The RAF Safety Magazine

Issue 41

AirClues

Drone Collision
What is the Risk?

Fatigue Medication for Aircrew

Aircrew Disorientation

ROYAL AIR FORCE
Safety Centre

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Foreword

by the Inspector of Safety (RAF) Air Cdre Sam Sansome

Air Commodore Sam Sansome

Welcome to Air Clues 41. We have been including a centrefold cut-out poster of RAF aircraft in the magazine for some time now. I hope you are enjoying these. In this issue, it is a great privilege to mark His Majesty The King's Coronation with a picture taken of the Red Arrows over London. It was a rather cloudy day otherwise, so this unusual angle is fabulous.

There seems to be a constant message of change wherever you look at the moment and the Safety Centre is not immune. Since the last edition we have had a number of people move on to different jobs in the RAF but we have also had a couple of people leave the Service and Civil Service that I think deserve a mention. First up AIR's Chief Environment and Safety Officer, Paul Byers, has left the post on retirement after almost 12 years in the role – his advice and guidance to successive CASs and my predecessors was greatly appreciated and his personal contribution to safety of our people was tremendous. Fortunately for us his replacement, Lizzy Kijewski, is already in post and busy answering your queries; she has been watching Paul in the role for the last couple of years so I know that we are in good hands.

Secondly Flt Lt Avril Webb will be leaving the RAF SC shortly after some 7 years in our promotions team. As well as being the friendly face at the Safety Centre stalls handing out Safety Centre branded goodies, Avril was familiar to most as the Human Factors Facilitator at RAF High Wycombe. Our conservative estimate is that she has trained over 10,000 people – in classes of 15 or less! This is frankly astounding and I am very pleased to say was recognised by the award of an AOC 11 Gp Commendation for her services to Human Factors and Safety in the RAF. My personal thanks to you both.

By the time this is in print we will be well into the hotter part of the UK year and it would be remiss not to remind everyone to stay safe – make sure you have done the necessary Heat Illness training and make sure you are aware of the symptoms and recovery actions. If you are in any doubt refer to the Individual's Guide to Heat Illness in JSP375 Chapter 41 Annex B – better to be safe than sorry, and that is both at work and when you are at home or on the beach.

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

Lieutenant Milne RN – 3 FTS – Green Endorsement

On 12 August 2022 at RAF Barkston Heath, Lt Milne RN was tasked with delivering an early Elementary Flying Training exercise in a Prefect T1 aircraft. Shortly after the trainee's practise of the take-off, he took control of the aircraft to begin the teaching element of the air exercise. On entering a gentle climbing turn to the right passing 800ft a 'Check Oil' aural warning sounded with an associated red OIL LO PRESS caption. Lt Milne initially suspected a possible engine oil leak and made the decision to terminate the departure and turn towards the downwind position in the circuit.

Lt Milne took the decision to continue a gentle climb to ensure sufficient altitude in the event of an engine failure whilst also putting the aircraft above minimum abandonment height in case the worst should happen. He achieved 1,500ft before the aircraft suffered a significant reduction in thrust. The 'Immediate Actions' were carried out in accordance with the Flight Reference Cards and Lt Milne selected the power lever to a mid-ranged position; however, the engine was unresponsive. A 'Mayday' call was transmitted to Air Traffic Control and the aircraft was established at a glide speed of 105kts. Lt Milne noted a change in engine tone commensurate with a slowing of propellor rotation to a point where he could see individual blades, which were approximately 75% feathered, with an associated engine torque indication of zero percent. With the propeller seemingly producing nil forward thrust, Lt Milne elected to try advancing the power lever once more, to no avail.

The aircraft had now descended to 950ft, short final for the alternate Runway 28 at RAF Barkston Heath. Lt Milne considered Runway 28 not to be an option for their current position and energy level and took the decision to intercept a low-key position for Runway 06. With the aircraft now lower than the ideal academic pattern, and no evident thrust, Lt Milne was committed to a forced landing. He informed ATC that they would be making an approach to Runway 06 and positioned the aircraft with precision to intercept the final turn towards their Initial Aiming Point. Lt Milne delayed the selection of landing gear and flap until the latest safe opportunity to preserve the aircraft glide performance. The aircraft landed safely on Runway 06 with the propellor still turning in a feathered state until Lt Milne shutdown the engine.

Mr Mick Spray – RAF Lossiemouth – Acquila GRMS
Well Done

Contractors at RAF Lossiemouth had been working on the airfield taxiway and, upon completion of the work, Rover 1 had been tasked with escorting two contractor vehicles from the airfield. At the same time, Mr Spray was operating on the airfield and behind the convoy of escorted contractor vehicles. It was from this vantage point that Mr Spray noticed that tools had fallen from one of the contractor vehicles. Mr Spray immediately informed the Tower who, in turn, notified Rover 1, thus stopping the convoy and informing the contractors of the occurrence.

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

IX(B) Squadron was conducting two waves of red air taskings and AS1(T) Wright was part of the see-off team. During pre-taxi checks on the second wave, AS1(T) Wright noticed a missing panel on the underside of the wing on one of the Typhoon aircraft.

Sergeant Tyreman – RAF Leeming – Commendation

Since the inception of Modnet and Windows 10, the MOD decided to no longer support Info-Path which resulted in multiple In-Form issues, an inability to load reports and an overall reduced reporting rate at RAF Leeming. Sgt Tyreman designed an INForm App for the RAF Leeming Error Management System (EMS) and, for the following 3 months of his own time, he completed the work until it was launched in March 2022. The App was a game changer for the EMS at RAF Leeming and report rates rose. It is easier for both reporters and LEMSCo's to use, the confidential report remains confidential, and feedback to the reporter is sent each time a change has been entered.

Mr Michael Shortley – RAF Waddington – Well Done

Mr Shortley was on duty in the Truck Runway Caravan at RAF Waddington. He was monitoring a Red Arrows formation departure of 4 Hawk aircraft – checking the configuration of each aircraft in turn. Moreover, the Hawk is relatively new to operations at Waddington, meaning he was less familiar with the type than other aircraft operating from Waddington. On checking the final aircraft in the formation, Mr Shortley noted that a small access panel was open mid-way down the right-hand fuselage. Correctly assessing that this was abnormal, he immediately informed the Tower Controller who informed the crew.

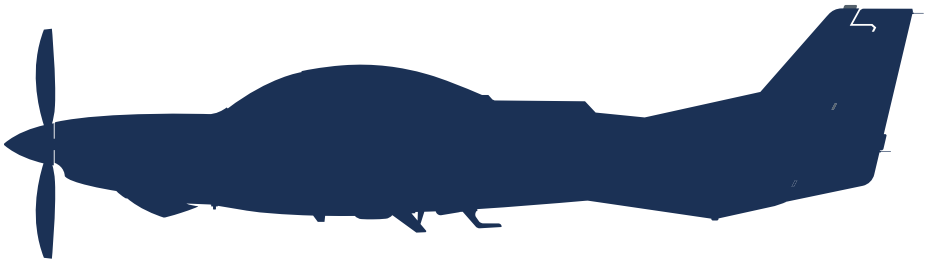
Mr James Cunningham, in his role as Ops Officer at RAF Barkston Heath, was checking and assuring the NOTAM plots on the electronic Military Aviation Planning Portal as part of the morning brief preparation. He identified an equestrian event that should have been annotated as an 'Avoid', but in fact was only displayed as a standard 'Warning' and was therefore without the additional visual flag of an exclamation mark within a red box in accordance with regulations. Realising the potential for crews to overlook the importance of this NOTAM, he immediately highlighted his concerns to the aircrew at RAF Barkston Heath as well as to colleagues at RAFC Cranwell and filed a DASOR.

Mr James Cunningham – 3FTS Ops (Ascent) – Well Done

Squadron Leader Balshaw – CFS – Good Show

Squadron Leader Balshaw was flying a visual circuit sortie in a Prefect T1 aircraft to return a 57 Sqn QFI to flying currency. Following four normal circuits and a practice Engine Failure After Take Off (EFATO), he was cleared by Air Traffic Control to undertake a practice Turnback EFATO. This exercise was successfully executed; however, upon selecting the undercarriage up, the gear indications remained at 3 reds. They climbed the aircraft to 1,500ft in the circuit to diagnose the issue and a made a PAN emergency call. As the aircraft was climbed to height, the hydraulic pressure caption illuminated, indicating that the hydraulic pump had been running for longer than 60 seconds. The crew actioned the 'Gear Fails to Lock Up or Retract Fully' drill from the Flight Reference Cards. On selection of the landing gear down, initially nothing happened, then one main landing gear indication turned green.

At this point a visual inspection from a departing aircraft was requested. In the time that the other aircraft took to get into position to inspect the undercarriage, the other main landing gear leg had also locked down, but the nose wheel still indicated red. This was confirmed by the crew conducting the visual inspection, who reported that the nose wheel leg appeared to be 'somewhere between up and down'. At this stage it was noted that the hydraulic contents gauge on the aft bulkhead was indicating zero and the crew could smell hydraulic oil. The 'Landing Gear Extension' drill was then actioned, with the shepherd aircraft reporting no movement of the gear when a recycle was attempted. This was then followed by the 'Emergency Landing Gear Extension' drill. On completion of this drill all three undercarriage legs were indicating down and locked. This was confirmed from the shepherd aircraft. The aircraft was then landed safely and shut down once clear of the runway. Upon vacating the aircraft, it was noted that the nosewheel and the underside of the aircraft was covered in hydraulic fluid.



Flight Lieutenant McMullan – NUAS/11 AEF – Good Show

Flt Lt McMullan was an AEF pilot with an air cadet flying in the vicinity of RAF Leeming in a Tutor aircraft. During this sortie, the cadet started to feel unwell following some gentle aerobatic manoeuvres. Flt Lt McMullan immediately ceased aerobatics and returned to straight and level flight, then commenced a gentle recovery to base, re-assuring his cadet who was by now becoming less verbally responsive. The cadet suddenly became unresponsive and slumped forward in their seat. Flt Lt McMullan promptly declared to Air Traffic Control that he had a medical emergency, ensuring both that he received priority over other recovering aircraft and alerting Air Traffic Control to the likely need for medical assistance on landing. In addition, he flew the aircraft whilst providing first-aid to his unresponsive Cadet; he maintained a clear airway by gently raising the chin from the slumped position. On landing the Cadet regained consciousness and was seen immediately by medical personnel.

Captain Nicholas Riddin – 3FTS – Good Show

Captain Riddin was the aircraft captain of a Prefect T1 aircraft operating from RAF Barkston Heath. On 28 July 22, whilst taxying, he took control briefly from the trainee Qualified Flying Instructor to test his brakes and steering. On doing so he perceived that slightly less force than usual was needed to move the control column to the central position from its usual resting place in the forward position. Sensing something was amiss, Captain Riddin elected to cancel the sortie and returned the aircraft to the engineers for further investigation.

On the first wave of the following day, Captain Riddin checked the external movement of the elevators as normal during a pre-flight walk round of a different airframe. He perceived that the force required to lift the elevators was less than normal. Having checked the aircraft either side of his, he assessed that this was the case and that his assigned aircraft might be suffering the same fault as the one the previous day so again placed the aircraft unserviceable with the engineers. As a result of the identified fault, Prefect operations were paused until sufficient technical investigation could be undertaken and appropriate advice sought.

Mr Mark Slater – Affinity Flying Services – Well Done

Mr Mark Slater was an Affinity handler at RAFC Cranwell observing a Prefect aircraft see-off from the Affinity Operations area. He noticed a fellow handler fastening the right-hand seat straps for a planned solo sortie whilst the pilot was entering the left-hand seat. Because Mr Slater felt this was unusual, believing the pilot in command should be in the right-hand seat, he asked the Affinity operations officer if indeed it was correct. A call was then made to the Ops desk which confirmed his suspicion that the pilot had entered the incorrect seat for a solo sortie. Immediately a call was made to the ramp supervisor who informed the pilot prior to aircraft start.

Mr Simon Evans – 3FTS/45 Sqn – Well Done

Mr Simon Evans, a Civil Service instructor on 45 Squadron Mission Aircrew Foundation Training, was instructing trainees on military charts and, whilst using the controlled airspace around Aberdeen as an example, he noticed a potential discrepancy. By comparing military and civilian charts of the area, it became apparent that the charts were representing the same piece of airspace as differently shaped areas in different locations. Not content to accept the discrepancy, Mr Evans cross-checked with further UK military and civilian charts and rapidly concluded that several military charts were incorrect. Mr Evans immediately took the appropriate steps to raise the issue with the local Air Safety Team and submitted a Defence Aviation Safety Occurrence Report and a corresponding Civilian Aviation Authority Mandatory Occurrence Report to alert the relevant authorities.

Corporal Clift – RAF Lossiemouth – Good Show

Cpl Clift was undertaking the task of replacing the Number 1 hydraulic accumulator on a Typhoon aircraft whilst on deployed operations with 1(F) Sqn. He noticed that one of the Variable Exhaust Nozzle petals on the right-hand engine was fractionally out of orientation when compared to the other petals. Despite this being completely unrelated to his task of replacing the hydraulic accumulator, Cpl Clift noted that this misalignment was uncharacteristic and justified further investigation. Although difficult to spot without a trained eye, Cpl Clift identified that the misalignment was a result of a missing upper hinge pin from the petal assembly.

Cpll Clift identified that the missing pin could pose a significant risk to airworthiness and be a serious flight safety hazard. He immediately informed his shift management to highlight the risk of a suspect loose article and possible mechanical failure of the petal.

Major Martin – RAF Shawbury – Well Done

Maj Martin was conducting a pre-flight walk round of a Juno HT1 helicopter at RAF Shawbury. He took the time to check the hydraulic fluid sight glass tubes – a check that is not listed or mandated in the Flight Reference Cards. He noticed that the No.1 sight glass was full of air and did not contain any hydraulic fluid. The limitation for the system is that it can contain no more than 50% air. Maj Martin elected to notify the Airbus Helicopters UK engineering team who confirmed his findings and placed the aircraft unserviceable.

Air Specialist (Class 1) Griffith – RAF Benson – Good Show

During the routine morning import and export of Flight Safety critical information conducted by the Aeronautical Information Cell at RAF Benson, AS1 Griffith noted that the information displayed on the Puma Mission Support System, electronic tablets used by the aircrew both for flight planning and during flight, detailed incorrect heights on the NOTAM and Royal Flights section of the newly downloaded information. AS1 Griffith quickly conducted a further check of all the information on the system before he determined that the integrity of the data was compromised due to an unknown fault. He immediately informed his chain-of-command of the issue to ensure the message was passed to all relevant flying units that there was a potential issue with their mission planning equipment. Following this action, he liaised directly with industry to ensure that the fault was highlighted. On investigation AS1 Griffith found the potential cause of the fault and quickly made adjustments to correct the issue. After amending the incorrect information caused by the software fault, he then used a separate system to find all correct information before manually modifying all of the NOTAMs and Royal Flights. Having ensured the integrity of the data he passed all findings back to industry for their further investigation and provided key insight into the issues and faults seen.

Sergeant Hill – 645th USAF Sqn (Embed) – Good Show

Sgt Hill was deployed from RAF Waddington as part of the 645th AESS Product Assurance Electrical team in the USAF. He was carrying out detailed and in-depth close-out inspections to highlight faults that require remedial rectification. Upon completion of installation of the No 4 Engine on a UK Rivet Joint aircraft, an inspection was executed and Sgt Hill highlighted numerous wiring faults as well as a singular fault which would be classed as falling well outside of his trade boundaries. Within the No 3 Engine nacelle, a cut wire was identified. Finding this cut was remarkable considering its location and proximity to other wires within a large wire loom. The resulting rectification was the replacement of the entire single wire running from the No 3 engine to the flight deck. While conducting the same inspections on engine No 4, Sgt Hill also identified that the heat insulation blanket at the rear engine attachment point was torn and split exposing the internal thermal barrier material.

Sergeant Mitchell – RAF Shawbury – Well Done

Sgt Mitchell was providing Air Traffic Services from RAF Shawbury to a Robinson R44 helicopter on a flight from Manchester Barton Airport to Birmingham. When approximately 5 miles south of RAF Tern Hill, a secondary airfield for RAF Shawbury, the pilot reported being met with a wall of snow clouds; these could not be safely navigated around and had been forecasted to have already passed through the area. Returning to Manchester Barton was not feasible at the time, and neither was continuing with the onward flight. Sgt Mitchell elected to direct the aircraft to land at RAF Tern Hill to avoid the weather, despite no ATC presence on the aerodrome, rather than have it land in an unsecure field or clearing. Furthermore, Sgt Mitchell informed the resident firefighting section at RAF Tern Hill, who were able to offer assistance to the R44 crew on landing.

Mrs Laura Saunders – RAFAT Eng (Babcock) – Well Done

Mrs Laura Saunders was tasked to carry out an unaided visual inspection of a replacement tailplane for a RAFAT Hawk T Mk1 undergoing Primary Maintenance. Having thoroughly cleaned the tailplane attachment points she identified a very small area of surface finish (paint) that appeared to have a hairline crack, barely visible to the naked eye. Concerned this may not have been just paint deformation, she raised her concerns to the Primary Team Lead, advising the area of surface finish should be removed to facilitate a more detailed visual inspection. Once agreed, the surface finish was removed, and Mrs Saunders was able to positively identify a hairline crack approx. 5mm long in the Tailplane Actuator Attachment Bracket.

Other Awards

RAF Gibraltar's Station Commander, Wing Commander Annella Doherty was pleased to present two personnel with their Station Commander Safety Commendations. Pictured left is Mr Joaquin Ignacio and on the right is Warrant Officer (Class Two) Neville Boyd.

ROYAL AIR FORCE

Safe Lifting

Life Saving Rules

I only operate equipment that I am trained to use and is verified fit for use.

I never walk under a suspended load and obey barriers and exclusion zones.

I only lift equipment that has been declared serviceable by an in-date thorough examination.

