and young curlews being nurtured by Chrissie and her team, it is impossible not to be moved by the thought that without the collaboration between all of our RAF stakeholders, along with Natural England collecting and delivering the eggs and the carefully planned and executed work by the team at Pensthorpe, those young curlews would simply not exist.

All imagery courtesy of RAF Marham MCO team.

UK Low Flying System Safety Update

By Sqn Ldr Pete Geddes, RAF Safety Centre Flight Safety

Reminder of LL Common Procedures

Following the trial and transition to VHF LL Common, feedback from the military was positive. A considerable number of General Aviation (GA) aircraft operate close to or inside the UK Low Flying System (UKLFS) without coordination. Civilian aircraft operating below 2,000' AGL were encouraged to mirror the military use of LL Common via an Air Information Circular (AIC) in Jun 23, which is now incorporated into the Civilian AIP.

The UK Military Low Flying Handbook (UKMLFHB) states that 130.490 should be monitored when operating in the UKLFS, where a Lower Airspace Radar Service (LARS) is unavailable. LARS coverage is displayed in the BINA ERS 'the red book.'

Note that much of the UK is covered by this service and should be used when available. If terrain or range prevents LARS usage, revert to LL Common.

Civilian Use of LL Common

The AIC was issued by the CAA to introduce the frequency to civilian pilots. Coastguard and National Grid helicopters have adopted its use. Police and HEMS helicopters have been making a blind call immediately prior to take-off when operating from an HLS or incident site. It was also incorporated into the CAA's Skyway Code; a guide for GA pilots which is used widely. It may take several years for the frequency to be adopted widely as this becomes a cultural norm.

Potential Problems

- Confusion with 'Safety Common' 135.480 (for use at aerodromes not assigned with a frequency). Until recently the UKMLFHB also confused the definitions of these frequencies. GA operating from a minor aerodrome (marked on the chart or not) are unlikely to be on LL Common.

- Over-crowding of the frequency. Most of the UK is covered by LARS and LL Common should only be used when outside of LARS coverage. Content of the radio calls could be reduced subject to feedback on this matter.

- Airspace users split across different frequencies. GA at 2,000' may be able to receive LARS but military traffic at 250' might not. The military traffic will be operating with a LL squawk so the LARS unit should at least provide traffic information to the LARS user.

- GA pilots are encouraged to use Frequency Monitoring Codes when close to controlled airspace infringement hotspots. This introduces another 'split frequency' problem, but the point above still applies.

- Some GA pilots deem 'see and avoid' alone in class G to be sufficient and it is possible to operate VFR without a radio. Work continues to reach out to these groups.

There is no perfect solution and part of this campaign is to encourage use of LARS, which will be a big step forward. Placing more airspace users on the same frequency is a healthy step towards reducing the risk of MAC at LL. Increasing use of ADS-B technology across military platforms should also increase SA with cooperating aircraft. Despite all the above, **a visual lookout scan is still one of the primary barriers to MAC.**

Airprox Hotspot in LFA 7 – The Black Mountains 'Gospel Pass'

Numerous Airproxes have occurred recently where military aircraft emerge from the valleys to the south of the 'Talgarth/ Hay Bluff Gap' area flow system and meet gliders operating on the ridges. The UKMLFHB states that this gap should be flown in a north-westerly direction. Misleadingly it also states ridge soaring can be expected when the 2,000' wind is north-westerly. A recent site visit from the RAF Safety Centre revealed that gliders will ridge-soar the Black Mountains in **almost all wind directions**. A common cause of Airprox is when military aircraft exit the pass when gliders are soaring on the northerly ridge. Gliders are so close to their operating airfield that they will be on the Talgarth frequency (122.915) and **NOT** LL Common. Most will operate on FLARM so there will be little means of electronic warning to most military aircraft. If gliders are soaring close to the ridge there is limited potential for visual detection between pilots until the last-minute. A solution taking all these factors into account is being explored with reps from RAF Low Flying and Talgarth involved.

For now, crews should be aware of the potential to encounter multiple gliders and paragliders in the area and proceed with caution.

Should you book into the UKLFS and CADS when over the sea?

The UKMLFHB states a booking is not required when operating outside of 3nm from the coast. CADS SOPs in Section 5 state a CADS entry should accompany a Low Flying booking. These SOPs also encourage crews to submit a booking when operating above 2,000'. This practice is widespread and helpful as it affords other airspace users SA on your intentions. One exception to this is RN air systems operating from ships. They may have intermittent access to CADS so aircrew should not assume that all military users will be on CADS and other forms of SA (including from the Mk.1 eyeball) form an essential part of the MAC risk mitigation.

