The RAF Safety Magazine

Issue 49

AirClues

Understanding Parachute Safety

The Problem of Mental Underload

Safety in Transition

ROYAL AIR FORCE Safety Centre

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March 2026
Produced by Air Media Centre, HQ Air Command. 5233_25WP
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Foreword

By Air Commodore Sam Sansome, Inspector of Safety (RAF)

Air Commodore Sam Sansome

Welcome to Air Clues 49. After 5 years in the post of Inspector of Safety RAF and Hd of the RAF Safety Centre this will be my last foreword. It has been an enormous privilege to oversee the production of Air Clues since Edition 35 back in May 2021, but in truth my input has been minimal. The heavy lifting has been done entirely by Wg Cdr Jim Lawson and the small but perfectly formed Safety Centre Promotion Team – and of course by those people that have supported him by providing the articles.

This edition contains a number of pieces that are particularly close to my heart. I have been honoured to be involved in the L G Groves awards since 2021 and have met the Groves family and helped judge the awards.
It has been amazing to see the brilliant work of our people – and the people in the Met Office – first hand and be able to recognise them formally with these prestigious awards. Thank you to the family for continuing their support. Please, read the article and if you see people that deserve recognition – put them forward!

Parachuting also is a favourite topic – and no; never have and never will. But I have been involved in the safety management of parachuting in the RAF and across Defence for 10 years now. I hope the article gives anyone brave enough the confidence to do what I have no intention of doing.

Finally, on 'Reg 18'. I am frequently involved in Service Inquiries (SIs), both safety and non-safety related and have seen the 'myth' of Reg 18 played out frequently. Hopefully Nicky's article will help to explain the purpose of Reg 18 and protection it offers from 20:20 hindsight.

Five years ago, my first foreword was all about Climatic Injury and I noted at the time the irony that the rain was pouring while I wrote. In that at least we seem to have come full circle. Cardinham in Cornwall has not had a single day without rain for the first 55 days of this year. I suspect Rob McKenna's lorry has broken down there – you either know him or you don't. Anyway, please continue to 'subscribe' and provide articles for Jim and the Team and be a part of the Air Clues family. I hope I'll see you around, but in the meantime, so long, and thanks for all the fish.

> "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

Flight Lieutenant Wright – RAF Brize Norton – Green Endorsement

On 27 August 2025, Flight Lieutenant Wright launched from RAF Brize Norton with a 206 Test & Evaluation Squadron crew to conduct a post-maintenance test flight on an Atlas C Mk1. The aircraft had not flown for over four years due to an extensive nose repair, and this was the first sortie post rebuild. The primary aim was to assess the engines, all four of which had been replaced whilst the aircraft was grounded. As the wheels left the ground it was immediately apparent that all was not well. The aircraft rapidly yawed left, requiring Flight Lieutenant Wright to apply a highly abnormal 15° angle of bank to maintain runway track. Unbeknown to Flight Lieutenant Wright at the time, incorrectly installed side-slip probes in the repaired nose section had caused the fly-by-wire flight control system to misinterpret the aircraft's flightpath and drive the rudder datum significantly left of centre. The fault meant Flight Lieutenant Wright had only one-third of the normal available right-rudder authority.

With no emergency checklist for this scenario, Flight Lieutenant Wright calmly conversed with his crew, conducting a handling check and leading a logical decision-making process to select and execute the most appropriate drills. During this diagnosis, further warnings relating to fuel imbalance appeared. Recognising these were almost certainly due to prolonged side forces, Flight Lieutenant Wright nonetheless instigated the checklists to rule out secondary faults. Throughout, he also remained cognisant that the engine test points were incomplete, monitoring parameters and remaining prepared for an engine malfunction that could have compounded the asymmetric handling. Following checks to confirm he had sufficient rudder authority to counter the crosswind on landing, Flight Lieutenant Wright manually flew a precise approach back to RAF Brize Norton. As the main wheels touched down, however, the change in flight control law logic caused the rudder to re-centre unexpectedly, inducing an abrupt right roll. Flight Lieutenant Wright's instinctive and immediate reaction in applying rapid yet precise opposing control inputs was all that prevented the outboard right-hand propellor from striking the ground, which could have been disastrous.

From the moment of take-off to the very end of the landing roll, Flight Lieutenant Wright displayed outstanding airmanship, leadership and decision-making under pressure. His calm and methodical approach to an unprecedented and hazardous flight control system fault, combined with his exceptional handling skills during the perilous moments at touchdown, averted a potential catastrophe for aircraft and crew.

Corporal McLeod – Leuchars Aerodrome – Merit

In March 2025, at Leuchars Aerodrome, Corporal McLeod was conducting a "Typhoon Hot Pit" refuel. Standard practice was to observe the aircraft tyres for wear. Corporal McLeod immediately spotted considerable wear, so he quickly informed the pilot that the tyre had damage. He then called his supervisor to inspect the tyre who agreed with the damaged condition and the aircraft was then parked and shutdown. He subsequently called the Rectification Controller of the Squadron to inform them of the situation. In a second instance, Corporal McLeod was marshalling an Italian Air Force C-130 which was taxiing prior to departing back to Italy. Whilst the aircraft was positioning onto the runway to begin its take-off, he noticed the Auxiliary Power Unit panel was still open. Corporal McLeod immediately contacted Air Traffic Control to tell them to hold the aircraft on the ground. Once it was confirmed the aircraft was holding its position, he made the aircrew aware of the open Auxiliary Power Unit door via radio and hand signals.

Mr Ian Smale – RAF Benson – Distinction

On 18 February 2025, at RAF Benson, whilst routine flying operations were taking place, Mr Ian Smale was conducting his duties as part of the Aerodrome Wildlife Control Unit. He observed a Tutor aircraft taking off from the main runway and noticed what appeared to be smoke coming from the rear of the aircraft, immediately notifying Air Traffic Control. This information was relayed to the Tutor pilot who, shortly after receiving the message, noticed fumes in the cockpit and declared an aircraft emergency to ATC. This early notification allowed ATC to take the required actions to prepare for an emergency situation, ensuring that the Fire Section crew and medical staff were quickly in position for the returning aircraft. If not for the quick thinking and rapid reactions of Mr Smale, there is a high probability that the aircraft would have continued its' planned sortie with the pilot unaware of the potential issue.

Air Specialist (Class 1) Gill – RAF Benson - Merit

On 3 December 2024, at RAF Benson, Air Specialist (Class 1) Gill was on duty in the Visual Control Room at Air Traffic Control. As a Puma helicopter was on approach to runway 19, AS1 Gill conducted her 'last look' checks, a routine yet crucial part of her responsibilities. It was during this routine check that AS1 Gill noticed that the landing gear of the Puma did not appear to be down as expected. Without hesitation, she immediately alerted the Aerodrome Controller.

Corporal McLintock – RAF Lossiemouth – Merit

On 7 August 2025, Corporal McClintock was the supervisor of a canopy jettison component replacement on a Typhoon aircraft at RAF Lossiemouth. During his post installation vital checks, he noticed that a nut and bolt were fitted in the incorrect orientation. Following consultation with multiple technical documents, diagrams, and his Senior Non-Commissioned Officer, he confirmed that the bolt in question had been installed in the incorrect orientation during canopy build. Engaging his on-shift Flight Sergeant and the Typhoon Engineering Authority (via the submission of a System Enquiry) his actions ensured that the structural implications were considered, and the required deferment action taken, restoring the integral airworthiness of the airframe, and avoiding a potential safety incident.

Air Specialist Class 1 (Technician) Wilson – RAF Lossiemouth – Merit

On 30 July 2025, at RAF Lossiemouth, Air Specialist Class 1 (Technician) Wilson was conducting an After Flight servicing of a Typhoon aircraft. He identified a fault with potentially catastrophic consequences, noticing that both securing bolts of the port main wheel brake pack assembly were mounted incorrectly. They had been installed with the nut on the outboard flange, with no witness marks evident, preventing groundcrew and pilots from detecting a loosening of the bolts. Notably, this check is not mandated within the Flight Servicing procedure, Topic 5B1, and so had remained undetected for over a year, and presented a significant flight safety hazard.

Air Specialist (Class 1) McCullough – RAF Lossiemouth – Well Done

On 6 November 24 Royal Air Force Lossiemouth was conducting night flying. It was reported that a bright and strong green laser had been fired into the sky from a car park on the edge of the airfield boundary. Air Specialist (Class 1) McCullough quickly took the appropriate action to report the incident to 999. Unfortunately, the call handler did not understand the significant risks that a laser (attack) can pose to aircraft. Air Specialist (Class 1) McCullough explained in detail to the operator the risks this sort of occurrence can pose and directed them to the location by quickly sourcing the road name and postcode. Police Scotland attended the site rapidly where the laser was reported. They spoke to the occupants of cars that were parked there and reminded them of the serious consequences of a laser attack to flight safety.

Flying Officer Wicklen – RAF Akrotiri – Merit

On 8 April 2025, Flying Officer Wicklen was the Tower Controller with a Shadow aircraft inbound recovering back to RAF Akrotiri following operations during the hours of darkness. Whilst checking the runway prior to passing the landing clearance to the inbound aircraft, she spotted 2 hares moving on the infra-red CCTV screen within the Tower. The small PC screen was located at another workstation approximately 2-3m away. The hares were on the runway and posed a significant risk to the approaching aircraft. When the pilot called 'Final, Gear Down' she initially instructed the crew to 'Continue Approach' to assess the situation, but once it was clear that the hares still presented a risk, she instructed the aircraft to 'Go-around'. Flying Officer Wicklen then instructed the Airfield Wildlife Control Unit to enter the runway to disperse the hares.

Flight Lieutenant Smith – RAF Lossiemouth – Merit

On 22 September 2025, at RAF Lossiemouth, Flight Lieutenant Smith, a new 6 Sqn Pilot, was participating in his second ever Large Force Employment sortie flying as #4 in the formation. The crews stepped on a tight timeline for a complex training mission. During crew-in Flight Lieutenant Smith checked not only his own jet but also the neighbouring aircraft, which was due to start engines shortly. Spotting a small blank lying on the rear of the wing and unsighted by both the operating pilot and groundcrew, Flight Lieutenant Smith made a swift priority radio call to highlight this FOD danger. This allowed #1 to direct groundcrew remove the blank and avoided engines starting with an item of FOD in close vicinity.

Mr Craig Jones – RAF Valley – Distinction

On 13 January 2025, at RAF Valley, whilst carrying out fuel checks of a bowser in building 117, Mr Jones noticed a strange smell which was different to exhaust smoke. He turned off the bowser and saw smoke rising from the engine bay and up the back of the cab. A member of Affinity staff wound their van window down and said they could see smoke. There was an engineer from Bliss Fox in the hangar at the time carrying out a service on one of the tugs. The fire alarm was activated and, for safety, Mr Jones quickly jumped in the bowser and drove it out of the hangar into the clear area of the pan, switched off the engine and isolated the electrics. He then grabbed the cab fire extinguisher ready to try to fight the fire. On inspection around the back of the cab and engine bay he could see the fire was out and there was a small amount of smoke which lasted for about 10 seconds. He told the engineer to come out of the hangar as it was smelling of smoke and he got out the larger fire extinguisher from the vehicle in case of re-ignition. He asked for someone to come and escort the engineer to the muster area as he stated that he needed to stay with the bowser in case it re-ignited. The on-site fire service arrived at the location and Mr Jones jacked the cab up so that the Fire Section could see the area of the small fire which had occurred around the electrical connections near the fuel filter.

Mr Jacob Jarvis – 3FTS (Affinity) – Merit

On 29 August 2025, at RAFC Cranwell, whilst replacing the steering lever on a Prefect aircraft, Mr Jacob Jarvis noticed that the eye end from the steering rod was attached underneath the lever assembly stop. The Aircraft Maintenance Manual states that this should be on the top, it is also pictured this way in the Illustrated Parts Catalogue. Upon checking the other aircraft in maintenance for a comparison one was found to be correct, but a further aircraft was found to also be incorrect. Mr Jarvis raised his concerns which triggered a fleet check that confirmed two aircraft were affected.

Oxford UAS SES Team – 6FTS – Team Commendation

Mr Lawrence Southwick, Mr Andy Marshall, Mrs Sandie Timms and Mr Steven Pipa are all members of the Oxford UAS Survival Equipment Team. Relentlessly positive, Mr Southwick has improved morale in his team and has also been invaluable assisting OC OUAS in optimising the operations set-up, re-locating his staff and equipment more than once to allow critical flight safety processes to be improved. Mr Southwick also led the safe introduction of the new Irving parachute as only the second 6FTS site to do so, contributing to several key DASOR investigations. Mr Andy Marshall was also heavily involved in the feedback process for the new Irving parachute, which has resulted in a new training video and suggested lanyard lengths amendments. In this they have both been commendably supported by Mrs Sandie Timms and Mr Steven Pipa who have an incredible 60+ years of experience which they bring to the Team.