I keep the load close to my body and adopt a stable position when required to carry out manual handling tasks.

I have read and fully understand the requirements of the Risk Assessment before conducting the activity.

SC140
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Civil Insights From the UK Flight Safety Committee

Certification and Safety – Where is it going?

By Air Cdre Dai Whittingham (Retd - former AO ISTAR)

You would have needed to avoid reading or watching news feeds entirely over the last few years to have avoided coming across the Boeing B737 MAX saga. Beyond the terrible, and arguably avoidable, loss of life in the accidents in Indonesia and Ethiopia, there have been profound implications for the world of design and certification, and also for the airworthiness system. The question now is whether the lessons – or at least those that are accepted once the corporate lawyers have had their days in court – will feed into the latest developments in the quest to make aviation cheaper.

What has this got to do with military aviation? You abide by the same airworthiness principles via the D&S, MAA and Duty Holder constructs now set in tablets of stone in the wake of the Nimrod accident and the resulting Haddon Cave Review. Those principles are there to provide assurance that an air platform can be operated safely, i.e. that risks to occupants and third parties have been reduced to the ALARP level, especially where Risk to Life is concerned.

Duty Holders have the ability to vary tolerance for risk in order to achieve an operational output but must still comply with ALARP, so a decision on "Practicable" must reflect the operational context. Fielding a new weapon system procured under a UOR might lead you towards an initial clearance with limited evidence, but there remains the need to follow through with more complete testing when time allows. And an 'emergency clearance' is, as the name suggests, for use when there is no time for anything else and the risk must be tolerated.

As an example of how this works in practice, the Nimrod R1 (other ISR platforms are now available…) had an emergency clearance to operate with an OAT of +50°C, though its formal clearance was only for +45°C. The ODH's instructions were very clear: if the task was pre-planned under normal ATO arrangements, the aircraft was restricted to +45°C and would need to fly earlier (or later) to fit round predicted air temperatures. However, if there was an urgent or developing situation where there was a significant increase to RtL for those on the ground, then use of the emergency clearance was authorised.

For commercial operators, there are no concessions to stray beyond the bounds of whatever has been certified by the regulator. If you operate deliberately above the published MTOM, your flight becomes illegal, it's as simple as that. All public transport aircraft have a Minimum Equipment List that specifies not only the systems that can be inoperative but also the number of flights or sectors permitted before a defect must be rectified. Regulators can, and do, take enforcement action against operators that have knowingly breached MEL requirements. That said, it is ultimately the aircraft commander that takes the decision on MEL issues. Sadly, commercial pressures are such that many defects that might keep an aircraft on the ground mysteriously

only emerge on the final leg of a multi-sector day – this is a behavioural issue, with professionalism at its heart.

This last point is a useful reminder that airworthiness is a system, not just a set of processes, and that people have a significant role in it, whether that be in operating within the limits that have been set, completing maintenance in accordance with the published procedures, or being trained to the appropriate standard. Which brings us back to the MAX. It has been argued that the MAX accidents stemmed from the combination of work-rounds to meet a certification standard (related to stick force gradient), assumptions on pilot recognition and response for non-normal conditions, and inadequate training. The sentencing of risk for pilot recognition and response conveniently assumed an outcome that did not require additional simulator training, and the work-round (MCAS) was not classified as one which required significant extra testing or approvals from the certifying regulator (the FAA).

It will be some time before all the MAX court cases are complete, at which point it will become clear whether the risk decisions were deliberately convenient, i.e. to maintain production timelines and maximise profit, or whether they were simply unfortunate. Regardless, we should not lose sight of the fact that, even if it has been mitigated, a risk can still materialise. The certification standards are designed to ensure that all risks are ALARP, but they do not bestow any form of immunity.

If you extend the examination of the linked concept of standards and assumptions, the test pilot will tell you there are assumptions made about pilot performance during the certification process. For example, a manufacturer must physically demonstrate that its aircraft is capable of stopping within distance X in the event of a rejected take-off at speed Y. As part of that demonstration, the test pilots (who clearly know what is coming…) will insert deliberate pauses to simulate the response time for the average line pilot in recognising the need to reject and then commencing the various actions. The data from these exercises then forms the basis of the performance manuals. So far, so good.

But when are these assumptions on response times tested? Unless there is serious damage, or injuries from a subsequent evacuation, runway excursion, etc., there may not be a formal AAIB-style (ICAO Annex 13) investigation into a rejected take-off. The logic here is there is likely nothing to be learned from an expensive investigation when the cause is known (birdstrike, engine surge) and the aircraft stopped safely as expected. Most incidents are only investigated at company level, and this might similarly be "known problem, crew performed in accordance with training/SOPs, aircraft stopped, nothing to see here."
All investigators will have access to outputs from the flight data recorders, though there will no access to cockpit voice recordings at company level. This data should show clearly whether the crew actions met the assumed timelines or not, but only if it properly analysed.

Insights from these analyses can be important in certification terms. If the assumption in this case was for a 3-second response time but all the data shows a 2-second response, you know you are operating more safely than was expected during certification. Conversely, a 4-second response might need a deeper consideration of training and/or the certification itself.

Almost all rejects happen in the relative comfort of the simulator – it is a mandatory exercise in the Licence Proficiency Check in most countries. All these events produce a wealth of data, but very little of it (if any) is subject to any meaningful examination. Fortunately, simulator manufacturers are now developing data frames that can be analysed in the same way as 'normal' flight data, using the same FDM key values. There is also long overdue discussion about the capability to replay FDM events in the simulator, which could enrich training. The ability to properly analyse simulator data has real potential for feed back into the certification system.

Not all certification efforts are welcome in all quarters. The major manufacturers are working on concepts to reduce the number of crew required to operate aircraft, especially those used on the long-haul routes.
Typically, these Extended Minimum Crew Operations concepts are based on removing one of the pilots from the cockpit, for some or all of the flight, of aircraft that currently require 2 people per the ICAO requirement for air transport operations. Not surprisingly, the pilot unions are not in favour, both on safety and industrial grounds. Are they right?

For those of you who operate as a single pilot for extended periods, you may be wondering what the fuss is about. There is of course a difference in RtL, as CAT aircraft tend to carry large numbers of passengers, which means a different risk appetite ought to be in play. However, there is also some protectionism to be dealt with. The answer will lie in the risk mitigations. The first question most people raise is about the risk of pilot incapacitation, which is clearly less of a problem if you have two of them to start with (even if you double the probability of one of them becoming unfit in flight). That in turns begs the question about medical standards. Do you now insist on a pre-flight medical, like the U2 crews, or do you tackle it with more restrictive age limits?

There are obviously technical solutions to the incapacitation question, those these have yet to be addressed. How does the aircraft decide its pilot is unable to operate? Does that decision get taken elsewhere? Is there a 'take me home' button, and who presses it? Autoland has been a trusted capability for many years, so a safe landing ought to be possible. Interestingly, Airbus has demonstrated a hands-free take-off with an A350 that was able to keep itself straight using a camera system, in much the same way many cars have lane-keeping assistance; it is only a small step to having automated taxy functions.

What about off-board support? What would be wrong with providing decision support via a datalink, to relieve the load on your single pilot? The Reaper/Protector force has effectively been doing this for years. It would also be a great avenue to use the knowledge and skills of those who have lost a medical category or are ruled out on age grounds. You might see parallels here with concepts for a mixed crewed/uncrewed combat air platform. Whatever, there will need to be some very careful decision making about system reliability and risk tolerance. Like ejections seats, if you have to activate the 'take me home' capability, it has to work first time.

All this is some way off at the moment, but the market pressures are there. With fully automated urban air mobility vehicles expected by 2030, the technology is going to lead regulation and perhaps public appetite in this area. There is also the small matter of a rapidly aging pilot population: some estimates see a European requirement for 6,000 new commercial pilots per year for the next 2 decades. The training capacity is currently 1,500 per year. "Do the math!" as our US colleagues would say.

Photo credit: Clemens Vasters from Viersen, Germany, Germany, CC BY 2.0 <https://creativecommons.org/licenses/by/2.0>, via Wikimedia Commons

Heat Stress

Confusion, Dizziness, Fainting, Headache, Nausea, Vomiting, Muscle or Abdominal Cramps, Pale Skin, Profuse Sweating, Diarrhoea, Rapid Heartbeat ...

If you recognise any of the symptoms in yourself or those around you, be proactive and seek immediate treatment.

ROYAL AIR FORCE
Safety Centre

SC12
Produced by Air Media Centre, HQ Air Command.

Safety Centre Safety Trophy

By the RAF Safety Centre

The RAF Safety Centre Safety Trophy is presented annually to the RAF Station, team or individual that has demonstrated an outstanding or enduring achievement, or cumulative set of achievements, that has significantly enhanced safety on the unit and/or across the wider RAF. Each year the Safety Centre receives around 15 nominations for this prestigious award. The winner is usually announced at the Air Safety Management Conference in November of each year.

2023's winner was an individual - Sergeant Blundell from RAF Akrotiri.

Sergeant Blundell has been employed as Senior Non-Commissioned Officer of the Continuous Improvements Team at RAF Akrotiri since October 2020. In this role he has demonstrated an exceptional level of innovation and drive that has directly influenced RAF policy and Air TLB Safety and Environmental Management Systems. His novel approach to In-Form management is now regarded as best practise and has recently been included in AP8000; his work has also been instrumental in the implementation of this system across 5 other Main Operating Bases and 83 Expeditionary Air Group. For the full citation, see the Safety Trophy section of the Safety Centre Comms Site.

Nominations can be submitted using the form available on the Safety Centre's Comms Site at https://modgovuk.sharepoint.com/teams/23116 (modnet users only).

Get your submissions in before the end of August 2023. Once complete, the Station/Unit Commanders should forward the form to the Safety Centre Spry Account: air-safetyctre-wgcdrspry@mod.gov.uk.

Sgt Blundell (right) receives the Safety Trophy from IFS, Gp Capt Andrew Keith. Photo by Gill McGlinchey.

ROYAL AIR FORCE

Awareness of Surroundings

Life Saving Rules

I am aware of my surroundings and position myself to avoid moving objects, vehicles and dropped objects.

I obey barriers and exclusion zones.

I take action to secure any loose objects and report potential dropped objects to the chain of command.

I understand the rules and my duties concerning FOD.

SC138
Produced by Air Media Centre, HQ Air Command.

Doc's Corner:

What Medication can be used to Aid Sleep for Aircrew?

By Wg Cdr Felicity Leaming, CFMO, RAFCAM

Photo by: Adam from UK, CC BY 2.0 <https://creativecommons.org/licenses/by/2.0>, via Wikimedia Commons

It goes without saying that the most important mitigation for fatigue is to get some sleep! The most restful sleep we can get is natural sleep. There is plenty of advice out there on how to achieve this using good sleep hygiene and this is talked about in your Av Med teaching at RAF CAM. That being said, if we are feeling tired and unable to perform our duties safely, we should declare that we are unfit to carry out our safety critical duties safely and then try to get some rest.

However, there are instances where getting good quality sleep of adequate duration is not possible. Issues on deployment, such as austere and noisy accommodation, changing shift patterns and time zones can all have a negative impact on our sleep. In these circumstances (and only in specific circumstances such as Ops and Exercises), military aviation medicine doctors can prescribe medications which are compatible with flying that can aid sleep.

You may be aware of medications used by other countries. The USAF have cleared the use of "go" and "no go" pills to help counter fatigue on Ops and other nations use similar drugs for the same reasons. In the UK, MOs can prescribe temazepam to help with work rest patterns and melatonin to help counter jet lag in specific circumstances. Both these medications require a trial period when the individual is not flying to ensure there are no side effects. The use of these medications is as an adjunct to an effective work rest schedule and is not to be used as a substitute for this. The responsibility for planning lies with commanders.

Temazepam

Temazepam is effective in both initiating and maintaining sleep and has no lag effect or complications if it is used as directed in AP1269a. Research and testing have shown it has no discernible effects on the body 6 hours after it is taken.

Currently, Temazepam is the only approved sleeping medication which can be used when in an active flying role in specific circumstances as discussed below. Other medications are approved by other countries e.g. Zaleplon, Zolpidem and Zopiclone but these have a less predictable excretion rate and a shorter half-life, meaning that they can cause people to feel drowsy when waking or they may not maintain sleep and so they are not approved for use by UK personnel.

In a very few cases temazepam may have side effects or may not be effective. For that reason, personnel are required to have a trial of the medication when they are not on Ops or flying to make sure they can take the medication safely. A trial can be discussed in your annual PME or an appointment

can be made to discuss this separately. The MO will usually suggest doing this over a weekend or when you are on leave. You will be required to report back on how the trial has gone, either by telephone, email or appointment with your MO. It is important that an entry is then made in your Flying Log-book and in your medical records to say that you have successfully completed the trial and are safe to use the medication when flying. Your electronic medical record may not be accessible when you are on deployment and so it is essential that a record is made in your Flying Log-book to allow you to use the medication when on deployment.

The ground trial consists of one dose of 10mg taken on 3 consecutive nights. This can be increased to but not exceed 20mg. You should report back to your MO within 2 days of the third dose of medication. In extremis, the trial period can be shorted to a single dose of 10-20mg to be taken no less than 3 days prior to flying. You must not take the medication less than 6 hours before the start of duty, you must not drink alcohol to take any other medications such as antihistamines etc while taking the medication, this is because these might exacerbate the effects of temazepam.

Once you have completed the trial and have had everything signed off by the med centre you can then have the medication prescribed (by a MAME trained MO) for up to 5 days to cover exercise periods or shift pattern changes, or it can be used as required to cover a route flight.

Melatonin

Melatonin can be prescribed for use in aircrew and controllers to manage jet lag. It must be prescribed by a MAME qualified MO. It can be bought over the counter in some countries, but it must not be used in this way. Only immediate release dose melatonin is approved for use. Melatonin is effective in preventing and managing jet lag when used for both Eastward and Westward travel and has a low risk of side effects or complications. It can be useful for mitigating jet lag when on deployment or exercise and during changes to flight scheduling. Again, it is not a substitute for an effective fatigue management plan.

Temazepam and melatonin are both used to mitigate fatigue but are used for different purposes. They should not be used together. Melatonin, like temazepam, requires a trial before it can be used when flying and on successful completion of the trial, an entry should be made in the medical records and in your Flying Logbook. The trial consists of a dose of 3mg taken on 3 consecutive nights 2 hours before the intended sleep time. This can be increased to 6mg if required. You should then report back to your MAME MO 2 days after the third dose to discuss any issues. Again, should it be required, an accelerated trial of one dose no less than 3 days prior to flying can be done in extremis.

When used operationally, the medication should be taken on arrival at the destination at the usual bedtime. It should not be taken before 2000hrs or after 0400hrs local time at destination as it will not work effectively. It should not be taken less than 6 hours before the start of duty. The standard dose is 3mg once daily for a maximum of 5 days. This may increase to 6mg if 3mg is not effective. You should not eat 2 hours prior to or of taking the medication.

Summary

As you can see from the above, medication for sleep and rest has risks and benefits but if used correctly, in the appropriate circumstances can be a useful adjunct to good sleep habits. The prime focus, however, should be on obtaining good quality natural sleep facilitated by sensible programming and adequate accommodation. Further information on the medications can be found in AP1269a Lft5-19 and any queries can be discussed with the CFMO or your SMO on Station. Sleep hygiene tips can be found at www.patient.co.uk. The Headspace App can be accessed for free through the RAFBF and can help aid sleep with sleep stories and mindfulness. If you are experiencing problems with sleep and insomnia please discuss this with your MO.

Mental Health Awareness – Every Mind Matters

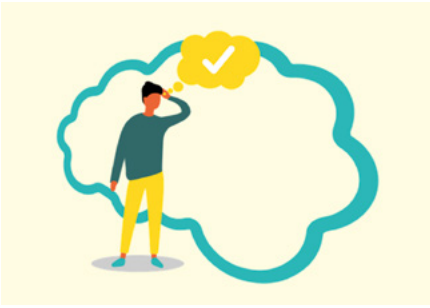
By the RAF Safety Centre (with thanks to the NHS)

The RAF marked Mental Health Awareness week in May by focusing on the issue of Anxiety. Did you know your RAF Mental Health Champion is Air Vice-Marshal Tamara Jennings? Look for the TeamSite 'AIR – RAF Mental Health Network' on Teams. Of course, improving mental health is something we should consider all the time, so here is some advice from the 'Every Mind Matters' arm of the NHS.

What is good mental health?

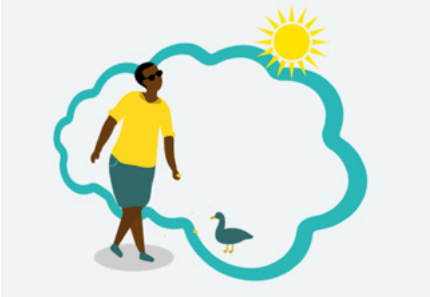
Looking after your mental health is not something we should just do if we are struggling, or feeling low, anxious, or stressed. It's something we should think about all the time and really invest in, just like with our physical health. Staying on top of our mental wellbeing is good for us now but also helps us deal manage difficult times in the future. Over time, it can also reduce our risk of physical health problems. There are lots of things we can do to look after our mental health and wellbeing every day – make a start with these 7 top tips.

Top tips to improve your mental wellbeing



1. Reframe unhelpful thoughts

The way we think, feel and behave are linked. Sometimes we develop patterns of thoughts or behaviours that are unhelpful so recognising them, and taking steps to think about things differently, can improve your mental health and wellbeing.



2. Be in the present

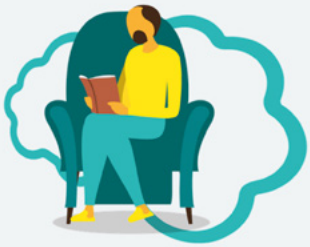
If we take time to be aware of ourselves and be in the present moment, noticing our own thoughts and feelings, and the world around us, we can gain a better perspective. Sometimes this is known as being more mindful.