How certain can you be that aeronautical information in the UKMLFHB is accurate?

The UKMLFHB should be used in conjunction with the UK Civ AIP, UK Mil AIP, Low Flying Charts (LFCs) and other military flight information publications (MilFLIP). Much of the data in the UKMLFHB is duplicated from the AIP, and in some cases, data is drawn directly from the public. The advantage of this is ease of access to military users when planning sorties. The disadvantage is it risks being obsolete as soon as it's copied across. Updates to LFCs are overseen by No.1 AIDU and follow a regular cycle that factors change to the AIP. MAMC oversee the UKMLFHB and are not resourced to check the data in the same way or as regularly as No.1 AIDU checks the LFCs. Consequently it follows that data in the UKMLFHB should be treated with caution. Any errors should be reported to OC Low Flying; Glenn.Hodgson-Hutton840@mod.gov.uk. A digital solution is being explored to ease this problem, but aircraft captains are reminded that it's their ultimate responsibility to adhere to the source documents.

Any feedback on these matters should be directed to Sqn Ldr Pete Geddes, SO2 Flight Safety-Fast Jet, RAF Safety Centre.

1:500K Chart Showing the 'Gospel Pass' under the red dot.

SC45
Produced by Air Media Centre, HQ Air Command.

ROYAL AIR FORCE Safety Centre

Airprox Highlights

With Comments from Wg Cdr Spry

29 Sep 23
Chinook v Unknown Light Aircraft
Airprox No. 2023229

The Chinook Pilot reported that, during a VIP passenger task, they had completed a drop-off of the passengers in the SPTA and were returning to RAF Odiham for a refuel at about 2,000ft altitude when they experienced an Airprox with a civilian light-aircraft. The weather during the day was warm and clear with few clouds around 3,000ft altitude making it ideal conditions for general aviation and gliding. As the non-handling pilot, they were briefing the crew on a local game shoot avoid several miles ahead. As they scanned up from the map display, they noticed a light, high-wing aircraft, similar to a Cessna 172, ahead at a similar altitude and within 0.25NM, moving from right-to-left in the windscreen with a gentle bank towards. It was the black tyres that caught their attention, as the white fuselage was barely visible against the few clouds in the backdrop.
Their immediate sense was to take avoiding action, but they were unable to find the words to instruct the handling pilot. Instead, they took control, turning right and descending as they declared that they had control. The aircraft passed down the port side in the opposite direction. In hindsight, they believed that a collision would have still been avoided had no action been taken. Nevertheless, it felt uncomfortable. At the time of the incident, they were receiving a Basic Service from Wallop Approach. As they were due to be joining to land at RAF Odiham within the next 10min, they chose to switch agency and report the Airprox with Odiham Approach. Subsequently, the crew discussed the event and the conditions for the day in detail and noted the following observations:

1. The handling pilot noticed the aircraft at a similar time to the NHP, however, they did not feel that positive action was required. As a crew, they agreed that the positive action was a safe course of action, and that aircrew must feel able to take control if required regardless of rank or experience.

2. They suspected that, for a few seconds, it is possible that both the HP and the NHP scanned into the cockpit to view the map display at the same time. Prior to looking at the map display, the HP had confirmed that TAS was clear. This serves as a reminder to continually scan, be disciplined with heads in and out calls and to avoid eyes being drawn into the cockpit for too long.

3. TAS was set to display on both HP and NHP at 7NM with volume audible. It did not give an indication of a traffic confliction immediately prior to or during the event. TAS was monitored for the remainder of the sortie. The crew later concluded that it was operating unreliably, sometimes working well but other times failing to pick up aircraft within 5 miles. For example, when transiting on the London Heli-lanes, they passed within 3NM of an NPAS helicopter at a similar altitude working on Northolt Approach. TAS remained blank which should not have been the case assuming the aircraft was transponding. This serves as a reminder that TAS is a useful tool but should not always be relied upon and cannot replace good lookout.

4. Given the conditions of the day, a Traffic Service may have provided better awareness and protection.

5. There are a number of distractions in the cockpit, such as tablets, meaning that crews eyes are more likely to be drawn into the aircraft. This serves as a further reminder to continually scan, be disciplined with heads in and out calls and to avoid eyes being drawn into the cockpit for too long.