RAF Waddington SES Team – Team Distinction

Members of the Survival Equipment Section at RAF Waddington provided exceptional support in developing a bespoke cold weather survival pack for UK Rivet Joint crews, addressing a critical capability gap. **Flight Sergeant Duke, Sergeant Betts, Corporal Murray and Air Specialist Class 1 (Technician) Callaghan** were specifically cited. When tasked to operate Rivet Joint aircraft in extremely cold locations, it became evident that existing survival packs were unsuitable for large, multi-crew aircraft due to their size and the limited storage space available on Rivet Joint. Demonstrating determination and professionalism, the team trialled numerous packing methods to create a proof-of-concept, 6-person extreme cold weather survival bag. Their efforts included detailed analysis of unsuccessful attempts and the creation of a packing instruction to enable replication by other survival equipment fitters. The innovative design, fitting into a standard-issue black holdall, minimises cost, reduces storage requirements, and ensures ease of use during emergencies. With space at a premium the 6-person pack, developed with this restriction in mind, allows Rivet Joint crews to stow the required number of packs for all PAX, significantly improving their chances of survival in cold climates. This solution has been successfully adopted, ensuring aircrew are properly equipped for operations in remote and contested areas. The team's ingenuity and dedication have made a substantial contribution to aircrew safety, confidence, and effectiveness in protecting UK interests globally.

RAF Regiment Gunner Training Staff – RAF Honington – Team Commendation

The RAF Regt Gunner Training Squadron and attached Physical Training Instructors and Rehabilitation staff at RAF Honington have delivered one of the most significant injury reductions in its history. The complete redesign of the 24-week Phase 2 Trainee Gunner course which prepares personnel for Dismounted Close Combat operations in defence of air assets, was driven by a clear priority: protecting trainees from harm while maintaining standards to meet operational demands. Historically, musculoskeletal injuries, particularly lower limb soft tissue damage and stress fractures, posed a serious risk to trainee health and career longevity. Concerned by these trends, the team of NCOs and officers implemented a comprehensive injury prevention strategy, introducing progressive conditioning, structured recovery protocols, and enhanced coaching and mentoring practices. These measures were designed to build resilience and reduce the physical strain that had previously led to high injury rates affecting pass rates. The team introduced targeted education on sleep routines, reduced reliance on caffeine and tobacco, and reinforced healthy habits throughout the course. These changes complemented the physical safety measures, ensuring trainees were better rested, more resilient, and less vulnerable to injury.

Sergeant Wood – Defence School of Transport- Road Safety Innovation Award

Sergeant Wood was awarded an Innovation award for his continuous work to improve road safety within the Army. His was an excellent example of innovation and dedication to road safety education within the Defence community demonstrating initiative and a creative and impactful approach to addressing a critical issue, particularly the dangers of mobile phone distractions while driving. By combining a high-quality video production with an interactive live demonstration, Sergeant Wood effectively engaged the audience and delivered a powerful message that resonates on both an emotional and intellectual level.

Air Specialist Class 1 (Technician) Mattocks – Chief Test Pilot Award

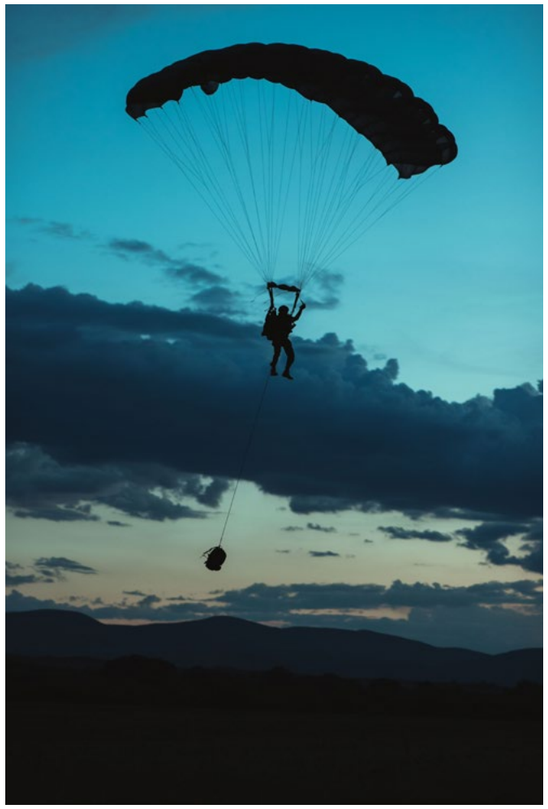
During the pre-flight installation of an instrumentation data recording device by US contracted Flight Test Instrumentation engineers, a potentially serious air safety incident occurred, requiring the immediate attention and decisive action of AS1(T) Mattocks. While overseeing the installation process, AS1(T) Mattocks observed that the recording device was interfering with the Seat Portion Assembly (SPA) connector. He noticed the contractor attempting to force the device into the receptacle, which risked damaging the seat. Recognising the potential hazard, AS1(T) Mattocks immediately instructed the contractor to stop. When the contractor was unable to fit the device, they requested that AS1(T) Mattocks disconnect the SPA connector to allow access. At this point, AS1(T) Mattocks, understanding the critical role of the SPA connector as an integral component of the Aircraft Assisted Escape System, directed the contractors to disembark from the aircraft. He then sought immediate advice from the Weapons Trade Lead. Upon inspection, the Weapons Trade Lead identified damage to the outer sheathing of the SPA cable connector. Thanks to AS1(T) Mattocks' vigilance and situational awareness, the damage was detected before it could go unnoticed, preventing the seat from being used in an unsafe condition.

Stepping Into The Air:
Understanding Parachuting Safety

By Squadron Leader Chris Wilce, Parachuting Risk, 1 Group HQ

Parachuting, more commonly known in the civilian world as skydiving, is one of the most thrilling and remarkable activities a person can experience. The sensation of freefalling through the sky, followed by the serenity of gliding to the ground under a canopy is an unforgettable adventure. For military personnel, parachuting is also a critical capability, enabling rapid deployment into challenging environments at low level (using a Low-Level Parachute made by Irvin GQ) with 16 Air Assault Brigade Combat Team as the primary user or by High Altitude Low Opening (HALO), High Altitude High Opening (HAHO) insertion (using the BT series of parachutes made by SAFRAN) with the UK Special Forces (UKSF) conducting the majority of activity in this sphere.

It is a complex discipline requiring a combination of physical skill, mental focus, and technical knowledge. Whether conducted as a recreational activity, jumping as a part of the Joint Service Adventurous Training scheme or in Single Service Sports Associations, or as an airborne soldier, sailor or aviator conducting parachuting as a method of insertion for military operations, or finally as an interested reader thirsty for knowledge of a novel activity, understanding its associated risks and how to mitigate them are essential.



This article summarises some of the key hazards and risks associated informed by 'real-life' occurrences. While some of them can never be entirely eliminated, the RAF as the lead for UK military parachuting has helped to minimise the likelihood of parachuting accidents over time through the learning of lessons from each such occurrence and subsequent robust risk management.

Hazards and Risks in Parachuting and their Mitigations

Equipment Failure

The parachute system is the most critical component of any jump. A malfunction, such as a failure of the main parachute to deploy or a problem with the reserve parachute can have catastrophic consequences.

The Risks Include:

- Harness or container system failure
- Main canopy deployment failure.
- Use of an Automatic activation device (AAD) – made by Airtec for the BT series of parachutes. Known as a Cybernetic Parachute Release System (CYPRES).

Equipment Failure Mitigation

Pre-jump inspections: Parachutists conduct a thorough inspection of all equipment before every jump. The level of inspection has evolved over time and is not only conducted by the parachutists themselves but also by the military and contracted personnel that are responsible for their maintenance along with the Parachute Jump Instructors (PJIs) responsible for parachute training and despatch. Parachute maintainers routinely check for main and reserve canopy integrity, lines, risers, harness, and container for wear, damage, or improper configuration, replacing worn or damaged components as and when required.

Emergency procedures training: Parachutists regularly practise emergency drills, such as 'cutting away' a malfunctioning main canopy and deploying the reserve. This is engrained in training, both as ab-initio students and as training conducted in the continuation space (every 28 days, so it becomes 2nd nature).

AAD: Use of an AAD for freefall parachutes is mandatory in the UK military, ensuring a last line of defence if the main canopy fails to deploy. It enables the reserve parachute to deploy automatically in a scenario where the jumper is unable to deploy it manually for a variety of reasons including unconsciousness.

Weather Conditions

Weather plays a critical role in parachuting safety much like it does for aircraft, albeit parachutists don't enjoy the same level of environmental protection that aircrew are accustomed too. Adverse conditions such as strong winds, turbulence, rain, or low visibility can all make a jump significantly more dangerous.

Weather Risks

- Strong winds causing loss of control during canopy flight.
- Turbulence leading to canopy collapse or instability.
- Low cloud cover obscuring the route back to the Drop Zone (DZ).

Weather Mitigation

Weather analysis and briefings: The 'Met' is always analysed by parachuting SQEP 24hrs before activity, then again much closer to 'P-Hr' (the timing used to describe the first parachutist on the ground). These checks study the forecast weather, specific to parachuting, before any sortie and includes wind strength from drop height to the ground, cloud cover (both height and complexion), and the likelihood of rain or worse, storms.

Wind limits: Attention is paid to wind speed on the ground and the wind speed and direction on 'track-back' to the DZ from the point at which the parachutists exit the aircraft whether at height or low down. Adherence to established wind speed limits for parachuting is a key consideration in

executing a safe sortie. For example, ab-initio High-Altitude parachutist are restricted to jumping on DZs with wind speeds no greater than 15 knots, whilst for qualified jumpers this speed is increased to 20 knots taking into consideration their experience in 'handling' the canopy.

Turbulence: A phenomenon that can be experienced by parachutists anywhere in the world but has prevalence in hot and dry climates. 'Dust-Devils' are a particular problem that are difficult to predict and to see but can be deadly. To mitigate this parachute training is often limited to cooler temperatures resulting in early starts to the working day!

Cloud Cover: There is a stark difference in acceptable limits for cloud cover from nation to nation. In the West Coast of the USA for example they often won't entertain the idea of parachuting in haze, let alone cloud! But they have the luxury of 260 blue sky days a year to assist with the decision to parachute another day. We don't enjoy the same pleasant climatic conditions in the UK and therefore jumping through cloud is commonplace. Technology has contributed exponentially over the years to help mitigate this risk, long gone are the days of navigating purely by compass! Although with the ever-increasing threat of of GPS deniability, it may be a skill that needs re-visiting.

Postponement if necessary: Ultimately, If the weather conditions are unfavourable, its much wiser to delay the parachute programme. It is all too tempting to press-on when conditions are on (or slightly over) the limit…but it is clearly safer to wait for more favourable conditions rather than to risk an accident.

Human Error

Human error (Human Factors) is one of the leading causes of parachuting accidents. Mistakes can occur at any stage of the jump, from equipment preparation right through to landing.

The Risks Include:

- Poor body positioning during freefall.
- Mistakes made whilst canopy handling.
- Landing errors.

Human Factors Mitigation

Comprehensive training: The training provided by the UK MOD to its parachutists by both RAF and Army personnel, augmented by contracted instructors for esoteric parachuting, is world leading. This level of training ensures all parachutists receive detailed lessons in equipment use, freefall techniques, canopy handling, landings training and emergency procedures. Regular refresher training through life is also essential and delivered continuously to the airborne community to maintain skills and combat skill fade.

Focus and discipline during activity: Involving avoiding distractions and maintaining focus throughout the jump. No parachutist should ever become complacent because you can be sure the devil will exploit it if you do. Following established procedures and the avoidance of taking unnecessary risks are paramount.

Controlled flight: The teaching and utilisation of canopy control techniques, such as flaring on high level square canopies, slows descent rate and ensures a smoother landing. Low-level parachuting involves round shaped canopies that cannot be flared. For a low-level landing, where we see the majority of human factor related injuries the key is a well-executed parachute landing fall (PLF). Keeping the legs tight together is key here, and fighting the urge to 'reach' with an individual leg for the ground avoids 'arriving' at the ground as opposed to landing on it.

Use of synthetic training aids: Technological enhancements over the years has developed hugely, such as the use of simulators (Airborne Delivery Wing, the organisation responsible for the delivery of the spectrum of UK parachuting capability, has its own) and vertical wind tunnels such as those constructed by iFly in the UK. More traditional training aids still very much have their place however, with a plethora of apparatus available to practice exiting the aircraft and maintain the correct body position whilst in freefall.

Collision

The sky may seem vast but the risk of mid-air collisions, even for parachutists, is very real, especially during large low-level insertions or high-altitude patrolling, particularly around 'busy' DZs. These collisions can occur during freefall or under canopy, with the added risk of collisions with ground-based features also a problem.

Collision Risk

- Mid-air collisions (MAC) with other jumpers during freefall, particularly when conducting formation freefall skydiving practice. Freefall is a skill more commonly practiced in the sporting side of parachuting whereby parachutes perform manoeuvres whilst linked together. Also, MAC between parachutists and aircraft.

- Canopy collisions during the canopy element of the descent.

- Ground collisions with obstacles such as trees, power lines, or buildings.

Collision Mitigation

Clear communication: Using standardised hand signals and/or equipment to enable in-air radio communications to coordinate with other jumpers and DZ personnel.

Separation protocols: Maintaining safe distances between jumpers during freefall and canopy flight is always pre-briefed and discussed along with various calculations by the Drop Zone Safety Officer (DZSO), Parachute Jump Instructor Despatchers or the Aircrew to mitigate against this on despatch. Also, the use of 'tracking' techniques (where a freefall parachutist extends his arms or legs to manipulate the airflow around their body to move forwards or backwards)

to move away from other jumpers in freefall after exiting the aircraft are useful along with various canopy specific inputs taught to and initiated by the parachutists to 'steer-away' from one another.