3. Get good sleep

Good-quality sleep makes a big difference to how we feel mentally and physically, so it's important to get enough.

4. Connect with others
Spending quality time with friends or family, talking to someone about how we are feeling or finding ways to help other people can all help stop you from feeling lonely and improve your mental health and wellbeing. This can be online, by phone or seeing someone in person.

5. Live a healthy life
Being active, enjoying the outdoors and having a healthy, balanced diet all impact how we feel. Also, binning bad habits like smoking, and cutting down on alcohol and caffeine can have a positive effect on our mood.



6. Do something for yourself
From enjoying your favourite hobby, learning something new or simply taking time to relax, it's important to do things that make you happy, like trying a new hobby or learning a new skill.

7. Write a letter to future you
When you're feeling good, think about what you would want to tell your future self if things get harder and you find you need more support. Reminding yourself of what's keeping you feeling positive right now can help you through those more difficult times in the future.

Try some of the tips from Your Mind Plan and write down the ones that helped you, include ideas of how to get started and anything else that you have learnt about yourself.

Get Your Mind Plan at: https://www.nhs.uk/every-mind-matters/mental-wellbeing-tips/your-mind-plan-quiz/
Reproduced by Kind Permission - https://www.nhs.uk/every-mind-matters

Safety Centre's 10th Anniversary

By the RAF Safety Centre

RAF Flight Safety has existed in one way or another for longer than most of us can remember. The first official body to be set up by the Government was the Inspectorate of Accidents in 1920. The Inspectorate of Flight Safety (RAF) has been in existence since 1975. It was located in Central London before it moved to an idyllic setting at RAF Bentley Priory in 1996. There, the more mature of us will remember carrying out all the flight safety related training for supervisors, authorisers, station flight safety officers and the like. Now these courses are run by CoAST, under the command of the MAA.

It was following the formation of the MAA that the Chief of the Air Staff stood up the RAF Safety Centre on 23 Sep 2013 with the aim of drawing together the areas of Flight Safety, Airworthiness and Functional Safety. This change in the RAF's approach to safety-related work saw greater coherence and dialogue between the ODH STAR organisations and the RAF Safety Centre which was building the foundations for better cooperation regarding Analysis and Assurance. The hope was a lessening of the burden of what seemed to be a never ending churn of Assurance Visits to stations. As the Safety Centre matured, DCom Ops (now called the Air & Space Commander) at the time appointed himself the RAF's Total Safety Champion. Fast forward to 23 September 2023, 10 years on, and there is no longer the term 'Total Safety' – we just use Safety to represent everything. We now have a 1-star running things as opposed to IFS. Having said that, IFS still exists, but now alongside a series of Inspectors from a wide spectrum of domains such as Fire, Fuels & Gases, Sport, Adventurous Training, Airworthiness, CESO, Movement & Transport, Medical, Battlespace Management, Land Safety, Land Systems, Ordnance Munitions and Explosives.

Happy 10th Birthday on 23 September 2023 RAF Safety Centre!

ROYAL AIR FORCE

Driving

Life Saving Rules

I will always wear a seatbelt.

I will not exceed the speed limit and reduce speed according to road conditions.

I will never drive while under the influence of alcohol or drugs.

I will not use a phone or operate any other devices when driving.

I ensure I am fully trained to operate the type of vehicle I am driving.

SC136
Produced by Air Media Centre, HQ Air Command.

An Insight into Aircrew Disorientation – an analysis of UK military aircrew disorientation incidents 2018 - 2021

By Tracy L Grimshaw, QinetiQ

Spatial disorientation in flight is a risk to flight safety. In order to ensure appropriate training and education strategies are in place, it is important to understand the factors that contribute to disorientation in military flight.

What is disorientation?

Occasions in flight where you have become confused about the attitude, height or position of your aircraft. Or worse, you have suddenly realised that the aircraft attitude, height or position was not what you had expected it to be.

What is it about the flight environment that makes you susceptible to disorientation?

During flight there are three main factors that contribute to a false sense of perception of aircraft orientation. Misleading or falsely reassuring information from these sources, combined with distraction either inside the cockpit or from events outside the aircraft, can lead to a potentially lethal disorientation:

1. **Visual misinformation:** It is common to see what is expected (or wanted), rather than what is actually there, and even more so during flight with many competing demands.
2. **The force environment:** during flight, human physiology means that you can 'feel' the same sense of gravity whether accelerating, decelerating or in level flight, and your aircraft may feel 'pitched up' even when flying straight and level.
3. **The sense of rotation:** slow rates of roll are undetected by the balance organ of the inner ear, or readily disregarded if there is no gravitational sense of being tilted. This can lead to unintentional overbanking.

Understanding UK military aircrew disorientation

The Disorientation Incident Survey (DIS) has been conducted regularly for the MOD since 2004 to collect anonymous military aircrew descriptions of their experiences of disorientation. The purpose of the survey is to help understand the factors contributing to aircrew disorientation in the UK military. The respondents are asked to rate the risk to flight safety of each incident they report, and the incidents are analysed to assess the factors contributing to disorientation. The survey was conducted most recently in 2021, collecting incidents across the three-year period from 2018. The results show that SD continues to present a challenge to aircrew. A total of 68 disorientation incidents were reported in the three-year period 2018 - 2021 (with 528 respondents stating

that they had not experienced a relevant incident in the time period requested). Of these, 20 were fast jet, 41 rotary wing and seven multi-engine. Most of these had not been reported as DASORs through ASIMS.

This article shares some of the common factors and circumstances that resulted in a loss of orientation, using descriptions from pilots in their own words (in italics).

Roll attitude uncertainty

Slow rates of roll or turn are not detected by our inner ear. The leans, a sometimes powerful sensation that the bank angle is not as indicated on the Attitude Indicator, were frequently reported, particularly when flying in degraded visual environments such as in cloud, at night or in close formation. For example, a Hawk non-handling pilot described experiencing the leans conducting an approach to an airfield in thick cloud as part of a pairs approach:

"During our descent, I was sure that we were in an accelerating left hand turn that was tightening. However, we were descending straight. We were descending through thick cloud with heavy precipitation". Another report, this time by a Merlin pilot, provides a typical example of how the leans can arise in cloud during turning manoeuvres, then rapidly dissipate once visual references are regained:

"Conducting IF [Instrument Flying] practice with Instructor in IF Actual conditions. Due to loss of horizon and lack of concentration, I gave myself the "Leans". This was due to conducting various turning manoeuvres with no reference to a horizon. I became aware of the problem after a few minutes, alerted the instructor and we then exited IF Actual conditions. The "Leans" then dissipated quickly once we were in VMC".

For fast jet aircrew, air-to-air refuelling (AAR) continues to provide a challenging environment for disorientation, with a combination of visual and force conditions creating attitude uncertainty for many aircrew. Many incidents occurred in cloud when few other visual cues were available, sometimes due to the view of the dihedral wing of the tanker aircraft or cloud structures creating a false sense of horizon, as shown by this report from a Typhoon pilot:

"Intermittent IMC [Instrument Meteorological Conditions] poor horizons AAR, plugged in taking fuel. Misleading visual indications HUD reference vs Voyager dihedral, cloud structure and AOB [Angle of Bank] during turn. All felt wrong, convinced I was straight and level. Took significant will power to read instruments and confirm AOB".

In another incident, the Typhoon pilot was unable to maintain close echelon formation on the tanker in IMC and degraded visual environment (DVE) and had to break away:

"It was 0.7 millilux, night, IMC at FL240, maintaining echelon right on the Voyager tanker waiting for my wingman to finish tanking. The tanker was in a left hand turn and called 'rolling out'. I matched the roll out rate but did not maintain co-plane, resulting in me being high on the tanker references. I perceived I was too far away and began to correct towards the tanker. At this point the silhouette of the tanker was barely visible and the lights stood out. The lights did not correct as I anticipated because I was high and unaware of this. I began to feel like the tanker was turning towards me although it was straight and level. I began to climb and roll away from the tanker but this confused me more, I could not make the outside mental model that I had match what was going on in the real world. Eventually I felt disorientated to the point that I initiated a break away high and right from the tanker".

This shows how the lights of the tanker against the dark visual environment can lead to confusion around what is expected to be seen, and what is actually there, leading to disorientation.

Air combat

Combat or missile evasion manoeuvres operate at the limits of the procedural envelope and increase the scope

for distraction and disorientation, Some descriptions highlighted the risk of developing an unusual position during such manoeuvres, for example, this Hawk pilot described a perception of being upright whilst actually inverted, due to the visual scene:

"1v1 air combat with altostratus layer of cloud at approx 16,000ft AMSL, no cloud below. Base height was 10,000ft. As I pulled up into a vertical merge and was subsequently upside down at approx 15,500ft, with the cloud layer being ABOVE me, it suddenly felt I was the correct way round at just above base height, even though I could feel I was upside down. The lack of cloud below me, over a blue sea and with the cloud being so high gave the illusion of the aircraft being the correct way up at 10,500ft with the clear sky above me. I transferred to instruments until my orientation was sorted".

Deck manoeuvres

There were several reports of disorientation during deck landings and take-off for rotary aircraft, and lessons from these rotary incidents can be learned for future F-35 deck operations. Disorientation often centred around low light levels, lack of horizon and the movement of the ship. This combination can lead to misinterpretation of the landing area; one Merlin pilot described landing in low light conditions, becoming confused around the image of the landing site:

"Very dark night approach to T23. Zero ephemeral lighting, complete cloud cover, nil moonlight or starlight, no horizon, sea state 4. Depth perception reduces massively in this scenario and it is very hard to gauge closing speed or height while looking out at the Ship and the Glide Path Indicator. Approach became very slow and at one point, closing speed was pretty much zero and I was slowly climbing rather than descending. With the Ship rolling about but no references around it to correlate it to, you are looking at a dim light in total darkness. Approach and landing was completed, albeit much slower than normal and was not a comfortable experience at all".

A similar incident, also a Merlin pilot, shows again how it can be easy to misinterpret lights set against a dark background:

"During a Night (Conventional) Deck Re-Famil sortie in very low light conditions, nil discernible horizon. During approach to the ship due to fixating on the wrong green light as a GPI [Glide Path Indicator] I incorrectly interpreted the orientation of the ship and therefore the aircraft's relative attitude and position. In the final stages of the approach I discovered by looking in at my instruments that I was disorientated, I re-orientated based on the instruments and landed without incident".

This pilot had based his judgement of his orientation on the image that he expected to see, by focussing on the incorrect light, leading to uncertainty around his aircraft position.

Distraction

Distraction is a factor in 50% of disorientation accidents, this is also reflected in the incident reports from the survey. Distraction was often the result of an in-cockpit task or a preoccupation with something outside the aircraft, such as the lead aircraft or a ground target. Some errors were small (though still critical), others more extreme; distraction combined with visual misperception and manoeuvres can cause severe disorientation. One Typhoon pilot described conducting beyond visual range training at night, and how distraction led to an unusual attitude:

"Conducting a hard turn at night while conducting 4vX A/A BVR training. Very low illum night with no horizon. Fixated on my radar scope while manoeuvring. When I looked up into my HUD, my aircraft attitude was significantly different than what I had initially perceived. I executed my UA drills and recovered the aircraft to level flight".

This was described by the pilot as a significant risk to flight safety (but was not reported as a DASOR) and is an example of how the force environment in flight can be deceptive. The change in the angle of the aircraft was not noticed by the pilot as it was a sub-threshold manoeuvre and, alongside distraction, this can create a high risk situation.

The following Apache incident shows how quickly attitude errors can occur when distracted by focussing on in-cockpit tasks:

"During IF GH IMC in a turn 'heads in' went 'heads out' and realised the pilot had turned the aircraft 30 degrees AoB without picking it up".

In another description by a C-17 pilot, focussing on an in-cockpit task resulted in the perception that the road was the horizon. The description highlights that low workload and low arousal can also play a role in disorientation:

"Dark, clear night, good visibility. Stars in sky, line of street lamps on the ground following the main road in a landscape which was otherwise generally dark. Aircraft in cruise, wings level, 25,000ft, autopilot/throttle engaged. I looked up from a document and my perception was that the road was the horizon. The road ran approximately 4 o'clock to to 11 o'clock in my vision, so the aircraft would have to have been at a significant angle of bank for this to make sense. Looking away, or at the flight instruments, did not immediately clear the illusion – I visually searched for and found a reference on the actual horizon, at which point my brain made sense of the situation again. Fatigue and monotony could have been factors".

ASIMS

Only four of the 68 incidents reported in the survey had been reported as DASORs through ASIMS. It is unclear why the other 64 DIS incidents were not reported through ASIMS, but it highlights that ASIMS should not be relied upon to accurately reflect the number of disorientation incidents that occur. It also shows the importance of maintaining anonymity in the DIS, as this may encourage free reporting of disorientation incidents.

Key lessons

There are several key take-away lessons from the results of the surveys;

- Disorientation is insidious – the most dangerous situations are those in which the pilot thinks the aircraft attitude has not changed when, in fact, it has.
- Distraction, either in-cockpit or external to the aircraft, plays a critical role in disorientation incidents. Be aware when focussing heads-in or on a single external point that disorientation can occur quickly.
- In a degraded visual environment, the pilot's judgement of orientation is less reliable than the aircraft instruments – use them. The instrument cross-check is to confirm that you are working properly, not the instruments.
- Be alert to manoeuvres in which small errors in aircraft attitude can have significant consequences (e.g. over-banking at low level).
- In the event of experiencing strong disorientation and struggling to establish control of the aircraft, transfer to instruments and regain safe flight.

This work was funded by the MOD Defence Science and Technology Laboratory as part of the Aircrew Systems Research Project. If you have any questions about this article or the spatial disorientation research, please contact Tracy Grimshaw at tlgrimshaw@QinetiQ.com.

Finally – most disorientation is a normal response to the flight environment. It is important that you share your experiences both with colleagues and through reporting systems, so that aircrew can learn from one another and improve flight safety.

Our thanks go to all those who have contributed incident reports to the Disorientation Incident Survey over the years. The next survey will be distributed in early 2024 to capture incidents from 2021 to 2023 (inclusive) and your continued support will be essential to help understand how disorientation manifests itself in flight, and how we can work towards reducing the number of disorientation incidents and accidents.

Aircrew booklets

The incidents reported through the survey are exploited through education and training in lectures and simulator training. Booklets for aircrew have been developed. The latest version of these booklets (volume 3) will be circulated in Spring 2023, PDF copies will also be available from Tracy Grimshaw at QinetiQ; tlgrimshaw@QinetiQ.com

Capita Fire and Rescue

Barbecues

– Enjoy yourself, but don't drink too much alcohol if you oversee the barbecue or any cooking!

– Make sure your barbecue is well away from sheds and fences.

– Never use a barbecue indoors. Keep a bucket of water, sand, or a garden hose nearby for emergencies.

– Never use petrol or paraffin to start or revive your barbecue.

– Do not empty hot ash into dustbins or wheelie bins.

Capita

FIRE & RESCUE


ROYAL AIR FORCE


RESCUE

I Learned About Air Traffic Control From That

(. . .and West Ham won the FA cup)

By Sqn Ldr Mark Burch (Retd)

Photo credit: Mike Freer - Touchdown-aviation (GFDL 1.2 <http://www.gnu.org/licenses/old-licenses/fdl-1.2.html> via Wikimedia Commons

It was the 9th of May 1980, and I was a young over confident and mildly thrusting second tour Flying Officer Air Traffic Controller at RAF Honington. Honington in those days was not the home of the Regiment as it is today but a fully active Strike Command Airfield in the centre of a combined MATZ and responsible for Mildenhall (Heavy Transports) movements as well as co-ordinating Lakenheath activity (F111) with 3 Buccaneer Strike Sqns (12/208/216 Sqn) and the Buccaneer OCU 237 Sqn. It was, in other words, an extremely busy place.

One of the oddities of the Buccaneer, the finest Strike aircraft the RAF has procured (other views maybe available!!) and affectionately dubbed the Banana bomber due to its unique profile, was that there were no dual control versions therefore a pilot's first sortie in it was also a first solo. This was known FAM1 flight and an experienced QFI was carried in the rear cockpit to provide appropriate 'advice and encouragement' when required - brave fellow! There was, therefore, a requirement for pilots to be used to the unique Buccaneer cockpit environment whilst airborne. Sadly, simulation was nowhere near as advanced as it is today so the solution was to equip a Hunter TMk7 two seater with a Buccaneer cockpit hence the Hunter TMk7B and 8B(RN version). This device simulated the cockpit but of course performed like a Hunter i.e. beautifully at all speeds, unlike the Buccaneer and of course it had only one engine. Whilst an engine failure in a Buccaneer was a serious event, the same in a Hunter was of an altogether more serious proposition. The recovery technique for an engine failure in a Hunter was called a 1-in-1 approach. Clean, a Hunter would glide 1nm and lose 500ft. Double that for a turn. Thus the idea was to vector the gliding Hunter towards final approach such that, when range was equal to height (i.e. 4NM @ 4,000ft), the pilot was instructed to commence the 1-in-1 procedure, gear would be dropped and flap deployed and handily the aircraft would lose 1,000ft for each mile and end up on the runway, piece of cake……..