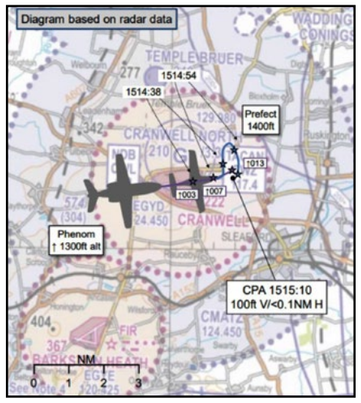
The unknown light aircraft pilot could not be traced.

For the full report, see Airprox No. 2023229 on the Airprox Board Website.

Spry's Comment:

This Airprox is a reminder that the see and avoid principle is the primary mitigation to MAC when VFR in uncontrolled airspace. We carry out risk mitigation against MAC on every sortie: we may increase our situational awareness by obtaining a suitable Air Traffic Service; our aircraft are fitted with some form of electronic conspicuity, whether it broadcasts our presence or alerts us of other suitably equipped air users (or both); we may elect a particular routing or altitude to minimise our encounters with other air users such as gliders or GA.

We can ensure that we have given ourselves the best opportunity of gaining early situational awareness on another air user, but there will inevitably be occasions other air users aren't as well prepared. In this incident, we can't confirm what MAC risk mitigation measures the other pilot had taken or if they had even seen the Chinook. A few days later, another Chinook had an Airprox with an FA200 aircraft. The FA200 was on a maintenance flight with the alternator not producing charge. The pilot had opted to save battery power for arrival and departure and so was flying with transponder and radios switched off enroute. Thankfully, it was a clear day and they had seen the Chinook in good time. Keep your eyes out of the cockpit and practise good 'eyes in, eyes out' discipline in multi crew platforms. It could save your life. ■



16 Aug 23
Prefect v Phenom
Airprox No. 2023182

The Prefect Pilot reported that, following completion of the circuits, the aircraft had been cleared to depart on a non-standard, left-hand turn, squawk 2610 and contact departures on Stud 3. During the process of flying this clearance, when established in the left-hand turn, they were instructed to climb "Not above height 1,400" due to traffic in the Coningsby instrument pattern.
This was acknowledged and as the aircraft levelled at 1,400ft whilst approaching a heading of approximately 360°, the departure clearance was changed to an 'End of Downwind Leg' departure due to the same traffic. The turn was then reversed to the right, maintaining 1,400ft, turning cross-wind to position downwind as directed. During this turn ATC asked if they were visual with the Phenom traffic, to which they responded "negative" but at this point a Phenom shadow was seen tracking under the aircraft. As the wings were rolled level "Airprox" was heard on the radio followed by "TCAS RA" from the same callsign and the Phenom was spotted to the left of the aircraft approximately 200-300ft below, departing on the extended runway centreline. The position of the identified aircraft was not deemed to be a conflict at that time and the sortie was continued as planned.

The Phenom Pilot reported that, during a PAR to RW08, at approximately 3NM, they were directed by Cranwell Talkdown to contact Cranwell Tower and continue visually due to 3 aircraft in the visual circuit. On frequency change, they were informed of a Prefect going around at circuit height, which they acquired visually. A "continue" instruction was issued on check-in due to another Prefect ahead on the runway to touch-and-go. They directed the trainee to continue on instruments for the test whilst they maintained visual contact with the traffic. None of the aircraft were perceived to be a threat and they were visual throughout the approach. At approximately 400ft they were cleared to touch-and-go.
Their extant departure clearance, provided by the radar controller, was to depart MID 2 not above 1,400ft owing to the active RAF Coningsby radar pattern. A normal visual touch-and-go took place, the instructor, as the IRE, was in the right-hand pilot seat.

The circuit deadside was to the left, and the previously reported Prefect was due to depart to the north.
Again, it did not appear to be a threat. On the runway they lost sight of the Prefect due to the limit of the windscreen but the departure lane was clear. On climb-out whilst still with Cranwell Tower, retracting aircraft services and accelerating to 180kts, at a height of approximately 1,100ft they heard ATC call "Prefect [C/S] are you visual with the departing Phenom?" At the same time, they saw a Prefect appear from the left-hand windscreen arch, converging left-to-right across the nose at a range of approximately 100m ahead in the 10 o'clock position, and 100ft above. The instructor immediately took control and initiated a descent, simultaneously they transmitted "Cranwell [C/S] Airprox". At the same time, they heard a TCAS RA "Descend, Descend" on the intercom which they also relayed to ATC.
The TCAS RA was short-lived and post their initial reaction. Their visual acquisition and reaction overtook events. The Prefect crossed their path above.