DZ management: Ensure the landing area is clear of obstacles and other hazards. DZSOs survey the ground beforehand to authorise a DZ for use. Previous occurrences have driven the development of safety considerations in this area and acceptability of certain hazards (e.g. powerlines) within the confines of a DZ for military operating use have changed over time as a consequence.

Technological enhancements: More recently the use of Automatic Dependant Surveillance-Broadcast devices (ADS-B - the UK MOD uses SkyEcho 2) has been a key development in mitigating against the potential for parachutist vs. aircraft MAC. Thankfully no recorded accidents have been realised in the UK MOD for this particular hazard, but near-misses have occurred and therefore it is managed closely (e.g. through the process of active airspace management) augmented with new types of technology.

Medical Factors

Parachuting places physical demands on the body, often why robust entry standards to military parachuting exist (P-Company, UKSF selection). However medical 'emergencies' can occur before, during, or after a jump, particularly at higher altitudes for esoteric parachuting activity.

Medical Risks Include:

- Hypoxia (oxygen deprivation) at high altitudes.
- Decompression Sickness (dissolved nitrogen forming bubbles in the body) due to rapid reduction in atmospheric pressure.

Medical Risk Mitigation

Medical fitness: There are entry standards to parachuting, each discipline requiring its own unique medical clearance. Annual regular medical assessments to ensure fitness to jump are policy in the UK MOD. Disclosure of any medical conditions that might undermine medical fitness by the parachutist is encouraged.

Oxygen use: For high-altitude jumps (anything over 12,000ft AMSL in the day or 10,000ft AMSL at night) supplemental oxygen is used to prevent hypoxia and decompression sickness. Ensuring oxygen systems are properly maintained by SQEP, tested, fitted and operated correctly is key to mitigating against these two potentially deadly, medical phenomena.

Conclusion

Parachuting is an exhilarating, unique and militarily vital activity that combines skill, precision, and courage. Whether undertaken for adventure, sport, or military operations, it is not without risk. However, as this article has highlighted, these risks can be effectively mitigated through rigorous training, meticulous preparation, adherence to safety protocols, and the use of advanced technology. The RAF is committed to parachuting safely, ensuring that this high-risk activity is conducted with the utmost professionalism and care and continuing to learn from past occurrences whilst embracing innovation. Whether you are a seasoned parachutist or a curious observer, understanding the complexities of parachuting safety is key to appreciating the skill and dedication required to step into the air.

2025 L G Groves Awards Ceremony: **Honouring Excellence in Safety and Meteorology**

By Sqn Ldr Mike Richards, L G Groves Proj O

Presented annually since 1946, the L G Groves Awards Ceremony was established in memory of Sergeant Louis Grimble Groves, RAFVR, 517 Sqn Coastal Command, who lost his life while flying on a meteorological sortie on 10 Sep 45. This year's Awards were presented by Group Captain Andrew Keith, the Inspector of Flight Safey at a ceremony held at the Avro Heritage Museum, in Stockport.

Celebrating Excellence

The L G Groves Awards aim to encourage the study of Air Safety, Ground Safety, and to stimulate research in aviation meteorology and recognise the vital contributions of those engaged in meteorological observation duties. Open to personnel from all three Services, the Met Office, and civilian support staff, the awards comprise four categories, each with a prize award:

- **L G Groves Memorial Prize for Air Safety** (£1,000) is awarded for the most important contribution made during the previous year towards improving the safety of personnel, aircraft or equipment in flight, or enhancing the survival of aircrew.
- **L G Groves Memorial Award for Ground Safety** (£500) is awarded for the most important contribution during the previous year towards improving the safety of personnel, aircraft or equipment on the ground either at a flying station or an associated unit.
- **L G Groves Memorial Prize for Meteorology** (£1,000) is awarded for the most important contributions to the science of meteorology, the application of meteorology to aviation or operational meteorology.
- **L G Groves Award for Meteorological Observation** (£500) is awarded for outstanding work in the field of meteorological observation.

A Historic Venue with Enduring Significance

This year's venue added special resonance to the ceremony. The Groves family played a pivotal role in the early success of A.V. Roe & Company (Avro), investing in the fledgling aviation firm in 1912 and enabling its growth into one of Britain's most iconic aircraft manufacturers. Avro went on to produce legendary aircraft such as the Lancaster and Vulcan, shaping the course of British aviation. Hosting the ceremony at the Avro Museum honoured this historic partnership and underscored the shared commitment to advancing aviation safety, a principle that remains at the heart of the L G Groves Awards today.

Members of the Groves Family, Awards Winners and members of the Release to Service Authority.

2025 Award Winners

Air Safety – Defence Geographic Centre (DGC)

The Defence Geographic Centre received the Air Safety Prize for its transformational overhaul of the M726-AIR charting system, a critical tool for low-level navigation safety.
By automating the production of a single digital chart for Great Britain, DGC reduced the update cycle from four years to just 28 days, adding over 4,000 vertical obstructions and 100 suspended cables. This innovation significantly mitigates the risk of Controlled Flight into Terrain or Obstructions, and has been widely praised across British military aviation, civilian operators, and NATO allies.

L-R: Gp Capt Keith, Anthony Groves and MAcr Mallam

Ground Safety – Master Aircrewman Gerald Mallam

MAcr Mallam was recognised for his exceptional contributions to air and ground safety across the Puma Helicopter Force and RAF Benson. His initiatives included tailored Human Factors training that reduced "Failure to Follow Procedure" occurrences by 50%, and the introduction of safety-enhancing equipment such as wireless communications systems, improved Night Vision Devices, and conspicuity panels for aerial firefighting operations. His ingenuity and persistence delivered measurable risk reductions across dispersed operations in Brunei, Cyprus, and the UK.

L-R: Anthony Groves, Simon Brown (Met Office) and Dr Gillian Kay

Meteorology – Dr Gillian Kay

Dr Kay was awarded the Meteorology Prize for her pioneering research using the UNSEEN methodology to assess the risks of extreme climate events. Her work revealed that 40°C days in the UK, once unprecedented, now have a 1-in-24-year return period, with a 50-50 chance of reoccurrence by 2035. Her work also highlighted scenarios of even more extreme heat, and the risk of prolonged North Sea "wind droughts," which pose challenges for energy security. Her findings have informed government policy and resilience planning, shaping national preparedness for climate extremes.

L-R: Anthony Groves, Simon Brown (Met Office) and Martin Veasey

Meteorological Observation – Martin Veasey

Martin Veasey received the Meteorological Observation Award for his leadership in developing the Enhanced Refractive Effects Prediction System (EREPS). This cutting-edge tool predicts how radar and communication signals propagate through the atmosphere, enabling improved battlespace decision-making in complex environments. Already operational aboard HMS Prince of Wales, EREPS has significantly enhanced UK capability to operate safely and effectively in high-threat, data-denied situations.

Buffet lunch

Looking Ahead

Next year marks a major milestone, the 80th Anniversary of the L G Groves Awards. To celebrate this historic occasion, the Prize Fund has been increased to £1,000 for each award, reflecting the enduring importance of these contributions to Defence and aviation safety.

Nominations for the 2026 Awards are now open, and all units and organisations are encouraged to submit candidates who have demonstrated outstanding achievements in Air Safety, Ground Safety, Meteorology, or Meteorological Observation.

To submit a nomination, please see the guidance in the 2026DIN06-001-L G Groves Memorial Prizes and Awards 2026.docx. The deadline for nominations is 30 Apr 26, and the Awards Ceremony will take place on 10 Sep 26.

As we look to this landmark year, it is fitting to recall the words inscribed on the stone at the 517 Sqn crash site where Sergeant Groves and his crew were lost:

"Every life that is saved by this Award is a continual Memorial to the sacrifice of these young men."

Eight decades on, that sentiment continues to define the purpose and enduring legacy of the L G Groves Awards. More information about the LG Groves Awards can be found at:
http://www.lggrovesawards.com

The Remembrance Stone at the Crash Site

Members of MET 517 Sqn in front of their Handley Page Halifax

RAF Safety Centre
Safety Trophy 2025

By RAF Safety Centre

Air Cdre Sansome Presents the 2025 Safety Trophy to Sqn Ldr Stuart Masters at RAF Brize Norton

In 2024/25, Squadron Leader Stuart Masters demonstrated exceptional leadership, innovation, and personal commitment in his role as Officer in Charge of the RAF Brize Norton Road Safety Committee (RSC), driving a fundamental and measurable improvement in safety culture across the RAF's largest Station.

RAF Brize Norton's operating tempo and complex infrastructure present persistent risks to life, with thousands of vehicle movements daily. Recognising this, Sqn Ldr Masters galvanised a diverse multi-agency team of service and civilian personnel, transforming the RSC into a proactive and high-performing body that has become a benchmark for safety excellence across Defence. Under his decisive direction, the Committee delivered a sustained programme of innovation, education, and infrastructure improvement. Over the year, he oversaw 16 major road safety initiatives, all executed with precision and purpose. These included the Station-wide Road Safety Week, an interactive Road Safety Roadshow reaching over 4,000 personnel, the hard-hitting Survive the Drive presentation, and an expanded Christmas Drink-Drive Campaign that saw a measurable decline in incidents.

His leadership extended beyond education. Through persistent advocacy and cross-stakeholder coordination, he secured tangible physical safety improvements, completing pothole rectifications, renewing markings and signage, and expanding lighting coverage across key risk zones. His ability to align resources under a single safety vision was instrumental in delivering these outcomes. The results were transformative. Incident data evidenced a clear reduction in road traffic collisions and near-miss reports, underscoring his impact on saving lives.

Sqn Ldr Masters' strategic foresight, inclusive leadership, and relentless pursuit of improvement have embedded a lasting Safety Culture that extends beyond Brize Norton into the wider RAF enterprise. His achievements represent the highest standards of safety leadership. His influence has extended across every rank and department, creating a unified approach to road safety that has demonstrably reduced risk to life and enhanced operational resilience. His vision, collaboration, and drive exemplify the very best of RAF leadership in action.

Safety Trophy Nominations for 2026

The RAF Safety Centre Safety Trophy is a singular annual award, presented by the Inspector of Safety (RAF) 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."

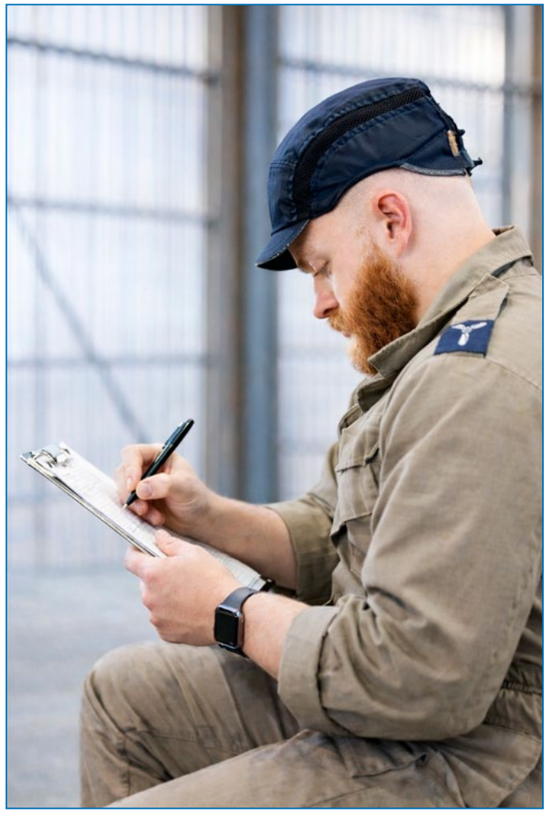
For consideration of the Safety Centre Trophy, Station Commanders must send nominations to Inspector of Safety (RAF) on an annual basis, not later than 30 August.
The Inspector will announce the winner at the annual Air Safety Management Conference (normally scheduled for Nov). A personal presentation will be arranged thereafter.
Nominations should be sent to the following email address not later than 30 Aug 26:
air-safetyctre-wgcdrspry@mod.gov.uk
All RAF safety domains are eligible for this award. It is not restricted to air safety.

Signature Responsibility:

The Foundation of Safe Maintenance Practices

By WO John Evans, 4FTS FS CAE (DDH), RAF Valley

At the heart of aircraft maintenance philosophy lies a commitment to airworthiness, integrity, and accountability. Central to this is the understanding and execution of Signature Responsibilities as outlined in the Manual of Aircraft Maintenance – Processes (MAM-P).
These responsibilities ensure that every task performed on an aircraft is not only done correctly, but that its completion is demonstrably recorded by a qualified individual assuming full responsibility for the work.



In this article, we focus on the First and Second Signature Responsibilities—the cornerstone of an engineer's contribution to aircraft safety and maintenance assurance.

First Signature Responsibility: Certifying the Quality and completeness of their work.
The First Signature Responsibility rests with the engineer who physically performs the maintenance activity.
This Signature confirms that the task was completed in full accordance with the relevant approved data, such as Trilogi, Technical Information (TI) and any additional tasks issued by the Supervisor.