So that's the cold war scene set; now if are you sitting comfortably, I'll begin. That day I was the radar director responsible for directing traffic around the Honington radar pattern. However, hovering in the background of my consciousness was the realisation that at RAF Shawbury that night there was a dining in night for the whole of the RAF ATC specialisation to celebrate 30 years of RAF ATC (I still have the tie). This was going to be one mean party and I was seriously

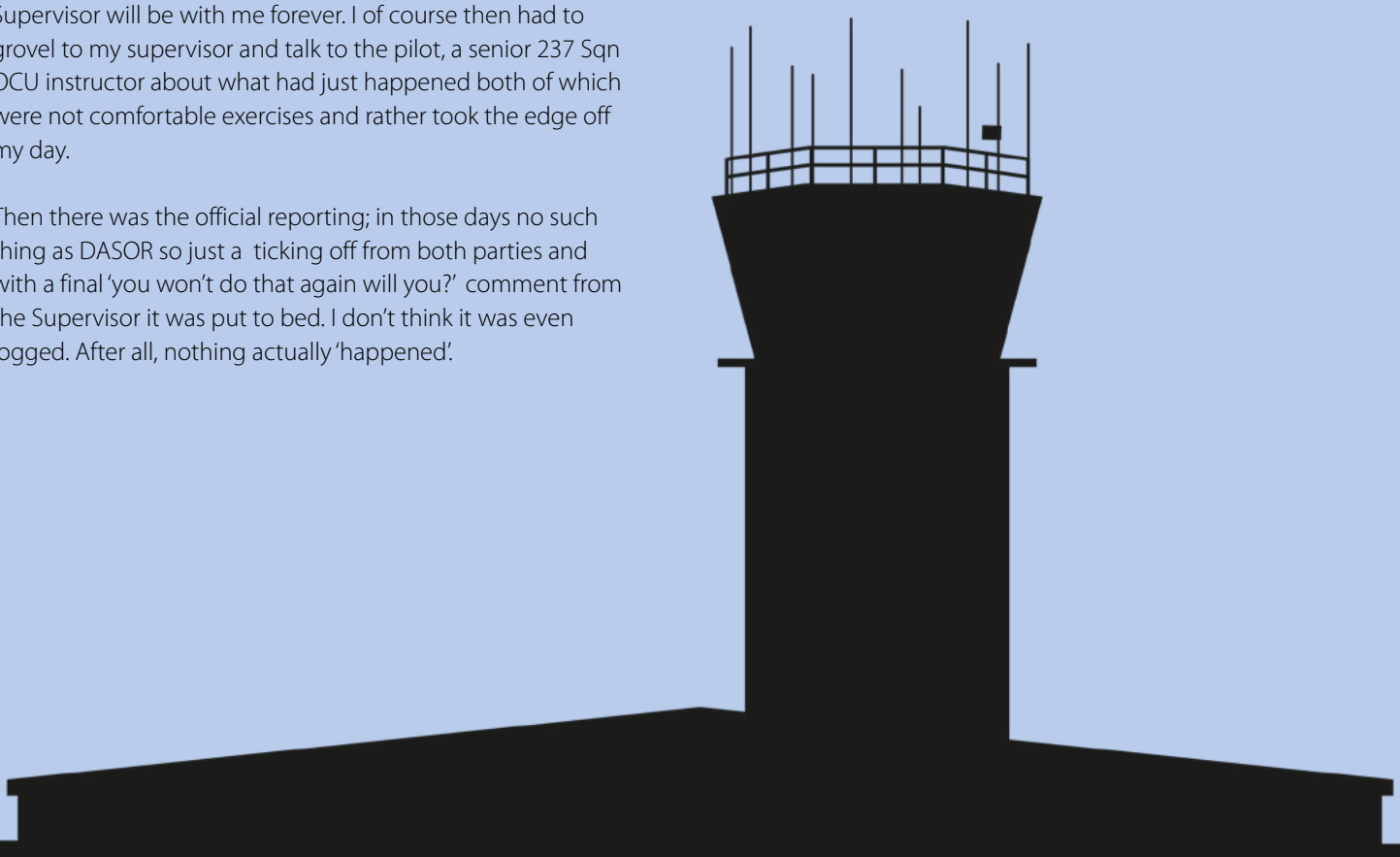
short of drinking vouchers! All was quiet in the approach radar room so I was allowed to go to the station bank to rectify this sad, but alas common junior officer situation, leaving the approach room with the quip 'I'd be back in 15 minutes'.

25 minutes later I was back with cash safely ensconced in my wallet. I walked into the approach room to find total carnage - the unit was absolutely humming. Lakenheath, Mildenhall and Honington activity had exploded into action. The Supervisor looked at me, looks very pointedly at his watch and yelled at me to sit down and vector a Hunter for a practice 1-in-1 approach. Everything was exactly as I left it - headset, chinagraph pencil, everything. Without pause I am immediately given a handover on the Hunter and commenced the 1-in-1. As described above it could be a bit of a mind boggler but satisfying when it worked.

It was all going so well as I rolled them onto final approach for RW27 at 6 miles and about 5,000ft. The 1-in-1 continued towards gear down point at which point something came out of the radar overhead in the opposite direction and flashed past followed by another and another. I was confused. The Supervisor asked 'where was my Hunter?' I told him it was 5 miles East. There followed a pause then the immortal shout 'EAST, EAST we're on RW09!' The penny dropped with a resounding clang, the runway had changed whilst I was away and I had not realised. The other traffic was departing Buccaneers from my airfield; luckily their initial rate of climb was not spectacular and my traffic was high. I had to break off my Hunter and reposition for the correct runway, I can just about laugh about it now although those words from the Supervisor will be with me forever. I of course then had to grovel to my supervisor and talk to the pilot, a senior 237 Sqn OCU instructor about what had just happened both of which were not comfortable exercises and rather took the edge off my day.

Then there was the official reporting; in those days no such thing as DASOR so just a ticking off from both parties and with a final 'you won't do that again will you?' comment from the Supervisor it was put to bed. I don't think it was even logged. After all, nothing actually 'happened'.

So, what lessons can be learnt from this rather sorry state of affairs? Firstly make sure you don't leave preparation for an evening event until the very last minute. Prior Preparation Prevents **** Poor Performance. Secondly always check what is happening when you have lost situational awareness for any length of time don't assume just because it looks the same it is, a big dose of expectation bias was in evidence. Thirdly being the 'good old days' a large dose of common sense was applied, as can be seen by the fact that it is still as clear a learning point to me today nearly 42 years later as it was then. Finally, how do I remember the exact date? That's easy, the next day on the way home, hungover and broke after a great party, I listened to West Ham win the FA cup on the car radio……



Level Busts

By the RAF Safety Centre

A Level Bust or Altitude Deviation occurs when an aircraft fails to fly at the level to which it has been cleared, regardless of whether actual Loss of Safe Separation from other aircraft or the ground results. A Level Bust is defined as any unauthorised vertical deviation of more than 300ft from an ATC flight clearance. Within Reduced Vertical Separation Minima (RVSM) airspace this limit is reduced to 200ft.
The level bust issue only relates to aircraft in controlled airspace or a designated ATZ outside controlled airspace and under either radar or procedural ATC control. A Level Bust can result in Loss of Safe Separation between aircraft or between an aircraft and the terrain or a ground obstruction, such as a mast, resulting in Controlled Flight into Terrain (CFIT). The availability and proper use of Airborne Collision Avoidance System (ACAS) provides a safety net which significantly reduces the risk of a Mid-Air Collision (MAC), and Ground Proximity Warning System (GPWS) has also reduced the risk of a level bust resulting in a CFIT accident.

Despite the electronic safety assistance, the potential for catastrophe remains and amounts to loss of safe separation from other aircraft, which may result in MAC, or collision with an obstacle or the ground (CFIT), especially as a result of having the wrong altimeter sub-scale setting – this can happen when an aircraft descends in a low pressure area with standard pressure (1013mb) set. Factors which increase the risk of a level bust include volume of traffic and high rates of climb or descent. Remember, 1hPa is equal to 30ft change in altitude. As an example, if you are descending to an airfield IMC with a QNH of 1003hPa and you still have 1013hPa set, this will give you a 300ft height difference and may result in CFIT significantly short of the runway if it goes unnoticed or corrected.

Types of Level Bust

No Clearance: the aircraft departs cleared flight level without clearance to do so. Distraction is likely here.

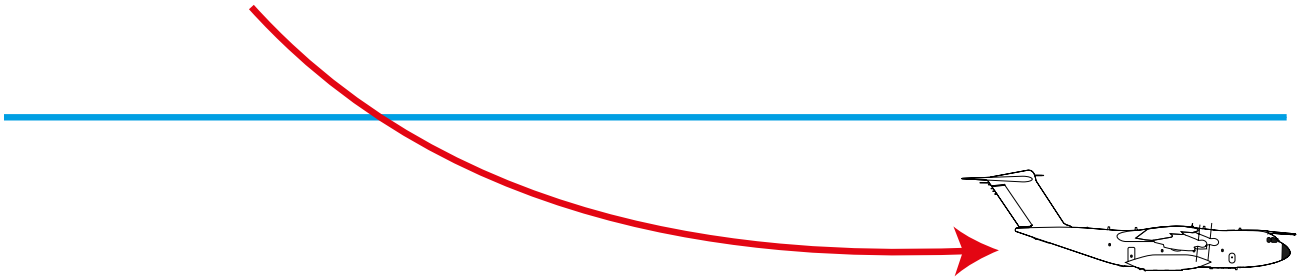
"I was carrying out the 'teach' of a CSU underspeed towards the end of an EFT GH sortie. The met conditions were challenging, with significant mountain waves, a strong westerly wind and rapidly changing gaps in medium level cloud below. Furthermore, due to my position, I was close to the western boundary of the Teeside International Airport CTA.
Whilst descending to VMC below, I called a practice PAN with Leeming radar with my intentions to return to Leeming for a PFL. I also asked for clearance to penetrate the Teeside stub as I was concerned about penetrating it – this was approved after a small delay. I was then given an altitude restriction to operate not below 3,000ft, which I acknowledged.

"In attempting to teach the emergency, remain VMC, remain in my area and descend against a strong mountain wave updraught, the altitude restriction slipped my mind. When I was already below the altitude, I was transferred to Leeming Director. On checking in, he asked for my altitude which was 2,600ft, which immediately reminded me of my altitude transgression. I commenced a climb as the controller asked me to do the same. Initially, the aircraft could only achieve a climb rate of 200ft per minute, an indication of the strength of the mountain waves. Once back at 3,000ft, I elected to recover as the weather precluded the teaching of anything else in the sortie. I recovered via a PAR, more than a little irritated with myself that I had allowed myself to be distracted from a fundamental principle of airmanship."

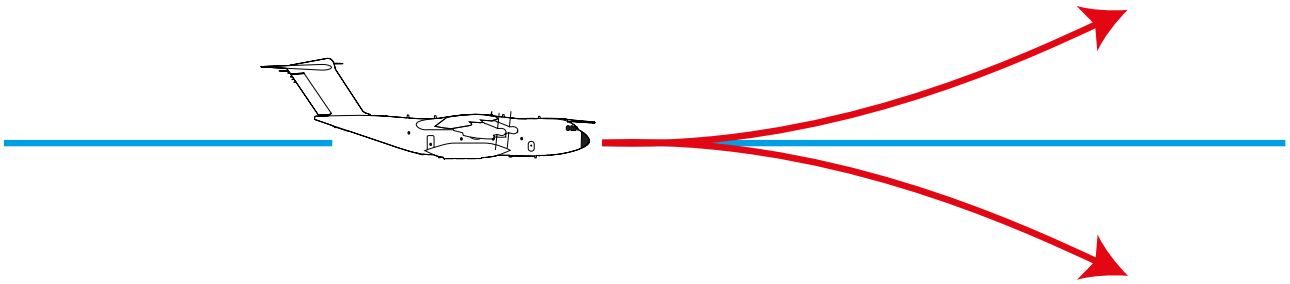
Failure to Follow Clearance: the aircraft both accepts a clearance and sets/records it correctly but then does not follow it; this can be (usually) a simple oversight, a flight management error or (rarely) a technical fault.

(1) "During a day VFR recovery to RAF Marham I inadvertently continued my descent to FL030 despite only being cleared to FL050. A pairs recovery was being flown with an ATC service from Swanwick Mil. On coasting in North of Norwich I was cleared to FL050 however I allowed myself to be task focused on maintaining VFR through a SCT/BKN layer and maintaining a good visual and sensor lookout during the descent. I began to level at FL040 once below the cloud layer and immediately

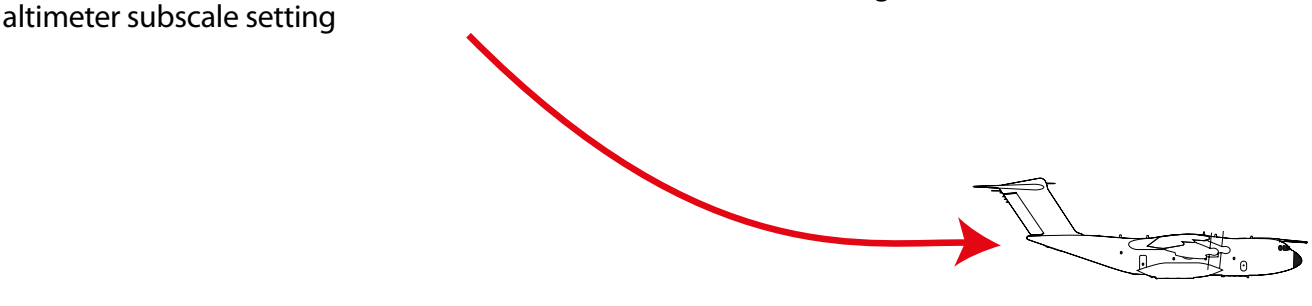
An aircraft climbs or descends through cleared level



An aircraft in level flight climbs or descends without clearance



An aircraft levels off at the correct indicated level but with the wrong altimeter subscale setting



realised my error. On observing my continued descent, Swanwick Mil also queried my altitude before handing me over to Marham Approach for an otherwise uneventful recovery. I was VFR and in sight of the surface throughout. The handover to Marham approach and descent to <FL050 may have been slightly later than I usually experience, however a good crosscheck and instrument scan should have prevented this error."

(2) "As number 3 of a 3-ship departure, inbound the East Anglia MTA, I climbed through the assigned climb-out level. I was prompted by Swanwick Military of the transgression and immediately recovered to the correct level, reaching 3,000ft above this during the recovery. My Head Up Display had failed, and I was blind on the pair ahead of me due to environmentals. I proceeded to devote too much focus on gleaning RADAR SA on my closure rate to the ac ahead at the expense of monitoring my altitude."

Incorrect Setting: the aircraft accepts a clearance correctly but then sets it incorrectly without the error being picked up by the crew. This can also be an incorrect sub-scale setting as well as just entering an incorrect figure into any Flight Management System.

"I was in a slow descent from FL 400 to FL 250 under the control of SWK Mil. This descent took a considerable period of time. As the aircraft passed through FL 280, ASACS gave a series of details pertaining to the intercept. I had thought I had set the autopilot correctly to level the aircraft off at FL 250 but this was not the case. As I was writing the new instructions down, the aircraft descended below the cleared level before being recorrected after a prompt from ATC. A simple pilot prioritisation error that should not have happened."

Late Clearance: the aircraft is unable to react fast enough to a late re-clearance and passes through new cleared level.

Callsign Confusion: the aircraft accepts a level clearance intended for another aircraft. Readback should correct this.

Incorrect Readback: the aircraft reads back clearance incorrectly and this error is not picked up by ATC so it is then recorded/set and followed.

GPWS Alert: The occurrence of a GPWS alert typically happens at a time of high workload and nearly always surprises the flight crew. Almost certainly, the aircraft is not where the pilot thinks it should be, and the response to a GPWS warning can be late in these circumstances. Warning time can also be short if the aircraft is flying into steep terrain since the downward-looking radio altimeter is the primary sensor used for the warning calculation.

Contributory Factors

There are a number of things which can contribute to a level bust onset. Distraction has to be top of the list and fast jets now have the disadvantage of only having one crew member monitoring the frequency. Set alongside high workloads, the risk of distraction and incorrect settings is elevated. This is also applicable to controllers who are unmonitored. High volumes of traffic and high rates of climb and descent are also common themes in level busts.

CAP 710 is a Level Bust Working Group Report (2000) by the CAA and, although focused on Civil Traffic busts, there were some interesting findings:

- The complexity of the presentation means that there is a high chance that certain SID charts may be misinterpreted. SID charts are largely designed by non-pilots and with no external pilot input involved. Factors other than safety can be overriding (e.g. noise).

- Multiple frequency changes are often given during the high workload period following take-off and before reaching FSA (First-Step Altitude). This can cause confusion and distract crews from important monitoring tasks.

- In the UK the altitude at which crews have to change altimeter setting from QNH to Standard Pressure corresponds to the period of highest workload in the cockpit. (Recommendation – Transition Altitude should be raised to a significantly higher value (e.g. 18,000ft) and ultimately this should be common throughout Europe).

- High workload manoeuvres in modern advanced technology aircraft (e.g. low weight with high climb rate) are often most securely flown by the auto-pilot. There is a tendency for some pilots to retain manual control too long when the workload unexpectedly increases, or a distraction occurs, and the crew monitoring capability becomes reduced. Instances have been reported where the overloading of one pilot was not detected by the other pilot, and a situation was allowed to develop which may not have occurred if there had been an early reversion to automatic flight.

- Experience has shown that the missed approach is one of the procedures that attracts the most handling errors. (Recommendation – Missed approach procedures should be practised in the simulator from different approach configurations and altitudes).

- ATC is often forced to issue multiple clearances to flight crew, thereby introducing the possibility of confusion. (Recommendation – In order to prevent flight crews confusing heading and flight level clearances, ATC should avoid using headings ending in zero).

If you have any close calls due to accidental level busts, write about it for Air Clues at:
Air-SafetyCtre-WgCdrSpry@mod.gov.uk
Article Source Credit: SkybraryAero.com

Wg Cdr Spry Comment:

Pilots: Remember the importance of transition altitude. When cleared to an altitude / height make sure correct QNH/QFE is set. When cleared to a Flight Level, make sure you have STD set (1013 mb – 29.92 mm). Altitude constraints such as on SIDs and STARS should be thoroughly briefed between crew members. Then you can ensure the correct settings are made on the flight management system. Set the clearance received, not the clearance expected. If in any doubt, confirm with ATC. Focus on the prime tasks during phases of dynamic flight. Don't allow any distractions to compromise this. Use the correct phraseology at all times; avoid the temptation to abbreviate. Make sure to use your callsign in any readback. Tell ATC immediately of any inability to comply with a late clearance. Stick to your SOPs and conduct visual scan checks; if you are fortunate to have more than 1 crew member, have an SOP that has another crew member monitoring.