They believed that they bottomed out from the descent at approximately 900ft. They elected to depart the ATZ at 1,000ft to anchor east abeam Sleaford whilst they reviewed the incident and decided on a course of action, they informed ATC of their intention to remain clear until ready to recover to the airfield and curtail the sortie. They were not in the correct frame of mind to continue the test profile. With ATC confirmation that there was then only one aircraft in the visual circuit, and for RAF Barkston Heath avoidance, they requested a downwind join to land back at RAF Cranwell.
The circuit and subsequent landing were uneventful. On landing they spoke to ATC to confirm callsign details and inform them that they would raise an Airprox report. Both crews have since debriefed the incident with each other. As a result, they were informed that the Prefect pilot was directed to/elected to change intentions and depart via the end of downwind leg, hence the crossed path. Fortuitous to the incident was that they had been transferred to Cranwell Tower and did not remain on Talkdown for the touch-and-go, as this had provided the mental trigger for the ATC query to the conflicting Prefect traffic.

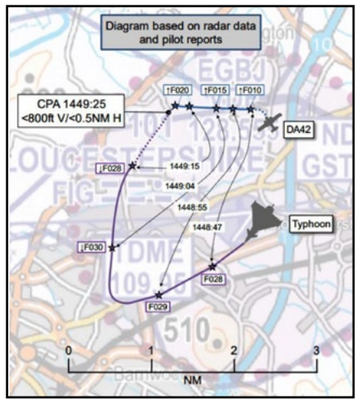
The Cranwell Tower Controller reported that they had two Prefects in the visual circuit, one looking for a VFR departure to the west, and the other conducting some visual circuits at the end of its sortie before landing. There was also one Phenom inbound making an instrument approach to the airfield, with the intention of conducting further instrument approaches. Cranwell had recently switched from RW26 to RW08RH; RAF Coningsby had various instrument approaches inbound to their airfield, resulting in a 1,400ft QFE climb-out restriction for departures from Cranwell. In addition, a "call for release" was active, requiring approval from the Cranwell Approach controller before aircraft could be cleared to depart the visual circuit; the only remaining departure of the day was one of the two Prefects already airborne in the visual circuit.

The departing Prefect (Prefect A) called downwind on their final circuit before departure, prompting the Tower controller to request release from the Approach controller. Departing to the west was unusual on RW08RH as it was the reciprocal direction; aircraft seeking a departure to the west would usually depart at the end of the downwind leg (EDWL), or with a Non-Standard Left Turn, as a left turn is outside the standard VFR departure arcs for RW08RH. This conversation was had between the Tower and the Approach controller, who requested the Prefect make an EDWL departure, which would also keep the Prefect away from the Coningsby radar pattern, which was still active. Prefect A [pilot] was cleared to touch-and-go.
During the time this clearance was given, and the aircraft was making use of the runway, the Talkdown controller requested the Phenom's clearance via the Radar Clearance Line. Given their relative speeds, there wasn't going to be time for the Phenom's clearance to be obtained so [the Tower controller] elected to instruct the Phenom to continue visually. The Phenom pilot switched to the Tower frequency, announced they were continuing with their gear down and, shortly after, when the runway was clear, was given the clearance to touch-and-go. Prefect A [pilot], now upwind, announced they were switching to the Cranwell Departures frequency. At this point the controller instructed the Prefect pilot to depart not above 1,400ft QFE, which was acknowledged. Then on the radar display they saw that Prefect A was turning left, and requested they make an EDWL departure to deconflict with Coningsby - this was also acknowledged. Seeing that Prefect A's turn was potentially going to conflict with the Phenom's flightpath, they asked Prefect A [pilot] if they were visual with the Phenom departing upwind. After a brief delay, Prefect A pilot acknowledged the radio call with their callsign, this was immediately followed by the Phenom [pilot] declaring an Airprox on frequency. Their next broadcasts clipped one another but it was heard that the Phenom pilot stated 'TCAS RA'.
The Phenom pilot appeared to comply with TCAS instructions and deconflicted with Prefect A by positioning beneath it. Prefect A continued turning crosswind and departed EDWL. The Phenom then repositioned ivo Sleaford and elected to RTB Cranwell visually and land.