Signing for task completion carries significant weight.
It certifies that:

- The correct parts and tools were used.
- The required tests or inspections were conducted.
- All procedures followed conformed strictly to approved technical publications.
- The task was completed in its entirety without deviation or omission including tool checks.
- That loose article checks were carried out and removed panels were closed or fitted.

Equally important is the engineer's obligation to highlight any issues, discrepancies, or additional findings uncovered during the task such as fluid leaks, cracks, poorly routed cables, scorching etc. Where required, this may lead to further inspection, rework, or raising a defect for engineering assessment. This process ensures that no assumption is made about a system's serviceability unless verified through procedure and recorded data.

The First Signature therefore is not just a procedural tick — it is a formal declaration of compliance, safety, and professional accountability.

Second Signature Responsibility: Supervision of the Engineer undertaking the work
The Second Signature Responsibility rests with the engineer who physically performs the Supervision of the maintenance activity. They should spend sufficient time on the activity to ensure the task's quality and completeness, accounting for the difficulty and nature of the task and the skill and experience of the First Signature undertaking the task.

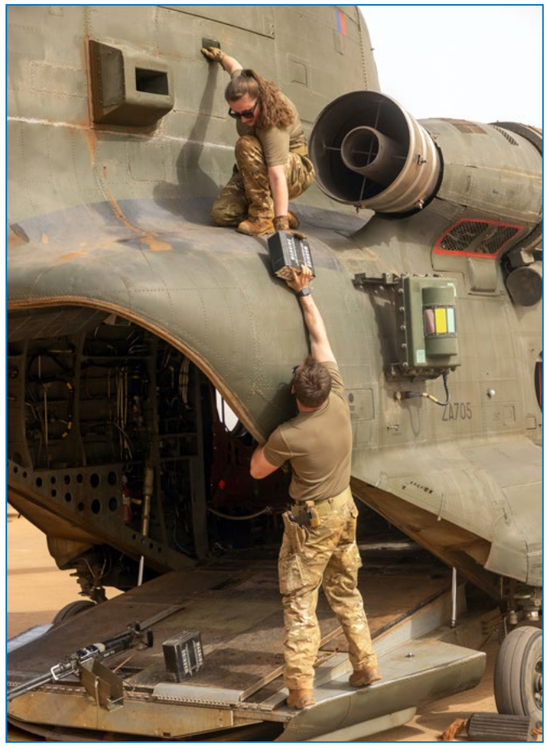
The Second Signature certifies that:

- The Tradesperson is authorised and competent to do the job and has been suitable briefed including any requirement to carry out Stage Checks.

- The Tradesperson has access to the correct tools, equipment and TI of the correct amendment state and any further instructions to complete the task.
- That the work has been completed to their satisfaction IAW TI.
- That the maintenance documentation is explicit, complete, legible and TI referenced.
- That Stage Checks have been documented. That any requirement for Independent Inspections has been identified and documented.

The Second Signature is again, not just a procedural tick. Crucially it provides a second set of eyes to challenge, validate, or escalate concerns. This oversight is vital, particularly for tasks critical to flight safety on aircraft and their components.

Accountability, Safety, and a Shared Standard
These first two Signature Responsibilities form the bedrock of maintenance assurance culture. They reflect a Whole Force organisation-wide recognition that airworthiness is not just a process—it is a chain of trust. Each Signature is a personal and professional commitment to ensuring that aircraft are maintained to the highest safety standards across the Service.



The Problem of Mental Underload

By Professor Mark Young, Human Factors in Transport Research Group, University of Southampton

Mental underload is closely tied to the idea of staying in the loop, and is critical in situations where people are a backstop for automation. In this article, Mark Young explains this often-misunderstood concept, and some implications for safety and performance.

Key Points

Low cognitive engagement: Mental underload occurs when tasks are continuous and essential but offer very little demand, resulting in insufficient cognitive engagement.

Impaired performance: Underload can significantly impair performance. When underloaded, attention degrades, monitoring is affected, and reactions slow down, increasing the risk of missing information and responding inadequately.

Passive monitoring: Automation often leads to underload by relegating people to passive monitoring roles. Prolonged periods of low cognitive engagement can leave individuals ill-prepared to handle sudden spikes in demand, such as system failures or situations requiring human intervention.

Methods to understand mental underload: Several methods help assess mental underload. These include monitoring performance on the primary task and secondary tasks, subjective ratings of perceived workload, and physiological measures. Mitigation strategies: Strategies to mitigate the risks of mental underload include periodically reintroducing manual control, incorporating related secondary tasks to maintain engagement, and redesigning systems to minimise prolonged periods of low workload. A more radical proposition involves waiting for fully autonomous systems to be viable.

Future research and practice: Future research and practice should focus on understanding the dynamics of attention decay and recovery during underload, developing more precise measurement tools, and designing systems that balance automation with meaningful human engagement.

Introduction

Mental underload is something that many operational readers will have experienced, and a concept that I've explored since the start of my career in Human Factors over 30 years ago. My own experience mainly comes from two sources: research on driving automation, and practice as a railway accident investigator, concerning train automation. This combination of experience has shown me how underload can leave individuals ill-prepared to detect and perceive critical information, or to handle surprises in critical moments. Underload is closely related to the ideas of people in control and staying in the loop, especially in environments that are high tempo and demand constant monitoring, like transportation. But the concept remains widely misunderstood. In this article, I'll explore what mental underload really is, how it affects performance, and, most importantly, how we can address it from individual and organisational perspectives.

What is Mental Underload?

Before we get into the theory, consider these three accidents which brought mental underload into the public eye in the space of two years. In 2016, a tram derailed on a sharp curve in Croydon, South London, tragically resulting in seven deaths. The driver had just navigated a long, straight section of track that required minimal interaction. The tram entered the curve at 73 km/h – well over the 20 km/h speed limit – and overturned. The investigation suggested that the monotony of this part of the journey created an underload state that may have caused the driver to lose awareness, with disastrous consequences.

In 2018, a passenger's bag became caught in the doors of a Central Line underground train in London, leading to them being dragged along the platform. The train operator did not notice the trapped bag. While the Central Line is largely automated, drivers are still responsible for opening and closing doors and monitoring the platform through CCTV before departure. The repetitive nature of this work, with frequent stops and highly automated operations, contributed to underload. While the passenger survived, the incident showed how repetitive tasks can reduce attention, even in highly experienced operators.

During Uber's 2018 test of autonomous vehicles in Tempe, Arizona, a vehicle equipped with sensors designed to detect objects failed to classify a pedestrian walking a bicycle across the road. Although the system detected an object, it couldn't decisively identify whether it was a pedestrian or cyclist. By the time the system responded, 1.2 seconds before the collision, it was too late to avoid the accident, resulting in a fatality.

A critical element of this scenario was the presence of a 'safety driver', whose role was to monitor the automated system and intervene if necessary. However, this task had become so undemanding that the driver disengaged, reportedly watching a TV show on their phone. What the three examples have in common is that mental underload usually occurs in tasks that require some constant engagement, such as driving, but in which the demands are excessively low, leading to a lack of mental stimulation and consequently affecting our attention.

> "While overload results in an overwhelming cognitive burden, underload results in cognitive disengagement. Effectively, our attention 'shrinks' when it is not being used."

But to understand mental underload, we need to step back and consider its relationship to mental workload more generally. Mental workload refers to the cognitive resources we dedicate to a task, and this depends on our attentional capacity. It's the balance between the mental effort we exert and the demands of the task. While overload results in an overwhelming cognitive burden, underload results in cognitive disengagement. Effectively, our attention 'shrinks' when it is not being used.

It might seem counter-intuitive, but underload can be just as dangerous as mental overload. The effects of underload can be subtler, however, potentially leading to a decline in performance over time. This might include difficulty in detecting, perceiving or understanding what's going on in a situation, and slower reaction times or inappropriate responses.

Several related concepts are frequently confused with underload. Here are some of the key things that underload is not:

1. **Doing Nothing:** Underload doesn't mean inactivity. A classic example is when individuals supervise automated systems, such as in flying or driving. Automation may handle most of the workload, with the human operator having to monitor and intervene if necessary. In these cases, the operator is facing a very low demand – but there is still a need to stay engaged.

2. **Boredom:** While underload can feel unstimulating, it's distinct from boredom, which is defined by the American Psychological Society as "a state of weariness or ennui resulting from a lack of engagement with stimuli in the environment".

3. **Automatic processing:** As individuals become highly proficient in certain tasks, their actions can become automatic, like driving a familiar route without much conscious thought. While this may require little mental effort, it's not the same as underload. Skilled performance still allows for rapid, effective

responses to changing conditions, whereas underload tends to reduce the ability to respond.

4. **'Complacency'** and over-trust: This often occurs when someone becomes overly reliant on automation or believes a system is so reliable that they no longer need to monitor it carefully. This is a natural response to highly reliable systems.

Why and When Does Underload Happen?
Research has shown that the underload 'problem' is predominantly tied to automation, as tasks without automation – even easy ones – often still require some active engagement, making it harder to fully disengage mentally. Automation is often designed to handle repetitive or routine tasks, leaving the operator in a supervisory role. This reduced level of task engagement can lead to mental underload. The operator's job becomes one of passive monitoring, which may lead to periods of low mental activity and a potential drop in alertness and readiness to intervene.

Many automated systems are designed to function at a very high level of reliability, and rarely require human intervention. This reliability further deepens the underload state, because interventions – which increase workload and can restore attention – are few and far between. When technical malfunctions occur, or when a system encounters a situation beyond its capability, there is a sudden transition from passive monitoring with low cognitive engagement to active problem-solving with high cognitive engagement. This sudden shift is particularly dangerous because it can overwhelm the operator.

Why Does Underload Affect Performance?
To understand this, we need to look at the relationship between stress, arousal, and performance. This is often depicted as an inverted U-shaped curve. The basic concept dates back to 1908, and shows that performance is optimal when stress and arousal levels are in a balanced, moderate range. However, both excessive stress (overload) and insufficient engagement (underload) affect performance negatively.

"When technical malfunctions occur, or when a system encounters a situation beyond its capability, there is a sudden transition from passive monitoring with low cognitive engagement to active problem-solving with high cognitive engagement."

When workload is too high, demands exceed cognitive resources. But when workload is too low, as in underload, performance declines due to lack of stimulation. In low-demand scenarios, our attention declines, affecting monitoring and engagement, leading to missed cues and slower reactions. To balance overload and underload scenarios, it is important to maintain a state where attentional demands are sufficient to keep operators mentally engaged without overwhelming their capacity.

Traditional models treat our attentional capacity as a fixed and finite resource. Picture it as a bucket with a fixed volume; as task demands increase, the bucket fills, but once it overflows, performance drops off. These models don't account for how underload, or low task demands, can also lead to performance issues. I developed the '*malleable attentional resources theory*' in response to this (Young and Stanton, 2002). It proposes that attentional capacity can expand or contract in response to the demands of a situation. In low-demand situations, our brain may artificially lower its ceiling when it comes to attention. As a result, our performance capacity decreases, even though we are not being overwhelmed by external demands. In higher demand situations, our attentional resources can expand to meet the task (up to a limit) but under low demand, attentional resources shrink, making it harder to respond to unexpected spikes in task difficulty. What might be within our capacity to cope under normal circumstances soon becomes out of reach when demands reduce.

This theory explains why underload, especially in highly automated environments, can impair performance. For example, if a driver or pilot in a high-demand scenario faces a sudden system failure, their attentional capacity may be high enough to respond effectively. However, in a low-demand, highly automated scenario, the same person's attentional capacity may have diminished, leaving them unprepared to handle the same event. The task demands remain constant, but the operator's ability to cope has dropped, leading to performance failure.

How Can we Measure Underload?
There are various methods commonly used to assess mental workload. These approaches help us understand how much cognitive capacity is being used during a task and how much

spare capacity remains, particularly when tasks are too easy, or automation reduces human involvement. The following four methods are the main types used in research and practice.

Primary Task Performance
The simplest way to assess workload is by monitoring performance on the main task. For driving, this could involve metrics like lane position, speed control, and steering stability. The problem is that primary task performance alone cannot always detect subtle differences between moderate workload and underload. Performance may remain stable at each of these levels of demand because they are both within the operator's capacity. So, we need a way of distinguishing these tasks by measuring leftover capacity.

Secondary Task Performance
To capture 'spare cognitive capacity', secondary tasks are often introduced. These tasks are only performed when participants have leftover attentional resources. In driving studies, an example secondary task involves mentally rotating figures and determining via a button press whether they are the same or different. This task competes for the same visual and spatial resources as driving, and so helps to assess how much cognitive capacity is left. If fewer responses are made on the secondary task, it indicates a higher workload on the primary task. In underload situations, more responses on the secondary task are expected because more spare capacity is available.

Subjective Ratings
Subjective measures like the NASA Task Load Index (NASA-TLX) are often used in Human Factors to assess workload. Participants rate their perceived workload on various dimensions after completing a task.

Physiological Measurements
Various physiological metrics provide data on mental workload. For instance, heart rate is a measure of physiological arousal, and can be linked to workload. As workload decreases, so does arousal, and vice versa. More advanced methods are emerging as potential ways to measure brain blood flow, offering a possible direct measurement of attentional capacity. While still developing, these tools could help detect when attentional resources are diminishing due to underload.