ATC: Warn aircraft on the frequency if they have similar call signs, and beware frequency 'blocks' which can hide developing safety risks. Restate the assigned flight level on initial contact on a new frequency. Give clearances, including re-clearances in good time. Bear in mind the workload of the flight crew. Consider using headings ending with the digit 5 to differentiate them from altitude clearances. Avoid multiple clearances in the same transmission as these can increase confusion. File an incident report when an actual or potential incident is experienced. It helps make the system safer. ■

Hazards on the Horizon

By Maj Pierre-Olivier Brouilette, RCAF

A few years back, I was doing some CCA (Close-Combat-Attack) training in Petawawa. I was the Det commander for a two-ship of CH-146s. Being familiar with the training area, I was well aware that a set of wires crossed the river to the south. On the initial familiarization briefing, I made sure to highlight the power line's position to the aircrew since they had never flown in the area and it can be hard to see sometimes. In the following days, we repeatedly overflew those power lines and everyone was pretty confident in their ability to locate them.

We introduced tactical scenarios to the air lessons on the last day. it was early afternoon, and I was leading the formation on a bright sunny day. As we flew over the river, communications were consistent between me and the other aircraft to maintain the tactical picture during the flight. My head was mostly inside the cockpit as I was reading the information and storyline I had planned. After a moment of pause in the play, I looked up to get some situational awareness (SA) on our current position. I looked around and saw features that made me confident enough that we had passed the power lines and we could proceed. Before placing my head back inside the cockpit, I took a "good" look ahead to ensure that said power lines weren't in front of us. They weren't. Or at least, I didn't see them…

As soon as I lowered my head, my world pitched 90 degrees upward. The co-pilot, who saw the power lines at the last second, initiated a desperate climb in attempt to avoid the wires. We came so close that one of the marker balls (the high-visibility orange/red ball on power lines) completely filled the vision I had through the chin bubble. The 4–5 seconds that followed were a mix of engine revving noise, spinning instruments and massive confusion in the cockpit. Somehow, we succeeded in avoiding them. Once we realized that we had cleared the threat, we turned around (pretty shaken) and landed back at the heliport.

We all gathered to go over the event and came up with the following deductions;

- The lighting conditions made it extremely hard to see the wire since they were backlit by the sun ahead of us.
- We had shifted too much of our focus on the tactical scenario, despite knowing the power lines were a danger in that area.
- We didn't prioritize the potential risk to our flight, we had let our guard down and allowed a known threat to put our lives at risk.

If I had just voiced that I was unsure on our location relative to the power lines, all the attention inside the aircraft would have shifted to the three basics—aviate, navigate and communicate. The pilot flying would have maintained a higher altitude to ensure proper clearance and we would have had five cleaner pairs of underwear. Due to my lack of communication and my false comfort of SA I carried on without a word.

Often in a multi-crew environment, we tend to focus on our personal task and we sometimes forget to communicate concerns to the crew. With experience, we tend to spread our focus and end up forgetting about the basics. This is not effective HPMA. When in a situation of uncertainty, don't hesitate, voice your doubts. This will ensure that everyone on board is cognizant of a current problem, and it will also help you collectively solve the issue and continue on the mission safely.

The Horizon is filled with hazards. Make sure your crew keeps them far away from your bird.

I Learned About Flying From That – Chinook Nose-Over

Submitted by JHC

The following article was written by the crew of a Chinook after a recent nose-over incident (DASOR 22\8984):

In September 2022 I had a very embarrassing and expensive write-off of my Chinook helicopter's nose-mounted Electro-Optical Sensor Turret (EOST) during a mis-handled landing and ground taxi. This article will hopefully highlight all the factors that contributed to that outcome.

Of relevant note, ground taxiing is best accomplished in a Chinook with the right-hand seat (RHS) 'in control' and applying power with a small amount of collective (not cyclic) for forward thrust. However, the left-hand seat (LHS) steers the aircraft with a small centre-console wheel and applies the brakes. During the incident in question I was handling from the LHS for the final landing at Odiham. I landed, centralised the controls (verbalising 'central – neutral – ground detent'), handed over control to the co-pilot in the RHS ('you have control') and went heads-in to complete the post-landing checks myself. These involve changing light settings, IFF settings and turning off the aircraft stabilisation system prior to ground-taxiing to park. As I did so, I heard a shocked expletive from the crewman, and looked back outside to see what seemed like nothing but tarmac taxiway out of the windscreen. We were very nose-down – and as I reached for the cyclic (which now seemed a lot further forward than it should be) to take control and sort this out, I felt and heard a distinct scraping from the nose….The accident therefore happened ostensibly for two simple reasons: First, the RHS mishandled the aircraft (he debriefed that he was fairly certain he put cyclic forward rather than collective – which would agree with my thoughts when I took back control). Second, I was not quick enough to intervene to stop that mishandling from damaging it. However, I believe that such

an over-simplification hides a number of contributory factors – Reason's 'holes in the cheese' – that are worth noting. Especially considering those 'holes' are not necessarily the ones that some outside observers have since claimed as the crux of the issue, including landing with forward run-on and at way too fast a speed, and handling errors due to being an ex-Merlin pilot!

First, background: We were carrying out Pre-Deployment Training (PDT) for Op SHADER, for which I was to be a nominated crew captain and was building hours prior to deployment. Also deploying was my co-pilot for the sortie in question, a first tourist whom I was tasked to instruct/examine on a 5-hr night tactical formation sortie, which he would plan, brief and fly as acting captain from the RHS. Additionally, a crewman returning from a staff tour was attempting to achieve his back-to-flying training serials on the same sortie.

In the immediate weeks before the incident I had been off for 2 weeks leave followed by a week of ground courses, so I had not flown for over 3 weeks – and it was my first sortie back (and therefore possible first 'hole' – captain's recency). We did not consider this a problem – 3 weeks between sorties is not unusual on the Chinook force. I was also experienced, qualified, competent and legal as I had done lots of flying prior to my leave, so was very night current.

My co-pilot had also been away recently – in his case for an extended 8-week period of overseas leave. His regular currency prior to that was already reasonably disjointed, and it meant he was completing a back-to-flying currency package (second 'hole' – co-pilot's currency/competency). He had made several attempts in the last week or so to achieve the sortie in question, achieving partial sortie success on one occasion, and had been frustrated by the number of times he had planned, re-planned, and briefed a relatively complicated training evolution.

Perhaps as a result, or perhaps due to relative inexperience in general, his plan was either a little blasé or a little naïve in terms of timings. He had planned time on the ground, but he had not thought about the 30mins needed off NVD on the ground to keep us legal on a 5hr sortie. He had also not planned enough time in the circuit to achieve the crewman trg and rotors-running refuel (RRRF) required prior to departing for general handling evolutions on Salisbury Plain, landing at a couple of fields and an ultimate Time-On-Target for a RRRF at Bideford. I noted all of this in the brief but elected to let him learn by his experience; some lessons are best learnt from mistakes! Being a smart chap, the moment we completed the first couple of serials at Odiham – and he realised he would be very late leaving the airfield – we had to fly at 140kts to have any chance of catching up. The cyclic was therefore planted well forward for the next 2 hours with a constant need to 'go faster' (third 'hole' – setting up for failure).

The rest of the sortie went well – the RHS' handling was competent and confident and (acting) captaincy improved throughout. We split from our playmate at the second RRRF spot in the West Country and returned, via 3 more landing points to Odiham. I had already noted that it had been a busy day, it was the early hours of the morning and my RHS had been working hard (fourth 'hole' – fatigue), so I elected to come off NVG for the final 30 mins and complete the sortie at medium level, where I took over for a final instrument recovery. At this stage, I thought I was being clever – I had foreseen fatigue, recognised my trainee's laudable efforts, and planned accordingly. I even – honestly – considered previous incidents where aircraft had landed 'on the roll' and had nosed-over – so made sure I briefed the crew that I would fly the landing – which would be vertical, not rolling – and hand over prior to ground taxi.

We did land vertically (or very nearly vertically; I could have overtaken the aircraft walking) – and not, as had been assumed by others, at great pace. I think that was the problem. As the RHS took over, he thought 'I need to accelerate' – and did so the way he had been trying to accelerate (to catch up his timeline) all sortie, by putting the cyclic forward (fifth hole – cognitive error).

Did I also contribute to the control error? We were both sure I hadn't at the time. I had verbalised 'central-neutral-ground detent' and, at the time, was sure I had confirmed by looking at the longitudinal position indicator (LPI). However, seeing the LPI is very difficult from the LHS as it is next to the RHS – and in hindsight memory is a funny thing; I cannot now recall doing so. I definitely didn't ask the RHS to do so. Perhaps the cyclic was already slightly forward – and his later inputs merely exacerbated the issue? We certainly handed over control at exactly the wrong moment to ensure checks were completed perfectly (sixth 'hole' – completing checks properly).

As I completed the checks, the RHS watched me do so (seventh 'hole' – both pilots heads in) – which was also crucial, as it meant no-one in the cockpit saw the immediate result of his cyclic movement. Which meant I was perhaps 1/10 of a second too late in taking control. Without doubt the moment we landed we both cognitively and subconsciously 'switched off.' In our minds, we had safely returned home – the sortie was over (eighth 'hole' – premature reduction in task focus). Of course, the sortie is not truly over until the aircraft is stopped, chocked and signed back in.

The EOST (seen under aircraft nose in picture to the left) hits at about 7 deg nose-down. Bearing in mind we barely scraped the underside of the EOST I calculated that, had the nose been half an inch – a fraction of a degree – less forward, there would have been no damage. However, an extra inch or so could have completely crumpled the EOST and possibly deformed the nose structure. The front rotor-tips would have hit a couple of degrees later.

What would I now do differently? I do not think this particular incident was due to landing with too fast a run-on – other similar incidents may have had this contributory factor, but we landed near vertically. The handling pilot at the time of the nose-over was a through-and-through Chinook man, so other 'type' experience was also, I believe, not an issue. I have many more types under my belt – but most of my hours are on Chinook. I was already conscious of my recency, his currency/competency, and fatigue either before or during the sortie and believed I had mitigated, as much as is possible, these three 'holes'. However, they are perhaps insidious in their effect, were possibly not fully negated, and may have been the foundation of the error (noting it would be difficult to be more restrictive on an operational sqn).

I would also still let a trainee make mistakes – it really is often the best way to learn – but I will be much more cognisant of what secondary effects this might have. 'Catching up' a timeline – with a resultant forward cyclic position for a considerable period – may contribute to unforeseen cognitive errors by setting the trainee up for failure later.

Ultimately, I will change my actions to address the last three 'holes' discussed; complete checks properly, be heads-out at an appropriate time and don't switch off prematurely. I think this can best be accomplished in this case by the following: First, have the RHS handling the final landing if possible. This way, they are already on the controls and will be cognisant of the cyclic position. They are also more likely to be able to see the LPI is neutral as they land. Second, consider the safest way to do post-landing checks. This could mean landing vertically, confirming LPI position, applying the brakes and ensuring all relevant switches are made – during which time at least one pilot should be heads-out at all times – before both front-crew go heads-out for the ground taxi phase. Conversely, where a vertical landing is not the safest option – for example when a runway needs expeditious vacation at a busy airfield to clear it for landing traffic – the LHS must ensure he maintains as much heads-out as possible and monitors control position and aircraft attitude. But is a running landing needed on final landing at Odiham?

Finally – and perhaps most importantly – I will not 'switch off' until I have signed the aircraft back in!

Drone Collision- What is the Risk?

By Sqn Ldr Rebecca Rowlands, RAF Safety Centre

Photo: Hurricane and close-proximity Drone © 2023 Roger Beverley; Reproduced by kind permission.

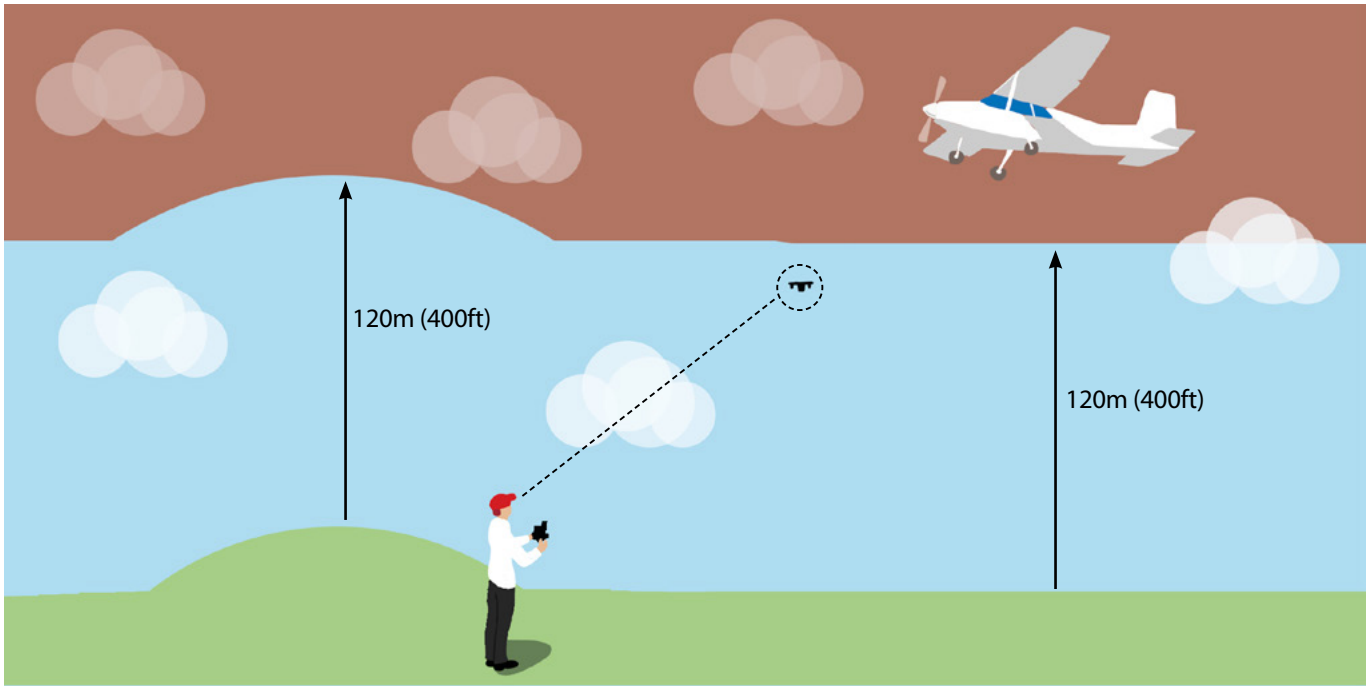
In March 23 a drone 'hobbyist' was prosecuted for endangering an aircraft when he flew his drone close to a Battle of Britain Memorial Flight Hurricane in July 2022. The Hurricane was conducting a flypast at Buxton Carnival and was protected by a NOTAM which banned all other flying in the area, including drones. The pilot of the Hurricane never saw the drone at all, and the incident only came to light when photos taken from the ground emerged. The drone hobbyist was charged with endangering an aircraft, received a £3,000 fine and a suspended 6-month sentence.

This was clearly an illegal and unsafe flight that posed a significant threat to the safety of the pilot and Hurricane but how much of an issue is legal drone flying to military aircraft?

To begin to answer that we need to consider several elements: the current regulations for drone flying and who is flying them, the risk of Mid-Air Collision (MAC) with a small drone and the future in terms of regulation and use.

Current CAA Drone Regulations

The current CAA drone regulations are divided into 3 categories: Open, for basic, low-risk flying; Specific, for moderate risk flying; and Certified, for high-risk, complex drone flying. The Certified category covers operations that present an equivalent risk to that of crewed aviation; because of this they are be subjected to the same regulatory regime (i.e., certification of the unmanned aircraft, certification of the UAS operator, licensing of the remote pilot). For that reason, considering our risk of MAC



Never fly more than 120m (400ft) above the earth's surface

Fig. 1. Illustration of 400 agl rule. Source: 'Drone and Model Aircraft Code'.

with a drone will concentrate primarily on drone flying within the Open and Specific categories.

The Open category allows you to fly one drone at a time, with a mass less than 25kg, up to 400ft (120m) above the closest surface of earth and within Visual Line of Sight (VLOS) of the drone operator. See Fig.1. It is possible to fly a drone above this height, but permission needs to be sought from the CAA and publicised through a Notice to Aviators (NOTAM) or a Temporary Danger Area (TDA). The rationale behind the upper limit of 400ft above ground level (agl) for drones is to deconflict them with General Aviation (think light aircraft), which cannot fly below 500ft, with a 100ft buffer for extra measure. However, this doesn't deconflict drones with military low flying which takes place firmly within this 0-400ft agl band. Drone flyers do not need to notify anyone of their intent to operate in this area, they do not need to be speaking to any ATC provider or similar, and they have no requirement for any electronic conspicuity on their drone to potentially aid our situational awareness of their presence. And therein lies the problem. Low flying military aircraft now have another air user (drones) with which to share the air, and drones are notoriously difficult to spot from the cockpit; they can be relatively small, probably dark coloured and difficult to distinguish against a backdrop of the terrain, trees, fields etc. Our Hurricane example demonstrates that perfectly, and that was a clear, good visibility day.

In 2019, it became a mandatory requirement to register your drone if it is not a toy, above 250g mass and has a camera attached. If you own a drone that matches those criteria, you must apply for an Operator ID and label all your drones with this ID. If you wish to fly a drone, you must take a short test on the Drone and Model Aircraft Code and receive a Flyer ID.