Spry's Comment:

Ultimately, errors and mistakes within ATC led to the Prefect pilot to rejoin the circuit without full situational awareness, which led to this Airprox. The non-standard left turn for the NW departure was a suitable course of action but a controller handover had occurred between the clearance being given and its execution. The oncoming controller was unaware of the original clearance and the Prefect's actions were unexpected, hence the updated end-of-downwind-leg departure clearance. Although the Prefect pilot would have had generic situational awareness that the Phenom had been in the circuit from hearing the RT calls, they had not assimilated that a turn back across the climb-out lane would put them into conflict with the Phenom. Whilst instructions within the MATZ are mandatory, it is still your responsibility to ensure you have sufficient situational awareness to ensure you can see and avoid other traffic; it you are unsure about an instruction or the position of other aircraft within the circuit, ask and confirm.

For the full report see Airprox No. 2023182 on the Airprox Board website.



13 Sep 23
Typhoon v DA42
Airprox No. 2023219

The Typhoon Pilot reported that, as part of a trial work-up, they flew a practice diversion to Gloucestershire airport (GLO) to use their small runway for low approaches. The transit through the Daventry radar corridor was uneventful and the handover to GLO radar [sic] from Swanwick Military was timely but the transition to GLO Tower was slow. They were requested to make a 5 mile call to Tower, by GLO radar [sic], but were already at 1NM so elected to stay at 3,000ft on the QFE, that is, above the upper 2,000ft limit of their ATZ. Holding within the lateral boundaries of the ATZ but at 3,000ft on runway QFE, they circled over the airfield until two-way communication was accomplished with GLO Tower. They got acknowledgement from GLO Tower that they were at 3,000ft and were cleared 'Number 1 for RW22'. As they reset onto downwind for a 1,200ft circuit, at approximately 2,000ft, heading 041° magnetic, they quickly became aware of a DA42 flying towards them on a converging heading also at approximately 2,000ft, both aircraft being just within the lateral boundary of the ATZ. They pushed minus 1G to ensure a break in collision and called the traffic to the Tower controller. The Tower controller seemed to have acknowledged the confliction but, on review of their tapes, it was not definite that [the Tower controller] had acknowledged the close call. They queried if there might be other conflicting traffic and that they were definitely cleared to proceed in the visual circuit. Helicopter traffic at a similar height, with a separation of 2NM, that was outside of the GLO ATZ, was called to them and they got [sight of it] quickly. Seeing that there was no further confliction, they continued their circuit work. They completed their low approaches and departed without further incident. During their return to base, they called through to their squadron operations and requested they call GLO on the landline to question the incident, and GLO confirmed that they were not aware of nor had received a report of the [Airprox] occurring. The Typhoon pilot had not initiated an Airprox airborne as they thought the message to GLO had been heard, understood and acknowledged. Only after review of their tapes did they believe that was not the case. Use of historic ADS-B tracking allowed them to talk directly to the Pilot-in-Command of [the DA42] who confirmed that they too had not been given a traffic point out to the Typhoon, but they were visual throughout and also actioned a breakaway based on visual contact with them, once they had assessed that there might be a confliction. [The Typhoon pilot's] assessment of separation is not less than 500ft.

The DA42 Pilot reported they were conducting a CPL skill test. The candidate requested taxi [instructions] and was told to hold at C1 for a RW09 departure as planned. They were then informed by the Tower controller that an inbound military aircraft would be operating in the circuit soon, and that if they did not depart relatively quickly, they would be expected to hold for this traffic. The Tower controller suggested a RW04 departure to expedite the departure (shorter taxi time). As the candidate had completed performance for all runways, they accepted this suggestion and stopped at the holding point for RW04. Another aircraft was told of the inbound military aircraft and was then given a take-off clearance for RW27 (wind reported on ATIS 'R' was 040/02). After completing pre-take-off checks and reporting ready, they were cleared for take-off to depart to the northwest and were passed Traffic Information on the light-aircraft that had departed RW27 ahead of them. The candidate had confirmed that they were visual with this light-aircraft and departed RW04. At approximately 1,500ft QNH the PIC heard and almost simultaneously spotted the Typhoon to their left overhead the airfield. [The Typhoon pilot] reported at 3,000ft and was told to report final RW22. They pointed the Typhoon out to their candidate [who] had the previously mentioned light-aircraft in sight but they had had no prior notification of the proximity of the Typhoon to the overhead. As the Typhoon rolled right and started to descend towards base leg for RW22, their candidate instinctively increased pitch attitude to increase climb rates, as it appeared that the other aircraft was going to pass below them. They thought the Typhoon [pilot] made a radio call having seen them, and also thought that they had, themselves, made a cryptic comment too. They saw the Typhoon pass directly below their aircraft, with approximately 500ft vertical separation.