Attention Ratio and Malleable Resources
In my research, I've used a combination of secondary task performance and eye tracking to develop an attention ratio measure. This ratio reflects how much time participants spend on the primary task versus the secondary task. By comparing the time spent and the number of responses on the secondary task, we can infer the degree to which attentional capacity has diminished in underload conditions. Some researchers have proposed a 'red line'. This is a hypothetical boundary beyond which underload or overload begins to affect performance. Defining this precisely remains a challenge. Each person's cognitive limits vary, making it difficult to pin down a universal threshold. However, it's clear that once mental workload drops below a certain point, performance suffers.

Workload is influenced by various factors, such as task difficulty, teamwork, automation, and individual skills or experience. This can make it difficult to understand which aspects of workload we are measuring when conducting research in this area.

Decay and Recovery of Attention
A critical aspect of underload is how quickly attentional capacity decays during periods of low demand and how rapidly it can recover when task demands increase. My analysis has shown that attentional capacity decays quickly, typically within the first minute, after a period of low demand. This decline is critical, especially in tasks like driving, where a relatively short span of low workload can leave people unprepared for sudden, urgent and critical demands. In one of my studies conducted using a driving simulator, participants experienced two driving conditions: one with partial automation, where only the speed and distance to the car in front were controlled by adaptive cruise control, and another with full automation, where both speed and steering were automated. In the fully automated condition,

the driver's role shifted to that of a supervisor, monitoring the system's performance rather than actively controlling the vehicle. The problem arose when the system encountered a failure. In this scenario, the car in front began to slow down, but the automated system failed to adjust the vehicle's speed accordingly. The driver had to recognise the failure quickly, take over manual control, and brake to avoid a collision.

The simulation revealed, not surprisingly, that skilled drivers were able to respond more effectively compared to less experienced drivers. Even though both groups had been in an underload state due to automation, skilled drivers had an automatic, unconscious response to hit the brakes, developed from years of driving experience. This response was less likely in less experienced drivers, resulting in a higher likelihood of collisions.

Recovery from periods of low demand is an area still under investigation. Research in driving suggests that while technology aims for quick recovery times (ideally 10-15 seconds), full re-engagement in a task can take up to a minute. This delay poses significant safety challenges, particularly in scenarios where automation temporarily hands control back to a human operator; in semi-automated driving, even a few seconds is too long. Understanding the dynamics of both decay and recovery is crucial for designing systems that ensure operators remain sufficiently engaged and ready to act when needed.

How Can we Guard Against Mental Underload?

Mental underload can be just as dangerous as overload, particularly in automation-heavy environments. When someone becomes disengaged, they are more prone to missing critical cues or responding too slowly when something unexpected occurs. The challenge, then, is to ensure attentional resources are maintained at an optimal level. Here's how we can guard against underload and even explore how it might be exploited in specific contexts.

> "I'm very much an advocate of designing out these problems in the first place. This avoids putting the onus on front-line personnel to deal with underload."

First, and most importantly, I'm very much an advocate of designing out these problems in the first place. This avoids putting the onus on front-line personnel to deal with underload, and is consistent with an ergonomics-oriented approach of fitting the task to the person. Underload shouldn't be their problem.

A common method of maintaining attentional engagement involves periodically reintroducing manual control in highly automated environments. This approach was recommended following investigations into accidents. Periods of manual control help to keep operators engaged, while also allowing automation to relieve cognitive demands when appropriate. Used carefully, it can also help to stabilise mental workload rather than cycling through peaks and troughs (although it is not certain whether people need variety or consistency in workload).

A natural response to underload is to increase task demands by introducing additional activities. However, these tasks should be related to the primary task, particularly in safety-critical tasks and environments. The key is to maintain a cognitive connection. For example, in semi-automated driving, providing tasks that enhance situational awareness (such as, say, a concurrent verbal commentary) can keep the driver engaged. Rather than allowing total passivity, we can encourage actions that maintain a certain level of cognitive engagement while still benefiting from automation's support.

> "While full automation is still a distant goal, the intermediate stages, where operators go from minimal engagement to needing to take sudden control, are fraught with risks."

A more radical idea to tackle underload is to rethink how we introduce automation. At the moment, automation is advancing in stages. While full automation (which the automotive industry refers to as 'Level 5') is still a distant goal, the intermediate stages, where operators go from minimal engagement to needing to take sudden control, are fraught with risks. Instead, we might consider waiting until full automation is achievable, avoiding intermediate phases altogether. While this is a more extreme suggestion, until technology is capable of fully autonomous operation, the issues associated with underload will continue to pose safety challenges.

Conclusion

Mental underload is a classic problem in Human Factors research and real work. Addressing it requires evidence-based system design and behavioural interventions. As automation continues to evolve, it's essential to maintain a balance that keeps people meaningfully engaged enough, without overloading them. Ultimately, tackling underload is about keeping people in the loop so long as they have to be able to take control.

This article was prepared with support from Dr Steven Shorrock.

Professor Mark Young is Professor of Human Factors in Transport within the Transportation Research Group at the University of Southampton and Past President of the Chartered Institute of Ergonomics and Human Factors (CIEHF). Mark has over 30 years' experience working in human factors across transport modes in both academia and industry. Before joining the University of Southampton in June 2023, Mark spent 11 years working as an Inspector at the Rail Accident Investigation Branch, applying his human factors expertise to the investigation of railway incidents and accidents. Mark has written more than 75 peer-reviewed journal papers and five books; he is a Chartered Ergonomist and a Fellow of the CIEHF.

For more background or to connect with Mark, go to: https://www.southampton.ac.uk/people/62gmgv/professor-mark-young

Originally Published in Hindsight Magazine Issue 36, Autumn 2024.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Safety In Transition

By Flt Lt Alex Still, RAF Safety Centre

Safety in Transition to Conflict: Keeping a Cool Head While the World Gets Interesting
In any period of change, across the RAF, one constant remains: the need to maintain safety. Transitions naturally introduce uncertainty — new environments and shifting priorities can all create gaps and risk if not carefully managed. As the world around us continues to move in unexpected directions, our ability to adapt while keeping people safe becomes even more essential. 'Safety in Transition' is about recognising these moments of change and ensuring that, despite the moving pieces, our commitment to safe practice remains steady and uncompromised.

Which brings me onto the topic of **Safety in Transition**. The old, comfortable models we once used to describe the geopolitical landscape we worked in and understood have shifted significantly, and they continue to shift at a pace that keeps even the most seasoned aviators on their toes. So what does that mean for us? Well, for a start, the **Agile** portion of Agile Combat Employment has never felt more applicable.

A New World, A New Tempo
Transition to Conflict isn't a switch we flick. It's more of a sliding scale — sometimes subtle, sometimes abrupt — and right now the dial is waving and moving faster than it has in decades. That shift brings uncertainty, compressed timelines, and a level of organisational strain that tests even the strongest systems.

This is where safety becomes more, not less, essential.
When the world speeds up, the temptation is to speed up with it — trimming corners, accepting more risk "just this once," or skipping a check because tempo and speed feels more important. But as any safety professional will tell you, that's exactly the moment when small errors snowball into big, capability draining problems.

ACE: Agile by Design, Safe by Necessity
The RAF's move toward ACE isn't just another policy change — it's a real shift in how we operate. We're spreading out our assets, giving smaller teams more responsibility, and getting

ready to work from locations we might barely know. It's an exciting step forward, but it also brings new risks that we'd be foolish to overlook.

ACE places a premium on:

- Quick decisions
- Dynamic movement
- Multifunctional teams
- Operating in austere or unfamiliar locations

All of that creates an environment where hazards change rapidly and often invisibly.

That doesn't mean slowing ACE down. It means making sure safety thinking is baked into the concept, not sprinkled on top later like an afterthought. ACE works best when teams are empowered — and empowerment only works if people understand the risks and feel confident to challenge unsafe actions, even under pressure.

So, how do we protect our people and our capability during this period of strategic turbulence?

1. Understand the Risks as They Actually Are — Not as They Used to Be Transition brings new hazards and shifts old ones. Risk assessments written in peacetime need updating, adapting, and to be actively used and reviewed by those on the ground to make real time decisions.

2. Maintain Discipline When Everything Else Is Moving Fast Procedures are not obstacles. They are stability in a world that's anything but stable. Discipline under pressure is where professional forces distinguish themselves.

3. Encourage Voices, Not Silence

The best safety cultures aren't the ones with the smoothest paperwork — they're the ones where everyone, from AS1 to Wg Cdr, feels responsible for calling out concerns before they grow teeth, and bite.

Leadership Through Transition
Strong leadership is the backbone of safe transition. Not leadership through slogans, but leadership that:

- Shows visibility
- Sets the tone for risk acceptance
- Asks the right questions
- Creates space for challenge
- Balances pace with purpose

During TtC, people take cues from the leaders they trust. If leaders demonstrate calm, clarity, and commitment to safe execution, that behaviour cascades naturally.

Navigating the Shift Without Losing Ourselves
The RAF is moving through one of its most significant transitions in recent memory. The world is sharper, faster, and far less predictable than it was even a few years ago. ACE is a powerful response to that challenge — but only if we execute it with safety as a non negotiable foundation. The pace of change keeps catching us off guard — whether it's sudden shifts in our global commitments, new operational demands, or emerging threats — but the principle remains the same:

We move with agility, but we do not compromise on safety.
We transition to conflict only in ways that preserve our people, our capability, and our readiness.

Insights from the UK Flight Safety Committee

The Lifeblood of Aviation Safety: Why Communication Still Matters More Than Anything Else

By Rob Holliday, based on Communication in Aviation Safety: Lessons Learned and Lesson Required by Paul Krivonos

Burbank assigned me a squawk code. Several minutes later the controller asked me my altitude and I responded 7,500 feet. He told me to squawk my altitude. I replied, 'Squawking 7500', and the controller confirmed my code. After landing, Ground directed me to a specific parking area, and I was immediately surrounded by three police cars with a number of officers pointing their weapons at me. They proceeded to frisk me and handcuffed me. They really roughed me up. I would suggest that controllers never use the terminology 'squawk your altitude.'

Clearly squawking 7500, 'hijack', makes no sense, the controller only wanted Mode 'C' for the altitude to display on their screen, but it happened.

Captain: 'While we were in level cruise at FL330, Centre cleared us to FL290, "pilot's discretion" to 11,000 feet (or so I thought). I dialled in 11,000 feet in the altitude window, and the First Officer [FO] acknowledged. The first clue I had that something was amiss was when I noticed another aircraft as we were approaching FL270, and the FO told me we were only cleared to FL290.'

First Officer: 'During the conversation with the controller, a conversation was going on within the cockpit with a deadheading crew member, which may have contributed to the FO and captain not verifying the altitude assignment with each other. The crew had several tasks in progress, with briefing, receiving ATIS, and making "in range" calls *(Callback,* September 1998).

US Air Force from USA, Public domain, via Wikimedia Commons

Of course, reading this in a quiet comfortable environment, it seems obvious that the controller is unlikely to clear the aircraft to two altitudes at the same time, if this is your interpretation, you would question it. If it can happen to them, it can happen to us.

> "In aviation, communication doesn't support safety — communication is safety."

In aviation, we like to think we are disciplined people who follow procedures, rely on data, and keep emotion out of the cockpit or the cabin. But when we strip away the technical language and the complex systems, aviation is, at its core, a human business. And humans communicate. Or at least, we should.

If there is one lesson that we, as a safety community, keep learning the hard way, it's this: communication is the quiet factor that decides whether everything goes right, or everything goes terribly wrong. We've known this for decades, but the examples keep coming. And when we look honestly at the evidence, we see the same patterns repeating themselves across cockpit crews, cabin teams, maintenance staff, and even management.

> "We don't lose aircraft because we lack data. We lose aircraft because someone didn't say — or hear — what needed to be said."

We might think that after the Kegworth accident, where the cabin crew did not provide crucial information to the flight crew. The British Midland Boeing 737-400 experienced an engine fire in the left engine, a fact that several cabin staff and passengers noticed, but this information was not conveyed to the flight crew, who reduced power to the other engine, then when vibrations and smoke ceased, mistakenly shut down the wrong engine.

If you think this lesson has been learned, think again. In 2024 an ATR 72 departed Caen with an incorrect centre of gravity and therefore out of trim, resulting in a take-off trim setting of 1.2 up when it should have been 2.2 up. The cabin crew member who carried out the passenger count found the passenger distribution unusual, given the small number of passengers on board. They were mainly seated in the middle and front sections. She pointed this out to the cabin manager. She told him that this distribution had been validated by the pilots. The pilots were not informed. And the load sheet error was not detected.

The examples in *Communication in Aviation Safety* are a reminder, if we needed one, that effective communication isn't just part of the safety puzzle. It is the puzzle. Everything else fits around it.

Why Communication Is Aviation's Hidden Risk Factor
The aviation system is, at its core, a network of conversations between pilots and controllers, cabin crew and flight deck, maintainers and operations personnel, dispatchers and commanders. Where those conversations falter, safety margins shrink.

Decades of analysis underscore this reality. Studies cited reveal that up to 80% of aviation accidents over a 20 year period involved interpersonal communication failures. Human factors remains the dominant causal factor in accidents, and communication is the medium through which most human factors manifest.

As Helmreich and Foushee famously observed:
"The theme of these cases is human error resulting from failures in interpersonal communication."

From misunderstood altimeter settings to ambiguous clearances, to cockpit conversations laden with assumptions, communication breakdowns create fertile ground for error.