Another element of the drone regulations which is pertinent to our drone MAC risk is Flight Restriction Zones (FRZs). See Fig.2. These describe an area surrounding a protected aerodrome (not all airfields are protected but major airports and RAF bases are protected aerodromes), with a radius of the ATZ, up to 2,000ft with runway protection zones of 1 by 5 km on the runway approach and departure lanes, again up to 2,000ft. It is illegal for drones to be flown in this area without the permission of the aerodrome ATC or operator. Given that most of our RAF bases are protected by an FRZ, how many of you have flown a drone on the married patch not realising you are breaking the law?

There are some other limitations on drone flights in the Open category such as minimum distances from uninvolved people / buildings etc but the 400ft agl limit and the FRZs are most pertinent to our flying.

Drone Flyers

As at mid-April 2023, the CAA had in the region of 450,000 active drone users registered either a Flyer ID (will be flying a drone), an Operator ID (owns at least one drone), or both. Whilst this sounds like a significant number and is certainly worrying to us as military low flyers, the CAA predicts that a

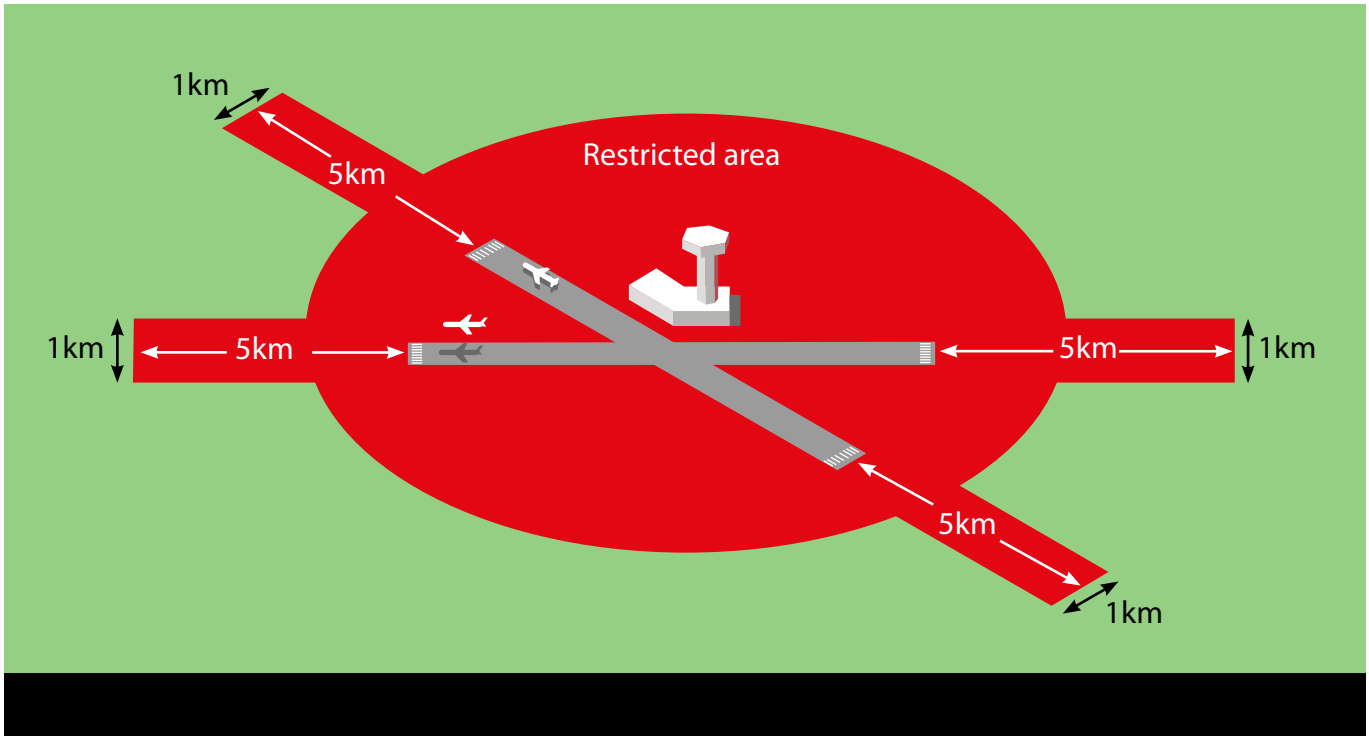


Fig. 2. FRZ map: Source: 'Drone and Model Aircraft Code'.

significant proportion of these drone hobbyists have drones less than 250g class as they are cheaper, technology has advanced so that they are just as good as larger models for a hobbyist's requirements, and the regulations permit greater freedoms at this mass and below. It is also important to appreciate that not all those users will be out flying their drones at the same time, every day of the year!
The CAA has in the region of 7,000 users with an operational authorisation such as a GVC (General VLOS Certificate). These drone operators are likely to be commercial operators, will have had more training, including class-based, and require more approval from the CAA for their drone operations. By the very nature of the extra training, they will have an enhanced awareness of other aviation and mitigations to MAC and other safety concerns.

Evidence, such as the altitudes at which drone Airprox are occurring and Police data of drone reports, indicates that there appears to be 2 subsets of drone users. The first are those who abide by the rules, understand the potential impact their drone flight may have on other aviation and may take extra, non-mandated mitigations like publishing their drone flights in advance or equipping themselves with Electronic Conspicuity receivers. The second subset are those who are either ignorant of the rules (no excuse really – the CAA works hard to publicise the responsibilities of a drone user whether hobbyist or professional user), or who ignore the rules for malicious intent (nuisance drones, prison contraband smuggling, etc) or to film 'cool stuff' to upload to social media.

Risk of MAC with a Drone

To understand a risk, we first need to make a few definitions. In this instance there is a hazard, which is drone flying. Hazards themselves only have potential for harm, so the risk is assessed from the likelihood and severity of the harmful outcome, which is the accident associated with that hazard (i.e., a collision with a drone), rather than the likelihood of the hazard (encountering a drone flight) itself. Let's examine the easy part of that assessment: the severity of colliding with drone.

Back in 2016, when the market in recreational drones was beginning to surge, there was real concern among the aviation community that there was no concrete data on drone collisions with aircraft, particularly windscreens. The Department for Transport, the Military Aviation Authority and British Airline Pilots' Association commissioned a study into the effects of a mid-air collision between small drones and crewed aircraft. The study combined live laboratory collision testing (firing drones or bits of drone at aircraft mock-ups) and computer modelling. This study aimed to find the lowest speed at collision where critical damage could occur to aircraft windscreens. Critical damage was defined as major structural damage of the aircraft component or penetration of the drone through the windscreen into the cockpit. The study found that, for the drone masses tested:

- Non-birdstrike certified helicopter windscreens have very limited resilience to the impact of a drone, well below normal cruise speeds.

- Although the birdstrike certified windscreens tested had greater resistance than non-birdstrike certified, they could still be critically damaged at normal cruise speeds.

- Helicopter tail rotors are also very vulnerable to the impact of a drone, with modelling showing blade failures from impacts with the smaller drone components tested.

- The construction of the drone plays a significant role in the impact of a collision. Those drones with exposed metal motors caused critical failure of the helicopter windscreens at lower speeds than the heavier class drone components, which had plastic covering over their motors. This is believed to have absorbed some of the shock of the collision, reducing the impact.

- The testing and modelling showed that the drone components used can cause significantly more damage than birds of equivalent masses at speeds lower than required to meet birdstrike certification standards.

The study resulted in an increase in knowledge regarding the severity of a mid-air collision between a crewed aircraft and a small drone and was further expanded to examine certain military platforms; due to the sensitivity of the findings, the results cannot be published here (and only a limited version of the study is available on the internet).

Now to consider the likelihood of a collision with a drone, which is a more difficult assessment. Drone flying is the hazard, and we can look at the likelihood of encountering drone flying to aid our assessment of the likelihood of collision. The likelihood of hitting a drone remains small due to their small size however, there will be factors, such as how much low flying your aircraft type conducts, that will increase the likelihood of a close encounter. Whilst we will probably encounter the hazard (drone flying) more regularly in the future, the realisation of that hazard (a collision) is low.

Airprox analysis is a good source of data to help evaluate this likelihood and is about as close we want to come to a mid-air collision. Fig.3 shows all Uncrewed Aviation (UA) airproxes with CAT, GA, Emergency Services and Military since 2012. It nicely illustrates the effect of the surge in recreational drone market sales through a steep increase in Airprox reports from 2014 to a peak in 2018. In 2018 and 2019, the 400 agl limit and mandatory drone registration were introduced. This contributed to a reduction in reports in 2019 and, once 2020's figures (and 2021's to an extent) are discounted due to the pandemic, there are indications that these reports are plateauing.

How will this graph look in the future? I suspect that this plateau will continue until the next evolution; the

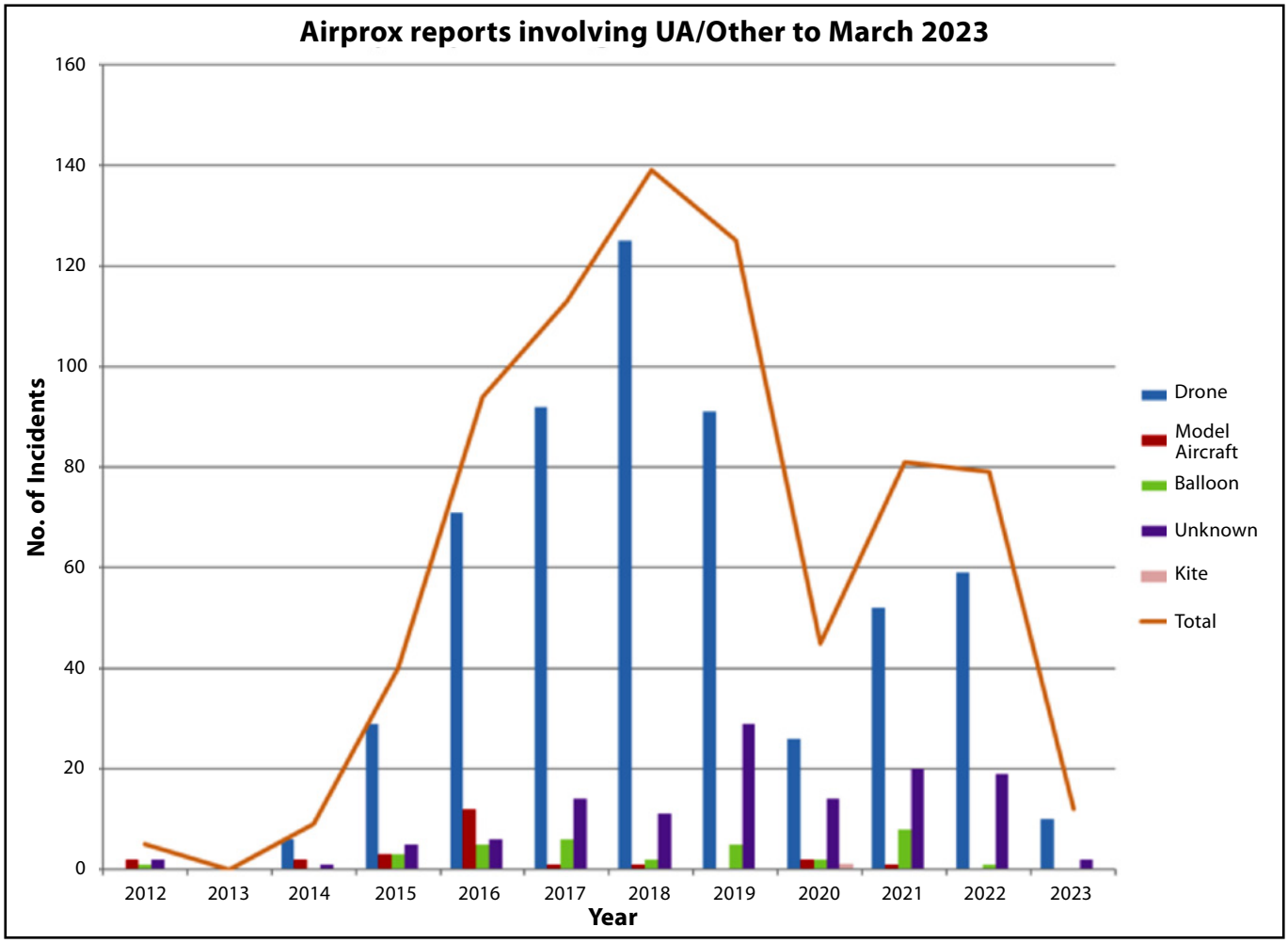


Fig. 3. UKAB Drone Chart: Source: UKAB.

expansion of Beyond Visual Line of Sight (BVLOS) drone flights in unsegregated airspace. I would then expect to see a spike in Airprox, not because BVLOS is unsafe (and future regulations will ensure that it is safe), but that BVLOS ops will be a new 'thing' for crewed aviation to adapt and get used to. In some cases, Airprox is about perception and when an incident is examined further, one party may consider the risk of collision as high whereas the other might have been visual all along and not even considered the event an Airprox; the same event is perceived differently depending on what information is available to each party at the time. I suspect that as the crewed aviation community starts seeing these novel BVLOS flights, this may bring about a rise in Airprox reports, not only due to the increase in the number of drone flights generally but also this perception reason explaining the increase.

On the military-only side, our Airprox 'chart' mirrors the total UKAB chart in Fig.3. However, in 2022 there was almost a doubling of Airprox compared to 2021 (9 vs 5). We have had 3 drone Airprox (in the UK) this year already. Drone vs military airprox count oscillates around 20% of the total military airprox reports seen each year. But… as demonstrated perfectly by the Hurricane example above, how many drone 'close encounters' are we having that we are unaware of and that don't get reported by drone operators? The UKAB Annual Report 2021 notes that: in ALL cases of drone operator reported Airprox (11 in total), the piloted aircraft did not see the drone. In 2022 there were 9 drone operator reported Airprox and in only 1 of those incidents did the piloted aircraft see the drone. There have been 4 Airprox in the last 2 years involving military aircraft where the crew were completely unaware of the drone's presence until after the event.

The majority of the 2021-2022 drone vs military Airprox reports have been categorised by the UKAB as C (no risk of collision but safety degraded), with 2 warranting category B (safety of the aircraft compromised). In November 22, an A400M encountered a drone at FL75 and the pilot reflected that, had they not been in a turn at the time, they would probably have hit the drone. That Airprox was categorised A (serious risk of collision).

Where and when are these Airprox occurring?

Fig.4 shows all Small UAS (drones, balloons, kites, model ac, unknown) vs military Airprox from 2014-2022 with the corresponding UKAB category assigned (A/B/C/D/E). You can see that they occur across the country with a greater number corresponding with greater military flying rate around Southern England (the M4 corridor and Southwest air bases) and Lincolnshire. When all aviation vs SUAS Airprox are added, the map at Fig.5 shows concentrated areas around cities and major airports. This corresponds to the high reporting by Commercial Air Traffic (airliners) of drone Airprox, predominantly in the departure or landing phase; fleeting encounters whereby it is impossible for the pilots to manoeuvre effectively. This data appears to indicate that drone Airprox is more likely around populated areas, particularly urban areas, and London especially. Since the majority of military flying takes place away from urban areas, this somewhat reduces our exposure to the risk.

There tends to be more SUAS Airprox reported over the warmer months of May to September. It could be argued both ways for either more drone flights due to the better weather or more crewed flights in general due to the better weather. The 5-year average in Fig.6 shows a tripling of the reporting rate for the summer months compared to the winter. Either way, it makes sense that the summer holiday periods present a perfect opportunity to fly a drone and the risk is therefore elevated.

Ultimately, assessing the risk of a drone MAC is a difficult thing to do. Thankfully, the overall risk of MAC with a drone remains low. To compare this with birdstrikes, in 2022 there were 144 birdstrikes with military aircraft in the UK and not one drone strike with any crewed aviation at all (military, GA, commercial, emergency services etc). The data available from the collision study may be worrying but the study examined

Fig. 4. Military vs Small UAS Airprox 2014-Dec 2021.

[Figs.4 & 5 - Interactive maps from UKAB showing SUAS airprox 2014- 2022 © 2023 Cadno Consulting.]

the worst-case scenario for a collision with a drone: a head-on windscreen strike. In reality, a glancing blow at an angle or impact with the main body of the aircraft is more likely and thus the severity of an impact will be much less than a head-on windscreen strike.

What can we do?

We can examine our particular platform operations and vulnerabilities (from the collision study) and understand how that affects our particular platform risk of drone MAC. Those aircraft that operate in the low-level environment, due to the nature of the drone regulations, are more at risk. Valley flying, for example, increases the likelihood of collision, with both the aircraft and drone confined to a smaller area by terrain and, with meandering valleys, less chance for the crew to see the drone or the drone operator to spot us and take action. We can also consider where we fly and how that may affect the risk. Historical Airprox evidence suggests the risk is much less in sparsely populated areas than more densely populated areas. If we fly standard low-level flying training routes we could look to gather intelligence from local drone clubs or drone social media forums to see if they inadvertently coincide with any known drone hotspots and adjust our behaviour accordingly. We already adjust our behaviour to mitigate the birdstrike risk when we increase height on coasting out; coastal areas are extremely popular with drone users so this mitigation may be helping with our drone MAC in these areas too. Increasing all our personnel's awareness and vigilance to drone activity is important so we can report when necessary and provide evidence for future mitigations and airspace and drone reforms.

Engagement and education with drone users, such as that we already conduct with other crewed aviation communities (gliding, hang gliding etc), is a good starting point. Considering the two subsets of drone users, the first, 'responsible' group presents a good opportunity with whom the military can engage and educate. Whilst the Drone and Model Aircraft Code highlights the requirement for drone

Fig.5. All Aviation Categories vs Small UAS Airprox 2014-Dec 2021.