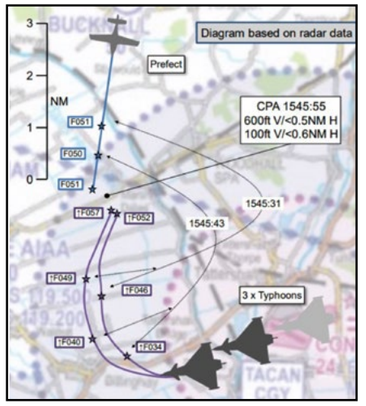
The Gloster Tower Controller reported at 1447 they cleared [the DA42] for take-off from RW04 with a left turn to the northwest after noise abatement. The [Typhoon] had been pre-noted by Swanwick Military at this time. At 1448 the [Typhoon] was on frequency 8 miles north with Gloster Approach. They first observed the [Typhoon] on what they believed to be [direct on runway heading] for RW22. Before they could pass any Traffic Information or delay the [Typhoon] pilot reported passing a DA42, at this point [the Typhoon] was due west of the field. They had given [the DA42 pilot] RW04 for expedition purposes. If [the DA42] had taxied to C1 for RW09 it would not have been airborne and [the crew] could have expected a delay of approximately 20-30min. Their plan was initially to delay the Typhoon in the overhead, then pass Traffic Information and integrate them accordingly.

The Gloster Approach Controller reported they had been anticipating the arrival of the Typhoon for some minutes and arranged ATZ traffic accordingly. The aircraft was pre-noted by Swanwick Military. They could not remember what level [had been] said, possibly FL70 or 80, but, as [the Typhoon] would be joining VFR, they had not allocated a level. On first contact, they thought [the Typhoon pilot] reported 8 miles northeast. There was some conversation about which runway they required, the wind was light so the Tower controller said they could have RW04 or RW22. [The Typhoon pilot] chose RW22 and requested a base leg join. They asked [the Typhoon's] range and [the pilot] reported 1NM, [being] closer than they had expected. The Tower controller asked where [the Typhoon] was and they said they had just heard them go over the top of them, they believed northeast to southwest. They transferred [the Typhoon C/S] to Tower and thought they heard the Tower controller ask them to report downwind. They assumed that as [the Typhoon] had been quite high on first contact and close to the field, they had done a 'run and break' type manoeuvre, overflying RW22 and turning right downwind to lose height. They heard the Tower controller say that a DA42 had been mentioned, presumably the [DA42 C/S] who had departed from RW04. They had been expecting the aircraft for some time, and they knew that the Tower controller had been offering expeditious departures to move everything out of the way, so they were surprised that there had been a conflict.

For the full report see Airprox No. 2023219 on the Airprox Board website.

Spry's Comments:

This occurrence highlights potential issues when fast jets operate at an airfield accustomed only to GA. In this case the conflict was with an aircraft on a procedural instrument approach, but frequently we see confliction issues around the circuit. Page 104 of the CAA's Skyway Code summarises the circuit joining procedures for GA, which military pilots may not exercise routinely. Whilst an overhead join is impractical for a fast jet pilot to fly, it indicates what to expect from GA in terminology all pilots will understand. In this case the Typhoon sensibly held with altitude de-confliction until SA on traffic was assimilated; unfortunately, this was not passed by ATC and the pilot relied upon 'see and avoid.' If you're placed in a similar position, refresh yourself on the overhead join procedure before flight so you can integrate with the best possible SA. Once airborne, do as this pilot did and don't try to mix fast jets and GA in the circuit. Keep your eyes out of the cockpit and expect the unexpected!. ■