> "Expectation is one of our biggest hidden risks. We hear what we're used to hearing, not what was actually said."

Expectation, Assumption, and Meaning: The Silent Saboteurs
The research highlights several recurring patterns in communication related incidents:

Expectation Bias
Pilots and controllers often hear what they expect to hear, especially in fast paced environments. When ATC issues an uncommon instruction in a familiar setting, a pilot's expectation of "the usual" can override the actual clearance. One ASRS case study describes a pilot who had conducted the same approach repeatedly; when given a different landing clearance, he automatically "heard" the familiar one, leading to a runway alignment error.

Assumption
"Never assume anything" is a refrain found throughout the examples. Crews assume others see the same traffic, understand the same plan, or have interpreted a clearance

in the same way. These assumptions have led to overshoots, altitude deviations, and near collisions, all documented in the ASRS reports referenced in the paper.

> "Every time we assume, we gamble. And aviation is no place for gambling."

Meaning and Language
Communication is not a conveyor belt of meaning. Senders and receivers interpret messages through their own filters. When a first officer misinterprets the call "3000" as an altitude rather than an altimeter setting, or when a flight attendant instructs "turn around" (meaning physically look behind you) and the captain interprets it as "return to the airport," the consequences can be significant.

Language Barriers
Even when English is the common language, accented speech, non standard phraseology, or mixed-language radio environments can introduce dangerous ambiguity. The paper notes several events where misheard clearances in accented English nearly resulted in runway incursions or conflicts.

These patterns show that communication failure is rarely the result of incompetence, it is the result of normal human limitations reacting poorly to abnormal situations.

Communication as Information, Coordination, and Leadership
In the Krivonos framework, communication in aviation serves five primary functions:

1. Providing information
2. Establishing interpersonal relationships
3. Creating predictable behaviour patterns
4. Maintaining attention and monitoring
5. Acting as a management tool

These interlocking functions illustrate how communication is not peripheral to aviation, it *is* aviation.

> "Clear, assertive communication turns a group of individuals into a crew."

Information Sharing
Without accurate and timely information flow, crews cannot build shared mental models. Numerous incidents show how small gaps, an altimeter setting misheard, a bird hazard not communicated, or a runway condition not relayed, can snowball into much larger hazards. Being prepared to give and receive a challenge or clarification is an important defence.

Relationships & Crew Dynamics
Communication forms the foundation of cockpit and cabin dynamics. Research highlights tensions around assertiveness versus mitigation (politeness). Too much politeness from a first officer may prevent critical challenge; too much bluntness may erode trust. High performing crews strike a balance, using communication to maintain both safety and cohesion.

Predictable Behaviour Patterns
Good communication creates predictability, checklists spoken aloud, callouts performed consistently, and shared situational awareness. Poor communication disrupts these patterns, leading to deviations and missed cues.

Monitoring & Attention
Communication acts as both a focusing tool and a distraction. Overloaded radio channels, complex clearances, and multi-tasking during critical phases all affect attentional control. The are multiple incidents where distraction contributed directly to errors.

Management & Safety Culture
At an organisational level, communication drives safety culture. As Krivonos notes, "the primary function of a manager is to develop and maintain a system of communication." Communication is how safety priorities are conveyed, how risks are reported, and how learning takes place.

When Communication Fails, the Consequences Are Fatal
Several high-profile accidents discussed in Communication in Aviation Safety underscore the tragic cost of communication failures:

- **Tenerife (1977)** – still the deadliest accident in aviation history, rooted in miscommunication between crew and tower.
- **Avianca Flight 52 (1990)** – the crew failed to clearly communicate fuel emergency status, contributing to fuel exhaustion and crash.
- **American Airlines Flight 965 (1995)** – a mix of miscommunication and incorrect assumptions led to a navigational error and CFIT accident.

Communication lapses do not just contribute; they often *trigger* the chain of events.

Cabin–Cockpit Communication: The Persistent Challenge
One of the most striking themes is the fragile relationship between cabin and cockpit crew.

Despite being part of the same team, cabin–cockpit communication is too often impaired by hierarchical barriers, cultural differences, lack of assertiveness, poor briefing habits and physical separation.

> "If cabin crew don't feel heard, we break one of our most important safety defences."

The Dryden F28 disaster is a sobering example. A flight attendant noticed severe wing contamination but did not pass the information forward due to past negative experiences with pilots. That delay contributed to a fatal crash.

The Maintenance Connection: Communication Beyond the Flight Deck
Although Krivonos focuses heavily on flight operations, maintenance errors are cited as another area where communication is critical. Poorly written task cards, ambiguous logbook entries, and assumptions between pilots and maintainers create hidden hazards that may only reveal themselves later, in flight.

> "Maintenance communication is the least visible part of the safety chain — and one of the most dangerous to ignore."

In *'It Was This Wing Wasn't It Identifying the Importance of Verbal Communication in Aviation Maintenance',* Michael Newman & Steve Scott, reinforce the point: communication failures, especially unclear written instructions, are recurring contributors to maintenance delays, misunderstandings, and safety risks.

Training for Better Communication: Where the Industry Can Improve
Communication training should be an integral part of safety training at all levels.

Many organisations focus heavily on technical skills but underinvest in communication skills. Yet communication is the tool that makes technical skills usable in real-world, time-pressured situations.

The research calls for training in interpersonal communication, active listening, questioning techniques and verification, conflict management, feedback loops (readbacks, hear-backs, cross-checks) and language clarity and jargon management.

Moreover, joint training between cockpit and cabin crew remains an often unmet need across much of the industry. Shared understanding builds shared responsibility.

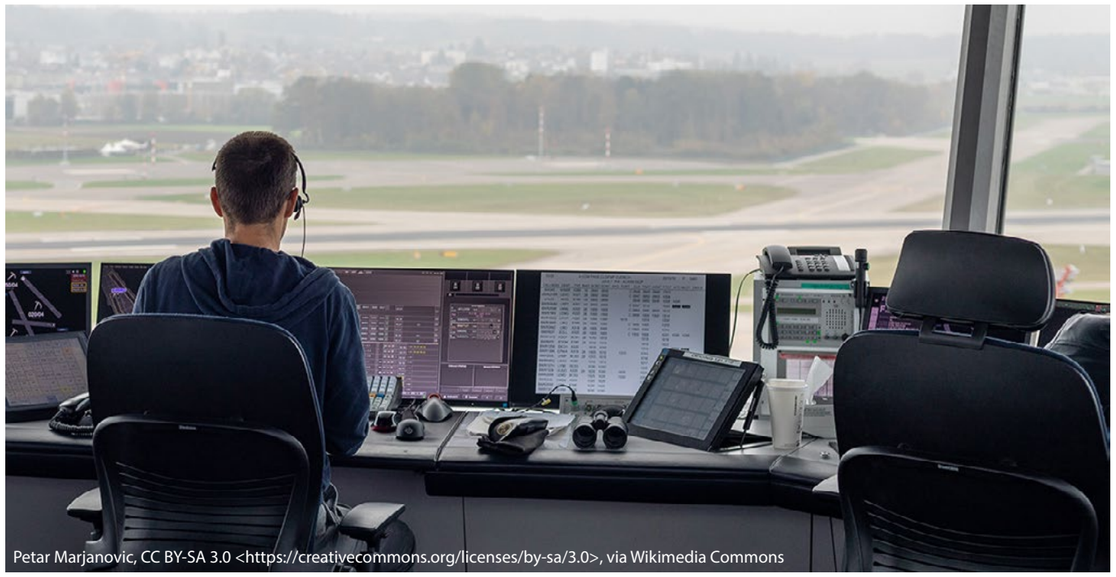
Communication as a Cornerstone of Safety Management
As Safety Management Systems (SMS) evolve, communication is increasingly recognised not simply as a behavioural factor but as a systemic one. A robust SMS depends on clear reporting channels, transparent investigation processes, trust between management and front-line staff, a culture of speaking up and consistent messaging about risk and safety priorities. Safety culture cannot thrive without communication that is open, accurate, and timely.

> "The lesson is always the same: better conversations mean safer operations."

Conclusion: Communication Is the System
The aviation industry has mastered technology, engineering, and regulation. But the human element, how we speak, listen, question, and understand, remains both a vulnerability and an asset. The evidence from Communication in Aviation Safety is clear. Communication failures are pervasive. They are preventable. And they matter profoundly.

If safety is the product of systems, culture, and human performance, then communication is the thread that ties them all together. In the cockpit, cabin, tower, or maintenance hangar, communication is not the soft side of aviation, it is the safety margin.

The industry's challenge is not simply to refine communication procedures, but to elevate communication as a professional discipline, practised, trained, reinforced, and valued. For in aviation, communication doesn't just support safety. Communication *is* safety.



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Aeromedical Considerations of Physiology in Combat Aviation

By Major Philippe Stewart CD, MD, Dip AvMed,
Royal Canadian Air Force, Directorate of Flight Safety Flight Surgeon

This article was written for the Royal Canadian Air Force, originally published in 'Flight Comment' Magazine 2025. Reproduced by kind permission.

The modern military aviator operates in an environment defined by complexity and in our new fighter platforms, acceleration. Layered atop this are cultural and technological advancements bringing in ever increasing complexity with integrated multi-domain command systems, global deployments and an expanding operational tempo. Each of these factors introduces cognitive and emotional demands that challenge even the most resilient individuals.

In this installment I aim to explore the psychological and cognitive aspects of combat aviation through three interrelated domains — each essential to maintaining readiness, safety, and long-term aircrew well-being.

Combat Stress

When the "fight-or-flight" response is triggered the body releases stress hormones, namely cortisol and catecholamines. These potent chemical effectors of human physiology drive up blood glucose for immediate energy availability and maximize blood flow for oxygen delivery to the muscles. To conserve energy, they suppress non-essential functions like digestion, salivation and bowel movements and cause an increased activation of the parts of the brain responsible for focus and vigilance to enable rapid decision-making.

Evolutionarily, this response is highly effective if you need to fight for your life or run away from a saber-tooth tiger. However, sustained activation leads to measurable declines in cognitive flexibility, situational awareness, and emotional control [1].

Research from Biological Psychiatry [2] and work from the United States Air Force School of Aerospace Medicine (USAFSAM) has shown that prolonged operational stress without sufficient recovery can reduce working memory accuracy by up to 25%. Studies from Defence Research and Development Canada (DRDC) and others have also demonstrated significant impairments in visual scanning and threat discrimination [3] after repeated high-intensity sorties — even among seasoned pilots.

Unlike conventional mental health conditions, combat stress is a performance variable — situated at the intersection of physiology and psychology. Left unchecked, it contributes to task fixation, communication breakdown and poor decision-making under threat. From an aeromedical perspective, proactive stress management is as vital as cardiovascular fitness.

Building resilience involves stress inoculation and cognitive readiness training — structured exposure to stress in controlled environments to enhance tolerance and adaptability. Incorporating tools such as biofeedback, heart-rate variability (HRV) monitoring, and mindfulness-based attention control have shown measurable improvements in reaction time and post-stress recovery.

Equally critical is leadership culture. Units where commanders openly discuss mental readiness and trust aeromedical advice demonstrate significantly lower rates of operational burnout and unreported distress. In this regard, psychological resilience must be viewed as a collective capability, not a personal failing.

Fatigue and Performance

Fatigue remains one of the most pervasive and underestimated threats in aviation. Decades of research confirm its direct correlation with cognitive slowing, impaired judgment and increased risk tolerance. Studies have shown that 17 hours of wakefulness degrades cognitive performance to a level equivalent to a blood alcohol concentration (BAC) of 0.05%. After 24 hours, it approximates 0.10% — a level at which civil aviation authorities universally prohibit flight.

Combat and expeditionary aviation often demand sustained operations across shifting time zones, with unpredictable sleep opportunities and continuous readiness requirements. Even modest sleep restriction (5–6 hours per night) over a week can reduce alertness and reaction time to levels equivalent to one full night without sleep. Fatigue in combat is both inevitable and cumulative.

The Royal Canadian Air Force (RCAF) was among the first global forces in advancing toward a Fatigue Risk Management System (FRMS). While scientific understanding of sleep and fatigue have since outpaced our current model, efforts are underway to integrate more effective and more efficient tools such as physiological monitoring, predictive scheduling algorithms and self-report systems. Wearable biometrics like wrist actigraphy and HRV sensors may soon be used systemically to provide early warnings of fatigue accumulation and recovery deficits.

However, technology must support — not replace — culture. Operational communities must recognize rest as a mission enabler, not a luxury. Flight surgeons and commanders share responsibility for balancing operational imperatives with human limitations. Structured crew-rest policies, circadian-aware mission planning and fatigue education can all reduce performance risk. Holistic performance programs — encompassing nutrition, hydration, and exercise — ensure fatigue is addressed as part of a broader readiness continuum.

Ultimately, fatigue management is not about enforcing limits; it's about preserving judgment. The most sophisticated aircraft is rendered ineffective if its operator is cognitively compromised by exhaustion.

Cognitive Decline and Aging

As the RCAF works to retain experienced aircrew amidst global shortages, the question of cognitive sustainability

becomes increasingly relevant. While age brings valuable experience and decision-making maturity, studies in gerontology and aging adults show that subtle neurocognitive and sensory changes can emerge as early as the mid-40s. Processing speed and divided attention tend to decline most significantly after age 40, while executive function and visuospatial accuracy show more gradual reductions [4].