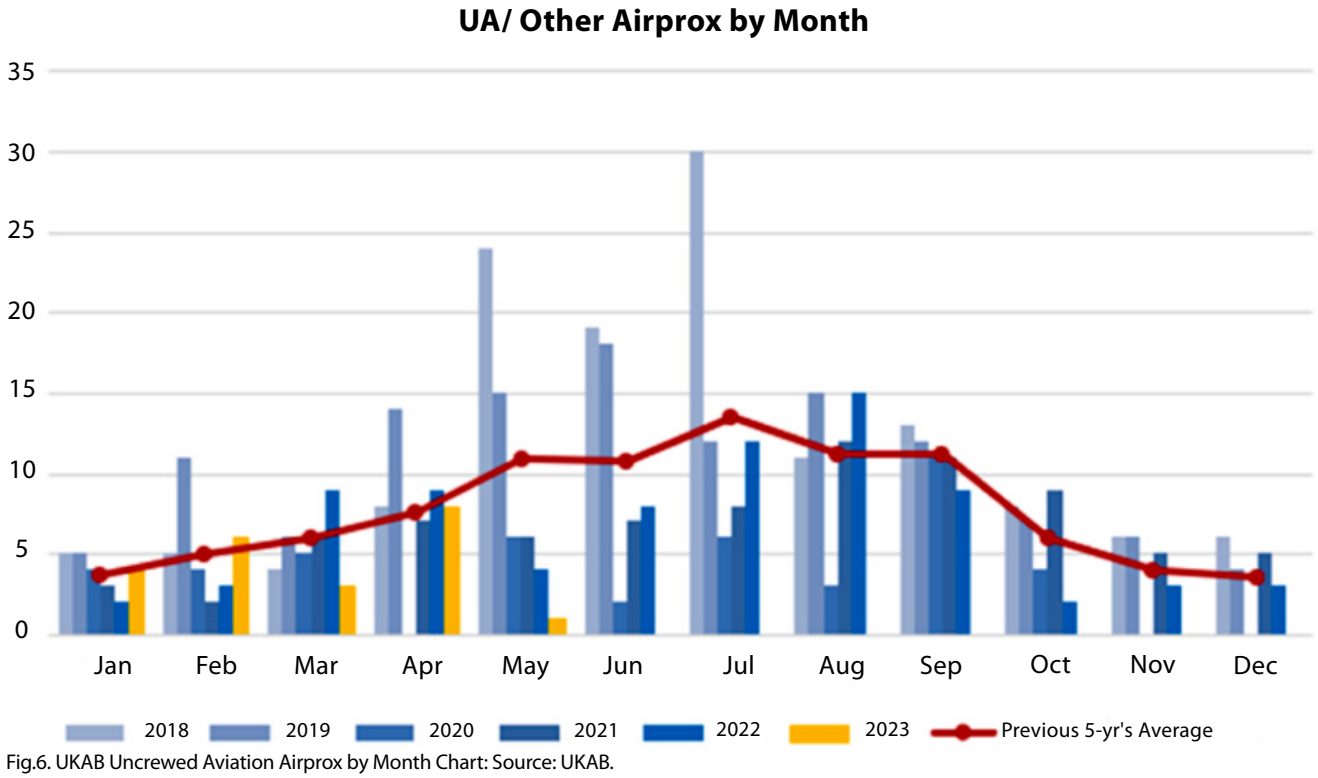


Fig.6. UKAB Uncrewed Aviation Airprox by Month Chart: Source: UKAB.

users to 'reduce your flying height or land as soon as you hear or see a low flying aircraft that may be affected by your drone', the understanding that low flying military aircraft use the same airspace and are more vulnerable may not be as apparent to them as us. Through education of drone users we can encourage behaviours such as notifying the MAMC of their intended flight (more on which in a bit), utilising drone planning apps, reporting Airprox so we can better understand the issues, or increasing their awareness that we are unlikely to see them to avoid them. There may be drone flyers who need a reminder of the regulations such as not flying a drone in an FRZ whom we can try to target through local social media messaging or information posted around base.
The RAF Safety Centre has produced a poster encouraging drone operators to notify us of their drone flight, even though they are not required by the CAA regulations to do so.
They can do this through contacting the MAMC (referred to as the Low Flying Booking Cell on the poster; the number is still extant) who will upload their flight details to CADS.

Inviting drone clubs, drone professionals (emergency services, industry etc) to Regional Air Users Working Groups, Military Civil Air Safety Days or even hosting a drone-specific safety day are good opportunities to begin this engagement. Unfortunately, the second 'irresponsible' subset will only be discouraged and dealt with through effective enforcement by the authorities, which can start with re-education if appropriate (such as a reminder of the regulations) up to a maximum of 5 years' imprisonment for endangering an aircraft. We can still influence this group through education of our people to report suspicious drone use, particularly near RAF bases.

In terms of technological solutions, the current CAA regulations do not require any electronic conspicuity for drones. There are popular drone planning apps where drone flyers can check the nearby airspace and publish their drone flight details. Consulting these prior to flight could give us prior knowledge of drone flight, but again, this is not mandated by the CAA and would only provide a partial picture. It may be that platform Duty Holders look to incorporate these apps into cockpit SA tools to provide real time drone flight information in the cockpit; whether this is realised depends on risk appetite, cost and practicality.
UK Defence already operates full C-UAS DETECT, TRACK, IDENTIFY and DEFEAT in some Theatres, commensurate with the threat. However, Defence has established a significant threat from UAS to Defence within the UK Homeland.
This threat pertains to 3 specific areas of flight safety (amateur users/media/industry/criminal activity), Hostile State ISR (Intelligence, Surveillance and Reconnaissance) against Defence assets (i.e. ISR on UK Defence Nuclear capabilities) and Counter Terrorism measures. Working closely cross government, in particular with Home Office Police Forces, AIR is leading a programme to develop C-UAS capability within the UK Homeland, particularly for fixed bases. In the future this will ensure effective real-time protection of our bases and the FRZs that surround them. Whilst unassured information, this could be linked to ATC to provide situational awareness to crews in the vicinity of any drone activity that might be a threat.

Drones and the Future…

Drones realise capability enhancements, cost savings, safety improvements and environmental benefits for business or industry, and, for the hobbyists, a new way on seeing the world. Drones are being utilised in many creative ways in the military.

Whilst the introduction of Beyond Visual Line Of Sight (BVLOS) drone operations in unsegregated areas may sound alarming for our MAC risk, the CAA is adopting an incremental approach to BVLOS as part of the Airspace Modernisation Strategy, with tight regulatory bounds for different levels of BVLOS operation. The CAA has trialled and is trialling BVLOS within contained areas and carefully coordinated with other air users. In the near future, 'atypical environment' operations will be taking place without any great technological enhancements: the drone will remain within a portion of airspace where it can be reasonably anticipated that there will be an 'improbable encounter rate' with crewed air traffic due to the proximity of certain ground infrastructure, which would be hazardous for most traditional forms of aviation. For full unsegregated airspace integration, the BVLOS drone must be able to comply with,

or demonstrate equivalence with, the applicable crewed aviation requirements. For example, the ability to establish and maintain two-way radiocommunications with an air traffic services provider using approved equipment with the appropriate licences. Any BVLOS drone in this category will also have to be capable of 'detect and avoid' (DAA); to provide an equivalence to the 'see and avoid' task undertaken by the pilot of a crewed flight. Electronic conspicuity is highly likely to be an essential enabler for DAA. For those drone operations that cannot satisfy the full requirements, Temporary Reserved/ Segregated Areas and Transponder Mandated Zones will be adopted, with DAA required if the airspace is to be shared with crewed aviation.

In terms of the regulations applying to the hobbyists, while all rules are continually kept under review, nothing is likely to change drastically in the near future.

In 2022, Price Waterhouse Coopers revisited their 2018 'Skies Without Limits' report to predict that the UK drone industry could contribute £45bn to the UK economy, make £22bn net cost savings, with 900,000+ drones operating in the UK skies by 2030. There are, however, many hurdles to realising this full potential, such as perception, drone implementation, regulation and skills.

The Future Flight challenge at UK Research and Innovation is one example of how the UK government is supporting the UK to be a world leader in drones and the management of low-level airspace. In July 2022, the programme announced 17 winning projects that will share £73 million in funding to develop and show integrated aviation systems and new vehicle technologies. 13 of the 17 projects involve drones in some capacity: reducing the time it takes for a medical sample to get to a laboratory; distribution of medical products and medicines; speeding up the surveying and safety of critical infrastructure such as transport and grid networks are some examples.

Of particular interest is Project Skyway, a drone 'superhighway' planned between Reading, Oxford, Cambridge, Coventry and Rugby. Altitude Angel is the company leading a consortium to realise this BVLOS superhighway project. The aim of Skyway is to make their foundation technology service, ARROW, available to any drone operators for any use case within the geography of the airspace coverage. ARROW is the name of Altitude Angel's detect and avoid solution through the deployment of a layered sensor system on the ground to establish the low-level air picture in a specified geography.

This picture is then used by their Guardian UTM (Unified Traffic Management) to provide a deconfliction service to drone traffic integrated with the system. It is this principle of integrating drones in Class G airspace rather than closing the airspace off to other users whilst in use that is unique to Skyway. It will deploy this ground-based network solution to sense both cooperating and non-cooperating air traffic through ADS-B, FLARM and visual cameras. Should a potential confliction be predicted between a Skyway drone and non-Skyway air traffic, the Skyway will amend the flight path of the drone to deconflict from that traffic. In theory, crewed traffic can ignore the presence of the Skyway knowing that its systems will divert drones away from any potential confliction. The initial plans are to operate in the 0-400ft agl band and

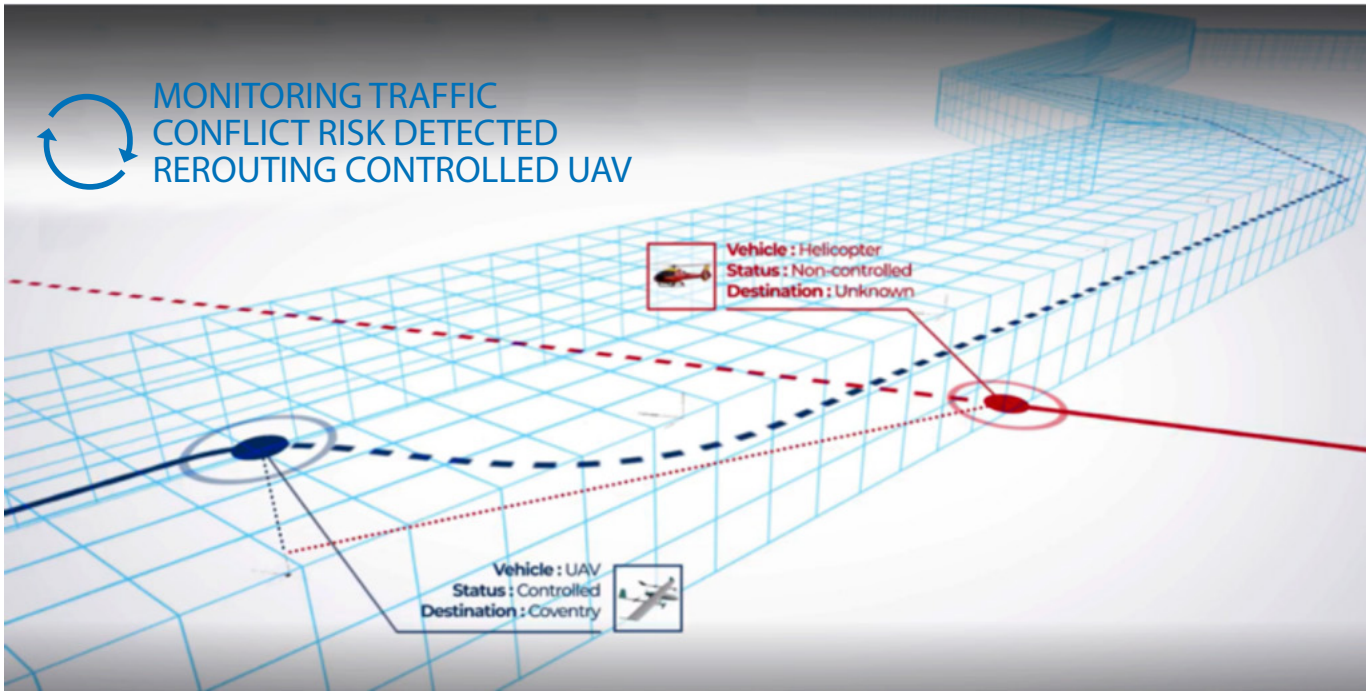


Fig.7. The Skyway's sensors detect crewed and uncrewed aviation and build a real time moving map of the sky above. This information is relayed to the Skyway controller to provide automated air traffic control for drones flying on the Skyway. Any conflict detected will result in an amendment to the drone's flight path, thus preventing collisions. Image: Copyright ©2023 Altitude Angel. Reproduced by kind permission.

trials will initially take place in certain segments of the corridor including Coventry, Milton Keynes, and Reading from July - December 2023. The trials will be conducted under existing drone flying rules which includes visual observers along the areas used to ensure deconfliction from other air traffic. This will not require NOTAMs and will be in relatively small volumes. The highway is planned to go live from April 2024 for customer demonstrations and further expand the geography thereafter to support further use cases.

Ultimately, drones will be a big part of aviation future. How the regulations change, how the future airspace plans develop, the introduction of Unified Traffic Management, electronic conspicuity for drones and technology developments will all shape how we share the air safely. Many thanks to the CAA, Director UKAB and Altitude Angel for their assistance in compiling this article.

Wg Cdr Spry Comment:

This is an area of aviation that will continue to grow and continue to attract the military's interest from both a capability enhancement and flight safety perspective. Your particular assessment, awareness and experience of the issue will stem from where you fly geographically (with more populated areas attracting more drone flyers) and the airspace you fly in (with the regulations and drone uses confining the majority of drone flyers in the low flying system). It may be a hazard that you rarely, if ever, come across, for example if your operating area is the Highlands of Scotland, whereas it could easily be a daily concern for those who fly in and out of London regularly. Increase your vigilance to drones when flying in more populated areas and when the weather is better; see and avoid remains the most effective barrier to drone MAC. Whilst the hazard may be increasing, the risk of drone MAC risk remains low. Continue to report drone sightings and Airproxes; capturing data will give us a more accurate reflection of the situation and can help identify mitigations.
For more drone resources, data, and news articles, check out the RAF Safety Centre Drone Portal on the RAF SC Communications Site> Flight Safety> Drone Portal (MODNET users only). ■

RAF High Wycombe Safety Day 2023 in pictures

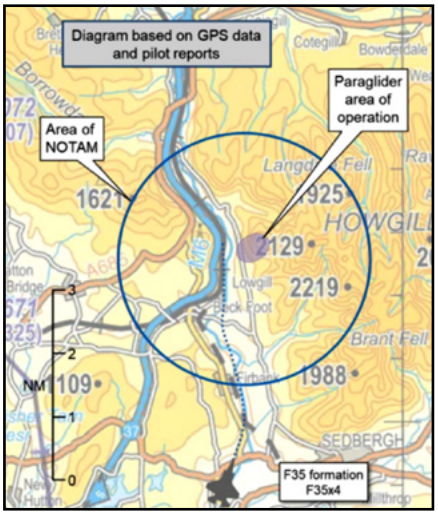
RAF Safety Centre


Welcome to
Severn Trent
Services


ROYAL AIR FORCE
Safety Centre
Safety is a choice
Be seen, be safer
RAF

Airprox Highlights

With Comments from Wg Cdr Spry



Paraglider v F-35
14 April 2022
Airprox No. 2022049

The Paraglider Pilot reported that they were soaring the hill known as Far Whitestones, a registered BHPA paragliding site along with 2 other pilots. They submitted a CANP for the site the previous day and have been informed that their activity had been NOTAM'd. They were directly above the recognised landing area for the site at about 420m in the process of descending to land. They were about to commence tight 360° turns when they heard the sound of a fast jet to the south. They immediately caught sight of the lead aircraft and immediately realised that there were several more. All the fast jets passed directly beneath them. They briefly attempted a 360° turn to increase their visibility. It was over very quickly and they watched the 4 aircraft disappear to the north along the Lune valley. [They opined that] had they entered their landing manoeuvre a minute or so earlier they would have been in direct line with the fast jets.

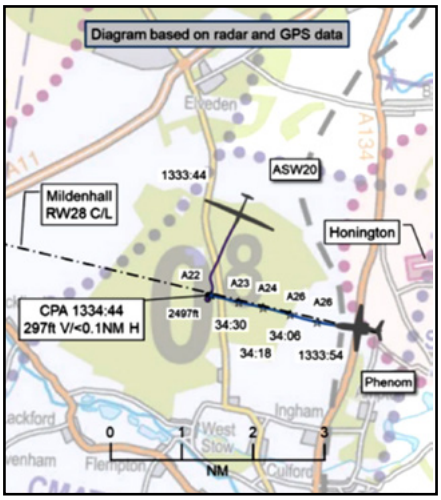
The F-35 Pilot reported that at approximately 1250 approaching the M6 pass, [they] called 'Paraglider high right', this call was acknowledged with '2 visual', '3 visual', '4'. [They] subsequently updated the call with 'couple of Paragliders up on the hill'. All formation members were visual multiple Paragliders and assessed no confliction.

A Paraglider Pilot Witness reported that they were paragliding [in the vicinity] - 1km east of the M6 between junction 37 and 38. Another [paraglider] pilot was also flying further away from the hill when military aircraft flew from the south to the north, along the east side of the motorway. They [the military jets] under-flew the paraglider pilot with perhaps only with 60-100m of separation. The paraglider was flying a green and white Advance wing and was known to some other pilots also there at the time.

For full details of this Airprox, see Serial No. 2022049 on the Airprox Board Website.