7 Nov 23
Prefect v Typhoon
Airprox No. 2023249

The Prefect Pilot reported that they were conducting an IF sortie with a planned transit to return to Cranwell from the OTR beacon which was being conducted at 4,500ft on the Barnsley RPS. During the transit a Traffic Service had been established with Waddington LARS having been handed over from Humberside. Approaching east abeam Scampton, ATC requested that they maintained their current heading due to the Waddington RA(T), which was agreed with. Shortly afterwards ATC contacted and informed them that Coningsby was due to launch a formation and requested that they maintained not below 4500ft, this was also agreed with. Shortly thereafter they were informed that the formation would be launched from Coningsby but that it was 'restricted below' them. A little while later they received several traffic alerts from the TAS; due to the speed of the Typhoon this was not something that appeared unusual, and they remarked to the trainee that it would likely be the formation 'restricted below'. Given that they were confident that the formation would remain below their level there was no great urgency in the cockpit to resolve the conflict. Shortly after this, they became visual with a Typhoon (they estimated 1NM ahead) at their current level. It became apparent that the formation was not remaining below them and so [the Prefect pilot] began to visually look for the whole formation. They became visual with two aircraft both approximately at their level, both climbing. The closest aircraft passed down their left-hand side, slightly above, climbing. As the aircraft were passing, Waddington gave Traffic Information on the formation and asked if they were visual, to which they indicated they were, and commented that the Typhoons were 'not restricted below'. During discussion with the Waddington LARS post event, it became apparent that a third unseen aircraft went underneath them, they never got visual with this conflict and believed it to be a pair only.

The Typhoon Pilot reported that they were the lead aircraft a formation of 3 Typhoons. Whilst on the ground at RAF Coningsby, they were given the departure clearance "MID N FL150". During departure the formation switched over to Coningsby Departures once the No3 was airborne. On initial contact, ATC said "Climb FL150 Traffic Service, traffic north 3NM, tracking south, 4,500ft", which was provided when they were already passing through 4,500ft QFE. [There was] a further call of "traffic north 2NM, tracking south, same level" when they were at 5,000ft QFE. Due to having already climbed through the Prefect's level, they assessed this aircraft as no longer factor traffic.

The Waddington Controller reported that they were providing the Prefect pilot with a Traffic Service and also had an aircraft on a Basic Service. Following a request from the WAD RA controller, the Prefect pilot was asked to maintain their heading on recovery to Cranwell to prevent them straying closer to WAD as the RA(T) over WAD was active and the Red Arrows formation was close to the east/southeast boundary. The Basic Service track was at 2,500ft Cranwell QFE under an agreement with Cranwell, crossing the Cranwell stub south-to-north. The WAD Supervisor received a call from Coningsby asking for Traffic Information on the Prefect, they informed them it was 'Prefect shortly to recover to Cranwell, 4,500ft Barnsley'.

The Supervisor passed on the information to Coningsby and then asked "can he maintain 4,500ft?" They transmitted "Prefect [C/S] for coordination with Coningsby are you able to maintain 4,500ft", to which the pilot agreed, this information was passed on to Coningsby. The Supervisor then informed them about the [Typhoon] formation departing Coningsby to the north, restricted below, and they passed the information on to the Prefect pilot. They were then told that the Helimed was on start, going to the north and were passed a flight strip from the WAD RA controller. They saw [Typhoon callsign] formation rolling and then received a freecall for a Basic Service track, which then divided their attention. Subsequently, an STCA then triggered between the Prefect and the departing Typhoons which they expected whilst the Typhoons climbed to the agreed level below. The alerts continued which was when they realised the Typhoons were in a continuous climb giving them a very short window to call traffic between transmissions. They called the [Typhoon C/S] formation traffic to the Prefect pilot as 'south half a mile climbing, are you visual?' By this point they believed it impossible to make any safe meaningful intervention in the scenario. The Prefect pilot called visual and queried if the traffic was no longer restricted below; to the controller's knowledge they believed they were. The WAD Supervisor called CON Supervisor to discuss the incident. At the closest point, they believed there was less than half a mile between the Prefect and the Typhoon formation leader with Prefect Mode C reading 051 and Typhoon reading 050 climbing. It appeared that the first two aircraft in the formation climbed above the Prefect, whereas the third aircraft in the formation stayed below and went underneath.

The Waddington Supervisor reported that they received a call from CON DEPS requesting Traffic Information on traffic which was northeast of WAD 8NM tracking south. They informed the CON DEPS that it was a Prefect at 4500ft Barnsley QNH inbound to CWL, shortly descending. They were asked if the Prefect could maintain 4500ft QNH against traffic departing CON to the north. [The Supervisor] requested that the LARS controller ask the Prefect pilot if they could maintain 4500ft to facilitate departures from CON, this was agreed, and the CON DEPS controller informed. CON informed them that there were 3 x Typhoons departing CON squawking 1741-1743, they then checked what the code callsign was assigned [Typhoon C/S]. Although no formal agreement of coordination was made, they were convinced that CON would be restricting their departing traffic below the Prefect, which was why they asked [Waddington] if they could maintain 4,500ft. After they saw the Typhoons fly through the Prefect's level they called the CON SUP to check why this happened; there was no time to intervene.