That said, these changes are neither universal nor irreversible. Targeted cognitive training — including working memory exercises, complex simulator scenarios and adaptive visual tracking — has been shown to stabilize or even improve age-related declines. Researchers at DRDC are actively exploring this underexamined area to identify opportunities for performance enhancement.

Moreover, physiologic age and cognitive resilience do not always align with chronological age. Sleep quality, cardiovascular fitness and stress load all play modulatory roles. While many of those variables necessitate strict age cutoffs — the preferred approach as always is individualized monitoring where applicable and appropriate.

The goal is not to limit careers, but to extend safe operational longevity through informed surveillance, proactive adaptation and respect for the evolving human-machine interface.

Conclusion

Three themes have remained top of mind as I wrote this article:

First Canada's contributions to aeromedical science over the past century is impressive. We have been global leaders in this field and while recent years have seen a decline in our organizational output, we have the tools and talent to lead again—by investing in research, supporting our institutes and maximizing collaboration with allied nations.

Second, there is a growing gap between human adaptability and the complexity of modern aircraft. Bridging this gap requires real-time in-cockpit physiological and performance data collection—supported by a culture that encourages timely reporting and robust investigation by human factors and physiology teams. With thousands of variables monitored in new aircraft, it is only logical that the human at the center of it all should be equally supported.

Lastly its a simple, unfettered reminder that the team of flight surgeons and aerospace medicine specialists — though occasionally tasked with the difficult responsibility of grounding aircrew — are deeply committed to keeping you flying, keeping you safe and enhancing your performance in every way possible.

The next generation of airpower will be defined not solely by aircraft performance, but by human adaptability. As combat aviation becomes more cognitively and psychologically demanding, success will depend on the ability to maintain resilience, manage fatigue and preserve cognitive function across an aviator's entire career.

At its core, aerospace medicine exists to protect the most complex system on any aircraft — the human mind. By ensuring that system remains strong, flexible, and resilient, we preserve not only safety and readiness — but the very spirit of military aviation.

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BERSAMA LIMA 25 - Mission First, Safety Always

By Lt Cdr Karl Byrne and the Joint Safety Cell

Exercise Bersama Lima 25 (BL25) brings together more than 4,000 personnel from across the Five Power Defence Arrangements (FPDA). With aircraft overhead, ships at sea, and troops on the ground, the scope is immense. Add in five nations, multiple services, and different safety systems, and the safety challenge becomes significant. But within that complexity lies the FPDA's greatest strength — the ability to integrate different perspectives into a stronger, shared framework.

At the centre of this effort is the Joint Safety Cell. Made up of officers from Australia, Malaysia, New Zealand, Singapore, and the United Kingdom, the Cell provides oversight and coordination across every domain — air, land, and maritime. Their mission is not to restrict operations but to create the conditions that allow ambitious, high-tempo training to unfold safely.

Lieutenant Commander Karl Byrne (Royal Navy), Deputy Chief Joint Safety Officer, says that what looks like a complication is actually the key to resilience. "Integrating five different nations, each with its own procedures, practices and culture, is complex," he said. "But it allows us to take the best of every system, combine it, and deliver a stronger, more resilient safety framework."

That framework underpins everything from air task orders to ground manoeuvres. Air safety is a driving factor in mission planning, shaping how sorties are tasked and how airspace is deconflicted. This includes ensuring fast jets, Ground-Based Air Defence units, and Joint Terminal Attack Controllers can all operate effectively without compromising safety.

The land environment adds another layer. Ground forces were first integrated into Bersama exercises in 2000, and their role

has grown steadily. This year marks the first time the scenario has included a Humanitarian Assistance and Disaster Relief (HADR) element — bringing a new set of risks and safety considerations for exercise planners.

For Lieutenant Bryce McGibbon (NZDF), this isn't about slowing the exercise down. "Safety is the foundation of everything we do. By managing risks early, we create the conditions for realistic training while ensuring our people remain protected. Safety is the enabler that allows us to achieve operational depth without compromise."

The collaborative approach has already proven its value. During Bersama Lima 24, the Cell developed the slogan "Mission First, Safety Always". It was simple but effective, resonating strongly across the exercise. The phrase has since been adopted into Australian Army doctrine — a clear example of FPDA practice shaping national policy.

Major Mark Tamblyn (ADF), who also serves as a reservist in the Directorate of Work Health & Safety, said the outcome highlights the importance of shared learning. "Operating in a multinational joint environment safely, while achieving mission success, is fundamental in warfighting," he said. For him, seeing the BL25 slogan enter national doctrine was proof that the Cell's work delivers impact beyond the exercise.

But the ambition at BL25 extends further. The Joint Safety Cell is striving to build a generative safety culture, where safety is considered at every level, by every participant. LTCDR Byrne explained: "The Joint Safety Cell should be the last line of defence, not the only line. Safety should be baked into the DNA of the exercise."

Malaysia's Major Tuan Nazir echoed this, noting that diversity is one of the Cell's greatest strengths. "The diversity within the Joint Safety Cell brings significant value, as each nation contributes unique knowledge, experience, and perspectives. This enriches the overall safety framework of the exercise, enabling us to identify risks more comprehensively and implement stronger safety measures."

Singapore's Major Benjamin Koh added that the lessons from BL25 will continue to shape safety practices at home. "Exercise Bersama Lima 25 showcased a well-integrated safety culture that emphasised proactive risk management, clear communications, and strong interoperability among the FPDA nations. One key lesson I'll be taking back is the importance of early and continuous safety coordination across all participating forces."

Midway through the exercise, it was clear that a generative safety culture was starting to take hold. Reports were raised earlier, openly, and without fear of reprisal. Risks were being identified and mitigated before they escalate, allowing training to continue safely at tempo.

For the Joint Safety Cell, success is often measured by what doesn't happen: no major incidents, no unnecessary pauses, and an exercise that delivers maximum training value while preserving the force.

The complexity of Bersama Lima 25 shows the reality of modern operations: five nations, each strong on their own, proving their strength again by training safely and effectively together in one joint environment.

Doc's Corner:
What am I allowed to take?
A guide to self-medication

By Wg Cdr Phil Lucas

Your New CFMO – Wg Cdr Phil Lucas

Warm greetings to you all. I am the new CFMO. Your eyes don't deceive you – I do indeed have wings with a background of 2000 hours flying. Mainly Hercules (C1/3) and AEF before going to Med school. 9 years later I finished training as a GP/Medical Officer. I keep my hand in with some 2FTS gliding when time permits. Why did I do it? Many reasons, but at the time I could see the value of an experienced pilot in the medical system and thought this was an area I can add some value and perspective for both parties. Pilots and doctors for the most part work very well together; the roles do carry similarities when it comes to risk balance and decision-making. There can be areas of friction, and these are overcome by communication and explanation of how each party sees things. This is where I come in, both as CFMO and as a pilot. If I'm upsetting both parties, maybe I've got the balance just right!

What am I allowed to take? A guide to self-medication

There are so many chemicals out there. Advertisements tell us that there is the latest wonder-substance to make us look younger, fitter and happier. This old CFMO feels that there is no way they can make a silk purse out of his sow's ear, but the allure of splashing out on some miracle cure is ever-present. They come in various pots, tubs and bottles. We eat them, rub them on our skin, stick them in our eye and poke them up our nose.

In medicine, we need to grasp and quantify risk for all these chemicals we take. Which chemicals are always harmful? (very few), which are always beneficial? (almost none), which is both? (vast majority). If most chemicals are both good and bad, where is the benefit/harm line and how to I apply that to everyone out there, given people are all shapes, sizes and ages.

So when it comes to our aircrew population and how these substances work on our bodies, we've got an additional problem to solve – when are they safe to take and when aren't they in the context of air safety?

As Aviation doctors, we spend a considerable amount of time discussing both supplements and medications to work out the balance of benefit and harm. We want you to be able to take medications, but we need to ensure that any side-effects (all medications carry these) do not pose a threat to flight safety. This is always a challenge for us to consider all types of aircraft and all flight parameters in all parts of the world. Not an easy task!

To further complicate matters, there is a rapid increase in medications which require attention and evaluation. The market is growing, as well as the access to these medications. Some can make a huge difference to health so we would like aircrew to benefit from these changes without compromising flight safety. That takes time to consider the evidence and we take information from drug companies, NICE, other nations' experiences, and specialist experience to make these decisions.

One area where we can improve access to medications is to introduce self-medication. We are not the first Air Force to

> "There is now a 'green list' for permitted over-the-counter medications, and this is found in AP1269A"

allow this. All medications are subject to statutory legislation and are classified as to whether you require a prescription, or whether you can buy them over the counter. Those over-the-counter medications tend to be medications that have been around for a long time and have a large amount of data behind them on their safety and effectiveness. We also have a lot of data on their safety within aviation. Therefore some over-the-counter medications have now been permitted to be taken by yourselves as aircrew without consulting a doctor. There are limitations around this which you need to understand; you can do this for no longer than 72 hours and cannot use multiple 72-hour timeframes to medicate for the same condition, in which you see your MAME. There is a 'green list' for which medications are permitted and this is found in AP1269A. Not all medications you can buy over the counter are safe for aircrew use. Some are sedating, such as decongestants while others carry adverse effects which may impact flight safety.

So hopefully in the very ambiguous and grey world of chemical-taking we all live in, we are at least able to provide some useful support and guidance for you as aircrew for dealing with minor ailments, using medications that are highly unlikely to degrade flight safety. Doctors live in a world of variability where every human is different. To make it worse, those differences also constantly fluctuate. Hence why we are always quite conservative by our nature; we need to at least consider the pessimistic end of the spectrum. Hopefully with self-medication we are handing some ownership to yourselves as professional aircrew to supervise your own health using medications which we expect to be safe and effective. Please use these wisely and be honest with yourself if you are not fit to fly. Fit-to-fly judgements are often tricky ones to take and external pressures abound. If in doubt, your MO is always there to discuss, support and guide.

The self-medication list can be found in AP1269A. Leaflet 5-19 Annex I (Page 739).

GASCo to Wind Up

The General Aviation Safety Council (GASCo) has announced that its Board has taken the decision to wind up the organisation in an orderly manner, ending more than six decades of work in support of general aviation safety in the United Kingdom. GASCo operations cease(d) on 31st March 2026 and the charitable company will apply for dissolution on 1st September 2026.

The decision follows a thorough review of the Council's financial position and long-term prospects. While the organisation has stabilised its finances in the short term and has continued to deliver safety activity with the support of many member organisations, the Board concluded that it no longer has a sufficiently secure and sustainable funding base to continue operating at a level consistent with its charitable purpose. Like many small safety charities, the Council has faced increasing financial pressures in recent years, and reductions in external funding have proved difficult to replace.

Founded in 1964 as the General Aviation Safety Committee and later reconstituted as the General Aviation Safety Council, GASCo has for over sixty years provided an independent forum bringing together representative bodies from across the UK general aviation community. Its work has focused on improving safety through education, the sharing of information, analysis of accidents and incidents, and the promotion of good airmanship across all sectors of general aviation.

Over that period the Council has organised hundreds of safety evenings and seminars across the country, delivered Military-Civil Air Safety Days and other national safety initiatives, published safety material and analysis, and provided a long-standing Safety Information Exchange through its regular Council meetings. More recently, it has also undertaken research and safety promotion work in areas such as human factors and electronic conspicuity, and has supported the Civil Aviation Authority's just culture approach through delivery of the Airspace Infringement Awareness Course.
Source: www.gasco.org.uk

RAF Crash Fire & Rescue Vehicles

By Sgt Martin Whatley, Deputy Station Fire Officer, RAF Brize Norton

Over the next few issues of Air Clues, we will be featuring RAF Crash Fire & Rescue vehicles that you might see on your unit, with some detailed recognition features for you to admire.

The Oshkosh Striker

Media Capacities

Water Tank	9500 Litre capacity
Foam Tank	1140 Litre capacity
Dry Powder	175 kg dry powder chemical system

Overview

The Oshkosh Striker is a leading Aircraft Rescue and Firefighting (ARFF) Major Foam Vehicle widely used across defence. Designed around rapid intervention and crew survivability, it provides the performance and reliability essential to maintaining safe flying operations.

This 6×6 variant incorporates a High Reach Extendable Turret (HRET) and combines high acceleration with off-road stability, allowing crews to reach an incident anywhere on the airfield within critical response times. With high-output pumps and the distinctive HRET, enable effective external firefighting and precise internal penetration during aircraft emergencies. The cab prioritises visibility, with a central driver position and wide panoramic windows with intuitive controls that support situational awareness under pressure. This vehicle can seat up to 4 Firefighters (including the driver). The Striker has a modern electronic system to assist with diagnostics, pumping operations and vehicle monitoring, reinforcing its safe and consistent performance. The Striker meets modern aviation safety demands with its combination of speed, stability and firefighting power makes it a cornerstone of airfield emergency response.

Crew Training

Within the first 2 years firefighters will have completed their trade training, TATs, driving qualifications such as CAT C and Emergency Response Driving then they will be looking at their first deployment.

The AS rank will all be able to complete each other's roles (driving, breathing apparatus wearers) then if they are eligible (generally around the 3–4-year mark) they will undertake Incident Commander training and will become an Incident Commander for that vehicle.