Spry's Comment:

Whilst the Airprox Board assessed there was no risk of collision, we should consider this from the perspective of the paraglider pilots. To reduce the risk of MAC they have submitted a NOTAM informing other Class G users of their intention to operate from the site. A paragliding NOTAM means there are five or more operators launching in that area. Whilst the paraglider pilots do not expect other aircraft to avoid the location completely, they leave a phone number for coordination if planning to pass through the site. After going to these lengths to de-conflict, consider how disappointed they would be when discovering military ac were planning to fly through without first contacting them, despite awareness of the NOTAM. Next time these paraglider pilots might not submit a CANP because of their experience here. Would you be looking out as thoroughly if there wasn't a NOTAM? The BHPA routinely attend military working groups to brief why they operate at certain sites and the effect of aircraft wake turbulence on their activities. The marking of BHPA sites on low flying charts is there to raise awareness of the potential to encounter hang gliders and paragliders. That symbol should prompt us to expand our lookout when passing these sites and potentially steer around them. If a NOTAM exists at the site, we should think carefully about passing through it without further coordination. How essential is it to follow that exact route? Is there a safer way? ☐



Phenom v ASW90
27 May 2022
Airprox No. 2022092

The Phenom Pilot reported being established on the RW28 ILS at Mildenhall at about 6 miles. The aircraft Captain, operating as PM in the right-hand seat, saw a glider which passed directly overhead the aircraft from right-to-left, approximately 200ft above. Nothing was seen on TCAS and no traffic had been reported by Mildenhall. The traffic was notified to Mildenhall and the ILS approach was continued.

The ASW20 Pilot reported being on a 300km cross-country attempt. Lakenheath/Mildenhall were NOTAM'd as closed so several gliders took the opportunity to task through the region. Despite good initial progress into the strong wind, wave interference meant that they experienced a lot of sink just after they passed Honington and had to turn back and stop to circle several times in that area before abandoning the task and heading back to [departure airfield]. While they were manoeuvring in the area, they saw a 'bizjet' after it had passed below (from left-rear to right-front). They were not alarmed as the vertical separation was adequate, although its path suggested there had been little horizontal separation. They estimated the vertical separation at 300ft but that could be inaccurate because they had no familiarity with the aircraft type or size. They did not hear the other aircraft at any stage. The other aircraft did not show any sign of a change in level or heading while it was visible to them.

The Mildenhall Tower Controller reported that [Phenom C/S] was on 5-6 mile final to RW28 when they reported that they had passed 200ft under a glider. The controller relayed the information to Lakenheath Approach Control, who replied that they had not seen a glider on scope and would advise any other arrivals of the report.

The Lakenheath RAPCON Controller reported that [Phenom C/S] was in receipt of a Traffic Service when they were cleared for the approach and switched to Mildenhall Tower at 1333. After reviewing the radar playback, no targets were observed on or near their path as they made their ILS approach to RW28 at Mildenhall.

For full details of this Airprox, see Serial No. 2022092 on the Airprox Board Website.

Spry's Comments:

In this case the glider pilot was under a false impression that the aerodrome was closed due to the misleading wording of a NOTAM. However, did you know that a glider pilot is only required to avoid an ATZ, not the MATZ which surrounds it? Many glider pilots do not hold the Flight Radio Telephony Operator's Licence (FRTOL), which is required to use a radio. They may not have the capacity to call an ATC unit, especially if struggling to find lift; their primary focus is staying aloft or considering landing options in their local vicinity. From the Civ UK AIP: 'pilots should call for the [MATZ/CMATZ] penetration service irrespective of the hours of watch published' and that 'If, outside normal operating hours, no reply is received after two consecutive calls, pilots are advised to proceed with caution.' This legislation is aimed primarily at powered aircraft and, whilst encouraged, there is no guarantee a glider will make this radio call. Many gliders do not carry a transponder so TCAS will not alert you of their position and primary RADAR will not always detect them. See and avoid remains one of the main barriers to MAC, even inside a MATZ. ■

Hurricane v PA28
26 June 2022
Airprox No. 2022116

The Hurricane Pilot reported that they were in transit to [destination airfield] after having displayed at [air-display airfield]. Visibility was excellent but it was rather bumpy due to high winds. Approximately 2NM west of Liss, whilst conducting a fuel check, they looked up from the fuel gauge to see a light aircraft (Piper Cherokee or similar low-wing aircraft with tricycle undercarriage) slightly left of their 12 o'clock, at a similar level and head-on, at what was estimated to be 300m. [The Hurricane pilot] immediately took avoiding action by breaking right (they couldn't 'bunt' as negative G must be avoided in a Hurricane). The other aircraft didn't appear to react. They were not in receipt of a Traffic Service at this particular time as the Farnborough LARS frequency seemed busy with other aircraft queuing for a service. However, they were monitoring various frequencies, including Farnborough LARS, to build an air-picture of what other aircraft were around. No collision alert was given by [the Hurricane EC device]. The Hurricane pilot considers that had they had a Traffic Service, the threat might have been highlighted and concluded that, although a very late pick-up, what did avert a collision was that a lookout was maintained between checking elements of the fuel system and this highlights the need to maintain lookout at all times and not spend extended periods 'heads-in'.

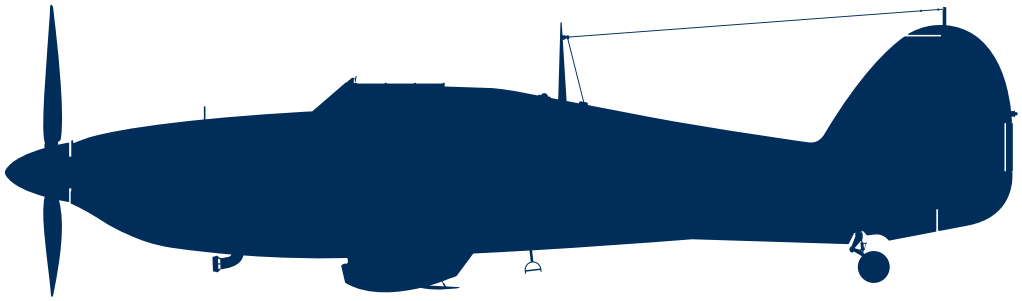
The PA28 Pilot reported that they did not see nor know of any aircraft in close proximity. They had checked relevant NOTAMs for their path of flight and were aware of the time of formation flying and display flights planned for that region.

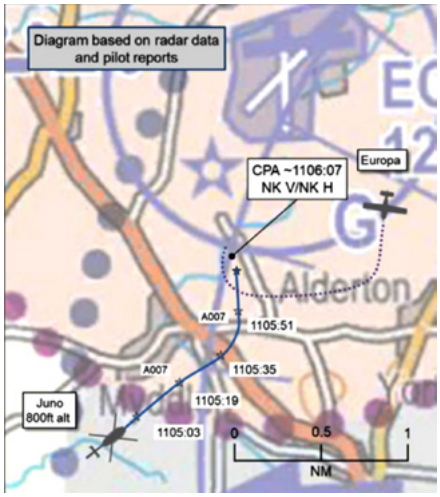
The Farnborough LARS WEST Controller reported that they were working both LARS West and Zone [they recalled] and there were not many aircraft on, but they were busy with zone-crossers and the required co-ordination with Approach. They were scanning the traffic and spotted [the PA28] (on a Basic Service) with opposite direction 7,000 squawk, a couple of miles away and indicating 200ft apart. They continued their scan, interacting with other traffic, and came back to [the PA28]. The label was garbling with the 7,000, so they moved them to enable seeing them more clearly. They noticed that they were merging and indicating similar levels, but [the controller's] attention was drawn elsewhere. They remember thinking that they would ordinarily have passed that traffic, but the [aircraft] had passed by that time and so they continued working. No Airprox was reported at that time.

For full details of this Airprox, see Serial No. 2022116 on the Airprox Board Website.

Spry's Comments:

This Airprox serves as a positive reminder to all of the importance of breaking up routine checks with lookout and minimising the time the head is in the cockpit, especially in a notoriously busy piece of airspace. Ultimately, it was see-and-avoid by the Hurricane pilot that prevented a MAC, with late and very positive avoiding action taken. Although the Hurricane pilot had a listening watch to build their air picture, it would have been more prudent to have had an Air Traffic Service, particularly knowing how busy the airspace was. Orders contained within 1 Group Air Staff Orders state: Pilots are to select an Air Traffic Service and use airspace that provides the maximum level of MAC protection commensurate with the briefed task. The Hurricane was fitted with PowerFLARM, an enhancement on FLARM (proprietary electronic traffic alerting system) that, in addition to detecting other air users equipped with FLARM, will pick up ADS-B and transponding aircraft. In this instance it did not alert. It is important to remember that see and avoid remains the most effective barrier to MAC; traffic alert systems are an aid to your SA and for many reasons they may not alert you to another aircraft in close proximity.





Juno v Europa
13 July 2022
Airprox No. 2022139

The Juno Pilot reported that during the join for their second consecutive 'quickstops' sortie of the day, contact was made with Sleap Radio, and the runway in use was confirmed as RW36. A lightaircraft was in the circuit and reported downwind. As their aircraft positioned on final approach at 500ft, parallel to RW36 but approximately 300 yards to the west (dead-side), the student took control to debrief them on a couple of points relating to the join. The light-aircraft pilot reported "Finals RW36", but as the student finished briefing them for the approach and handed them control, the light-aircraft unexpectedly crossed, [they recall], left-to-right 80-100ft ahead of them and approximately 20-30ft below, in a descending right-hand turn; [the light-aircraft] then rolled-out lined-up on RW05 and landed. Avoiding action was not needed because the relative flightpaths were not in direct confliction. Although avoiding action was not needed, the two aircraft came much closer than they had expected or would have chosen. After touchdown, the Sleap controller [sic] asked the light-aircraft pilot if everything was okay (the answer was 'yes') and then reminded the light-aircraft pilot that RW36 was in use. Once the lightaircraft had stopped at the end of its landing run, they [the Juno pilot] contacted Sleap Radio to file [sic] an Airprox. After discussion with the student, they decided to continue the sortie, and took a few minutes to reset; approximately 30min later, with lots of GA traffic, some of which were flying non-standard patterns, and increasingly busy radios, they felt that it was becoming hard for either of them to concentrate properly and curtailed the sortie. There were no indications of the light-aircraft on the Juno ACAS.

The Juno pilot added that the student had perhaps chosen a poor moment to debrief them on the join; with the benefit of hindsight, instead of paying attention to the debrief, they [the instructor] should have monitored the light-aircraft visually rather than rely on their RT calls for situational awareness.

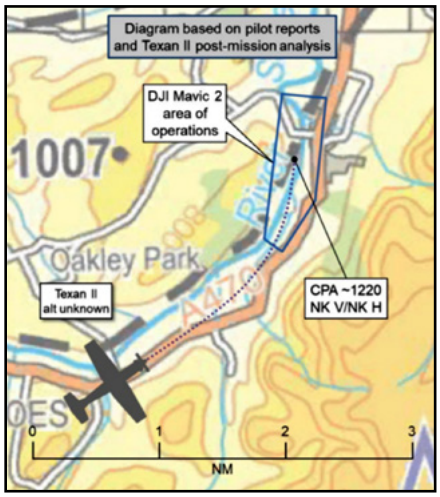
The Europa Pilot reported that their aircraft had suffered an Airmaster propeller motor failure on a previous flight, and they had spent the previous two days fitting a new motor and wiring and also rebalancing the propeller. The work was signed-off by an aircraft examiner. A test flight was required. The active runway at Sleap was RW36. They took-off at 1059 and completed one circuit checking some of the indications and settings on the propeller. They completed a touch-and-go on RW36 and continued into the circuit intending to monitor the propeller indications downwind on the 'Manual' and 'Hold' settings, and the increase in RPM through two settings on the base-leg. They may have drifted in on the downwind leg and, on turning on to base-leg, they were distracted checking the indications on the controller and flew though the RW36 centreline. On turning on to final, expecting RW36, that has a similar dead ground before the runway as RW05, they were immediately distracted and their attention was focussed on a flock of crows on the runway (RW05), they landed as the crows dispersed.
They were made aware of their mistake by the Sleap Radio operator. Due to the distractions, they did not see the helicopter. [They feel that] this error could have been avoided if they had taken someone else to lookout or monitor the propeller checks.
[They add that] as they were only planning to do one or two circuits, they were not carrying their GPS devices.

The Sleap Air/Ground Operator reported that the runway in use was 36RH, helicopters were using the dead-side of the aerodrome as per the LOA. [The Europa pilot] was conducting a flight test and was distracted with the propeller controls and they overflew the centreline of RW36 and mistook RW05 for the runway in use, landing on that runway. They did not have sufficient time to alert [the Europa pilot] to their error. [The Juno pilot] was in hover practice on the edge of RW05 while the aircraft landed.

For full details of this Airprox, see Serial No. 2022116 on the Airprox Board Website.

Spry's Comments:

The Juno was making an approach to the dead-side of the airfield; it would be very reasonable to assume that the other circuit traffic would remain east and clear of their approach path. As this incident demonstrates, it is prudent to anticipate the unexpected and to remain vigilant to circuit traffic until you are content that no potential deconfliction exists. A circuit is a VFR procedure and see and avoid is an essential part of deconfliction; radio calls are there to aid your awareness of traffic in the circuit and cue your eyes onto it. The Juno pilot acknowledged that they should have prioritised monitoring the other aircraft rather than concentrating on the debrief; consider your prioritisation of tasks and the potential implications this may have on flight safety. ■



7 Mar 22
Airprox No 2022024
DJI Mavic 2 v Texan II

The DJI MAVIC 2 Operator reported that, early on the morning of the intended flight, they uploaded their flight plan to Drone Assist UK. They arrived on the site at around 1200 and noted the weather – sunny with some cloud, moderate ~16mph wind with occasional gusts. Excellent visibility. Low risk of rain. Nobody else was present on site and the nearby fields were clear of livestock. At around 1215 their 'spotter' arrived and they set up the drone, undertook calibration, checked the battery and wifi levels etc. The drone operator briefed their 'spotter' on the procedure should anyone approach and the return to home function should they become incapacitated. At around 1218 they took-off and commenced their flight. At 1220 their drone was at approximately 100m elevation and 160m to their east when they heard a distant buzzing, which they knew from their ATC days was a turboprop – commonly used for RAF training (they suspected a Tucano, but later ascertained that these were replaced by the Texan recently). They immediately started scanning for a distant plane and told their 'spotter' to watch for any aircraft. As they finished their sentence, the RAF Texan appeared from a bend in the valley, over the trees. They immediately considered reducing the height of the UAV but realised that if the pilot had spotted it, they would stand a better chance of avoiding a static object than a moving object. Additionally, the UAV can only descend at ~2m/s. Within the split-second it took to appear, the Texan banked onto its port side and appeared to pass between their location and the drone at the same elevation. It appeared that the pilot may have attempted to fly directly over their heads, so was closer to them than the drone. They cannot emphasise enough that this was all within a split-second. The opportunity to react was solely instinct. They then considered what to do with the UAV. Their 'spotter' reminded them that training aircraft often travel in pairs or threes, so they descended the UAV. They then flew the UAV back to the landing point. At 1225 they called Welshpool ATC – they were unaware of any such aircraft in the area and suggested that they call RAF Valley, which they did. After 20+ min trying to get a response, they were finally put through to ATC, then Ops. RAF Valley could neither confirm nor deny whether they had aircraft in the area. RAF Valley Ops took their location, height of the incident, rough distance (at that point they estimated it was 200-300m away, but later confirmed it was only 160m away) and phone number. They asked if the flight was recorded on NOTAMs – the drone operator explained that this was done via Drone Assist and asked if they needed to report this anywhere else and were told no – Valley would deal with it all from there. RAF Valley Ops called back to ascertain if they would be flying just that day or tomorrow too. The drone operator confirmed that it was just on that day. They asked whether RAF Valley knew that they were in the area (so they can continue) and, whilst they cannot confirm or deny what they can or can't see, or whether any of their aircraft will be in the area, they do at least now know the location of their drone operations for the afternoon. They later called [their operating organisation's] drone experts. Contrary to the advice from RAF Valley, they confirmed that an Airprox needed to be reported.

The Texan II Pilot reported that, several days after completing their flight, they were made aware via email that a recreational [they believed] drone operator had filed an Airprox report, stating that they had come close to their drone at approximately 1220 in the vicinity of Llandinam, Powys, Wales. A NOTAMed route was loaded into the aircraft, and multiple hard copies of up to date, NOTAMed maps were carried by both aircrew. Nothing resembling a drone was seen at the time by either aircrew. Upon being informed of the Airprox report, the student pilot replayed the sortie recordings, which included a GPS ground trace, HUD tape and aircraft performance data. Nothing resembling a drone was seen on the HUD tape.

For the full report, see AIRPROX REPORT No 2022004 on the Airprox Board Website.

Spry's Comments:

It is heartening to see an Airprox report submitted by a drone operator. In many crewed vs uncrewed aviation 'close encounters', the crewed platform does not see the drone. In fact, in 2021, in all drone operator-reported Airproxes, the crewed aircraft was not aware of the drone at all. Capturing incidents like this can help understand the scale of the issue in the 0-400ft AGL band where military low level flying training and drone operators legitimately share the airspace. It allows both parties to consider measures to increase safety, although mitigations, such as mandated electronic conspicuity for all drones, are a still a way off. There are recreational and commercial drone flight planner apps where drone pilots can publish their flight details; for this particular incident, the drone operator had done just this. There is no mandate for drone operators to publish their flight in the Visual Line of Sight (0-400ft AGL band) and such, apps will not display a complete picture of all drone flights. However, it may be worth considering incorporating such programmes into the plan for SA building or something for Authorisers to check pre-flight.

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	030 6798 0101	-
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
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	-

Capita Fire and Rescue

Wildfire Aware

Many wildfires can be prevented – make sure you enjoy the countryside safely.

The fire service receives over 30,000 calls a year to wildfires.

Cigarettes

Extinguish and dispose of correctly, don't throw them on the ground.

Litter

Dispose of litter correctly.

Glass bottles can start fires with sunlight.

Barbecues

Never leave a BBQ unattended and fully extinguish with water.

Only use a BBQ in designated areas.

Take all portable BBQ waste home and dispose of safely' and 'portable BBQs are subject to restrictions in hot weather – check before you light up.

If you see a fire no matter how small call 999!

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