For the full report see Airprox No. 2023249 on the Airprox Board website.

Spry's Comments:

See and avoid when operating VFR may be the only barrier to MAC as the formation collects during a radar trail departure. The controller misjudged the situation and didn't pass any de-confliction measures, but strictly speaking, the weather was fit for VFR and was under no legal obligation to do so. Pilots frequently operate on tower frequency until all formation members are airborne and should be reminded to maintain their obligations when VFR. This can be difficult when also trying to join close formation on the lead, so the emphasis should be on the lead to enhance lookout on behalf of the formation. Changing to departures on the runway (even on a nice day) can help build SA and consider the merits of staying on tower frequency if there is no circuit traffic. A close formation take-off or a reduced stream take-off interval would also minimise the time without provision of a radar service. ☐

Safety Contacts:

Group / Station / Unit	Flight Safety Officers	Health, Safety & Environmental Protection Advisors
1Gp	01494 495454	-
2Gp	01494 495049	-
11 Gp	0300 165 7695	-
22 Gp	0300 1540 190	-
Air Support	01494 497923	-
BM	95760 3230	
JHC	01264 381526	-
Test & Evaluation (ASWC)	01522 727743	-
1ACC	01522 603359	-
2FTS	01400 264522	01400 264551
3FTS	01400 267536	-
4 FTS	01407 762241 6666	-
6FTS	01400 266944	-
Air Cadets (RAFAC)	-	01400 267817
Boulmer	01665 607325	01665 607282 / 7289
Benson	01491 837766 6666 / 7525	01491 827109 / 7254
MOD Boscombe Down	01980 662087	01980 662312
Brize Norton	01993 895764 / 6666	01993 895525 / 7062
Coningsby	01526 346575	01526 347256 / 7196
Cosford	01902 704037	01903 37472 / 237
Cranwell	01400 266666	01400 267469 / 7498
Defence Geographic Centre	0208 8182816	94641 4816
Fylingdales	-	01751 467216
Halton	01296 656666	01296 656640
Henlow	01462 851515 6150	01462 857604
High Wycombe	01494 494454	01494 496489 / 5094
Honington	01359 236069	01359 237782 / 7516
Swanwick	01489 612082	-
Leeming	01677 456666	01677 457637 / 7231
Leuchars	01334 856666	-
Lossiemouth	01343 816666 / 7714	01343 817796 / 7697
Lynham	-	01189 763532
Marham	01760 337261 6666	01760 337595 / 7199
No1 AIDU	02082 105344	-
Northolt	020 8833 8571	02088 338319 / 38521
Odiham	01256 702134 6666 / 6724	01256 702134 7650 / 7733
Scampton	01522 733053	01522 733325 / 3137
Shawbury	01939 250351 6666	01939 250351 7529 / 7559
Spadeadam	-	01697 749204
St Athan	01446 798394	01446 797426 / 8250
St Mawgan	01637 857380/95423 7380	01637 857162
Syerston	01400 264522	01400 264551
Tactical Supply Wing	95461 7177	-
Valley	01407 762241 6666	01407 767800 / 7685
Waddington	01522 726666	03001684954
Wittering	01780 416377	01780 417611
Woodvale	01704 872287 x 7306	
Wyton	01480 52451 7554 / 7146	-
Overseas Flight Safety Contacts	**Telephone**	**Email**
Al Udeid	9250 060 451 3043	83EAG-DepFSO@mod.gov.uk
Ascension	00247 63307	BFSAI-ASCOpsOC@mod.gov.uk
Akrotiri	94120 6666	BFC-Aki-Safety-AssuranceSFSO@mod.gov.uk
83 EAG	9250 060 451 3050	83EAG-AIROPSFSO@mod.gov.uk
Gibraltar	9231 98531 3365	GIB-RAF-ASM@mod.gov.uk
MPA	00500 75490 or 94130 5490	BFSAI-AirOpsWg-ASM@mod.gov.uk
Tactical Leadership Programme	0034 967 598527	aa3@tlp-info.org
Naval Air Station Jacksonville	001 904 542 4738	-

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