The Bumper Monitor
Bumper Monitor - 3000L / 6000L per min (Max 6000L on 100% flow rate)

Hydro-Chem Nozzle in action

The Bumper Monitor in action

Firefighting Pump Capabilities
The Oshkosh also has a Single Stage Centrifugal Pump that can produce up to 7511 litres per minute at 15.5 bar pressure

Oshkosh's Hydro-Chem Nozzle (HRET)
Hydro-chem nozzle (HRET) – 1800L / 3600L per min (Max 3600L on 100% flow rate)
Dry Powder (from hydro Chem nozzle) – 8kg per second

Tech Specs	
Powerplant:	Deutz TCD 16.0 L V8 diesel engine
Top speed	70 mph
Acceleration	0 - 50mph in 35 seconds
Gear Box	Allison EVS-4800 Series electronic control 7 speed automatic
Height: (Unloaded)	3.71m
Height: (Loaded)	3.6m
Width	3.048m (without mirrors)
Width	3.523m (including mirrors)
GVW	34227kg
Turning circle	Kerb to kerb with rear wheel steering Left 20.1m and Right 21.3m

RAF Fire and Rescue Service

The RAF Fire and Rescue Service plays a central role in maintaining air safety across the Royal Air Force.
RAF Firefighters are there to provide 24/7 fire and crash rescue protection. A deployable Aerodrome & Rescue Firefighting capability to Defence in the UK and overseas. Trained to respond within seconds to aircraft incidents, ensuring aircrew survival and preventing minor events from becoming major accidents with highly specialised ARFF vehicles and equipment.

The work spans far more than crash response. Crews maybe called upon to handle structural fires, technical rescues, hazardous materials, emergency support for engineering and flying operations. Whether it's managing a fuel spill, securing munitions after an incident, or providing standby cover for flying activity forming a vital link in the air safety chain.

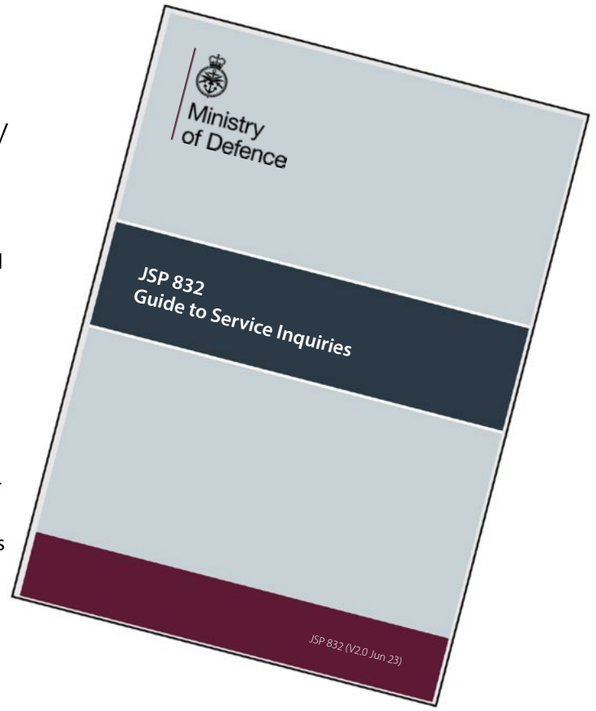
Prevention remains at the heart of the mission. Firefighters deliver everything, from safety briefings to conducting fire safety inspections, and work closely with aircrew, engineers, and station execs to identify risks before they escalate. Possessing a specialist knowledge of aircraft systems, fire behaviour, and emergency procedures underpins safe operations across the RAF.

The RAF Fire and Rescue Service is essential safeguard for the people, aircraft, and missions that define the modern Royal Air Force.

Reg 18 – Mythbusting

Reviewed & Updated by Wg Cdr Nicki Severs (DSA HQ Legad) & Col Ivo Peters (DAIB Hd))

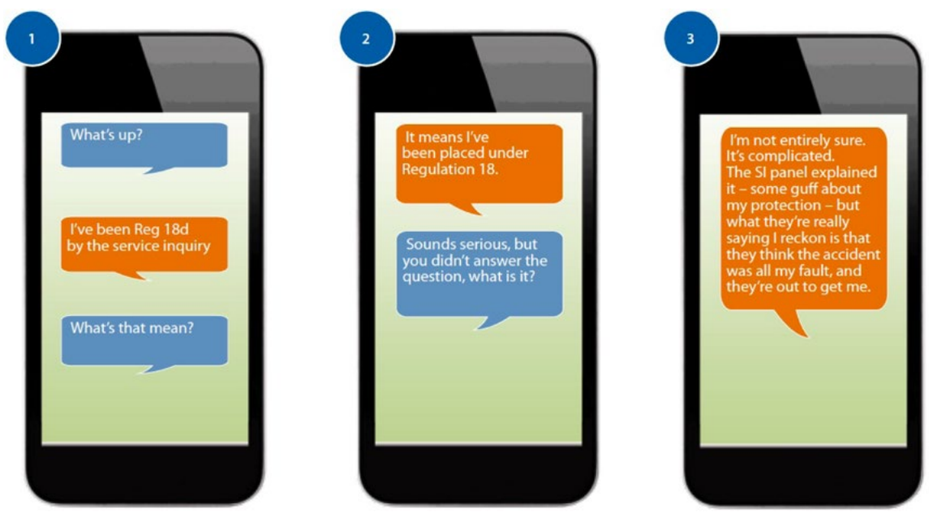
If you have any awareness of Safety Inquiries convened following an accident, you may have heard of "Regulation 18".



Over the course of the 10-plus years, DG DSA has convened a number of safety-related Service Inquiries (SIs) which the Defence Accident Investigation Branch (DAIB) have assisted in. It is clear to all of us that Regulation 18 suffers from a serious perception problem. The aim of this article is to tackle some urban myths surrounding Regulation 18, explaining what it is for and, perhaps more importantly, what it is not for. It is worth nothing that Regulation 18 applies to any individual caught up in an accident, whether Service or civilian. This article is obviously based on DAIB experience and ways of working in relation to the examples and procedures described, but the legal principles hold good for all types of Service Inquiries.

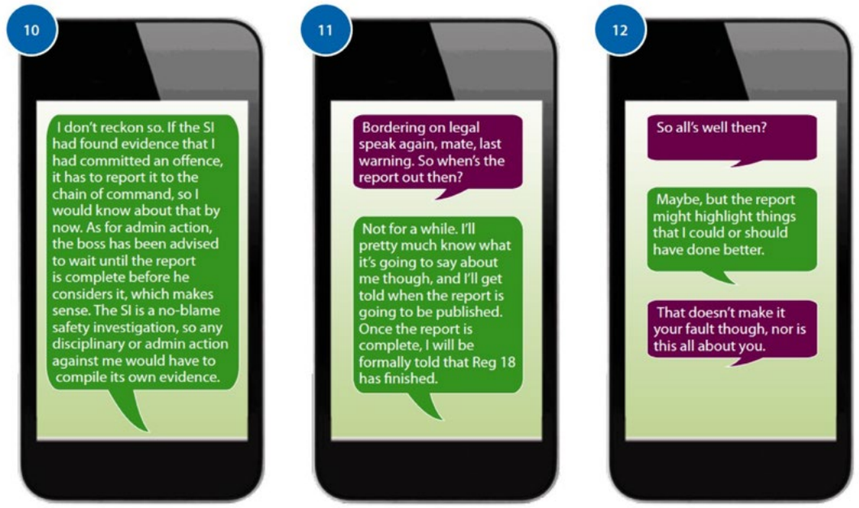
("Reg 18" refers to Regulation number 18 of JSP 832 (Guide to Service Inquiries) which is copied verbatim at the end of this article.)

Imagine your mate is involved in an SI. Is this how the conversation would go?



Does that sound familiar? This is a very common perception, as inaccurate as it may be.

What we are aiming for are more conversations like this:



Well, our two friends might not like legal speak, but this is a legal process so we can't really avoid it! Let's unpick the conversation:

"It's part of the Armed Forces Act"
The power to make regulations governing SIs derives from section 343 of the Armed Forces Act 2006, and the regulations themselves are contained in the Armed Forces (Service Inquiry) Regulations 2008 which is a piece of secondary legislation. You can find the regulations and more policy on how SIs are conducted in JSP 832 (Guide to Service Inquiries), which is available on the Intranet.

"The SI president is of the view that my character or reputation could be impugned."
The threshold for this is very low, and Regulation 18 is triggered if the character/professional reputation may be affected by the findings of the panel. "May" is very subjective and it's up to the president to decide if it has been met. The president needs to consider if anyone reading the SI report might think that some individuals could or should have done better. Although the SI report is written in a non-blameworthy way, even presenting just the facts with some analysis can raise questions in the reader's minds. If this is the case, the need for Regulation 18 may be triggered. The threshold for Regulation 18 is very low: if you think of the criminal standard of proof used in disciplinary offences (beyond reasonable doubt) as being at the top of your head, the civil standard of proof used in administrative action (on the balance of probabilities) being around your waist, the threshold for triggering Regulation 18 ("may be affected") would be barely at ankle height! Therefore, it does not necessarily mean that an individual has done something wrong warranting disciplinary or admin action. An individual who is subject to Regulation 18 is called a "potentially affected person" (PAP).

"What sort of protection?"
The regulations permit the PAP access to the evidence in a number of ways. The "traditional" Regulation 18 scenario envisages witness X saying something adverse about witness Y, and witness Y being invited (under Regulation 18) to listen if the panel decide to re-interview witness X and cross-examine them. However, experience tells us that it is very rare for this scenario – straightforward adverse comment made by one witness about another – to arise in a safety SI. The move towards investigating human factors and wider systemic/organisational factors (as recommended by the-then Charles Haddon-Cave QC in the Nimrod Review) has meant that often it is only where the investigation is nearing completion and the totality of the evidence is being analysed that the need for Regulation 18 is firmly established. It is the comparing and contrasting of various witness statements against other documentary evidence (such as regulations and orders), and other evidence gleaned from a wide variety of sources which informs the panel's findings. Therefore, the need for Regulation 18 may only become apparent after all the witnesses have been spoken to. Also, under the 2008 regulations, a PAP can be "excluded" from parts of the panel's proceedings (or, in fact, all of the proceedings). The president can decide that it would not be in the best interests of the investigation to have the PAP sitting in on interviews – you can imagine how witnesses might not want to speak freely if the PAP is sitting in the room. This means the investigation would not be getting the best witness evidence available. By presenting the PAP with extracts of the report, and the underpinning evidence, once the panel has crystallised its findings in writing means the PAP can see what is being said and why the panel are saying it (and can comment on it); in this way, the requirements and intent of Regulation 18 are achieved in a way that does not compromise the investigation process.

Therefore, in such cases, the PAP will be given a copy of those parts of the draft SI report which triggered their Regulation 18 and be offered access to the underpinning evidence upon which the draft findings are based.

"And what do they do with that?"
Once the panel receive the PAP's formal response, it will consider it carefully and make appropriate amendments to their findings. That is not to say that all the PAP's comments will be incorporated – it's the president's call. However, the PAP's response in toto will become evidence in its own right and will be placed on record with the SI evidence pack.

"What does the boss think?"
Although it's not a specific requirement of the regulations, the president will inform the PAP's chain of command about Regulation 18 being engaged. Being involved in an accident, especially a fatal one, will be a pretty stressful experience and the chain of command have a duty of care towards their people, which includes looking after their welfare. For all the panel know, the PAP may be having huge domestic difficulties, with the accident and Regulation 18 just adding to the stress. By informing them about the Regulation 18, the chain of command will be better placed to keep an eye on them.

"Is he happy for you to crack on with your job?"
The mere fact that Regulation 18 has been engaged does not mean that the individual can no longer do their job or is not fit to operate in their usual role. If DG DSA considers that the actions of an individual present an ongoing risk to safety, he will inform the chain of command of this fact quite independently of any Regulation 18 action. The chain of command, and the PAP's peers, must retain a sense of proportion; ensuring that they keep an eye on the welfare of the individual, but guarding against jumping to any erroneous conclusions that the PAP has become a danger to themselves and others simply because of Regulation 18. Remember the threshold for Regulation 18 is deliberately low, so its initiation does not "prove" anything.

"What about disciplinary action?"
The 2008 Regulations prevent, by law, information given to a SI from being used against someone in disciplinary proceedings. For example, a witness statement given to the SI cannot be handed to the police and used to sustain a charge under the Armed Forces Act 2006. However, if the panel do come across information which it believes could point towards an offence having been committed, they will have to consider very carefully whether to report this to an individual's CO. We are all striving towards a just culture across Defence and we recognise it is neither beneficial nor appropriate to report (for disciplinary purposes) each and every misdemeanour. However, if the panel believe the actions of an individual have "crossed the red line", they are to report it to the CO. Once the CO becomes aware of a potential offence, he must (in accordance with the Armed Forces Act) investigate it. Whether he tasks the police or not is a matter for him, not the SI or the DSA. If the police become involved, they must gather their own evidence iaw their strict legal procedures. The decision on whether to charge an individual with an offence is a matter for the CO; the DSA has no powers of discipline. The CO will take his own independent legal advice on this – it's standard chain of command business. Once the chain of command has received a copy of the SI report, it may decide to initiate administrative action for, say, professional failings. There is nothing in law to prevent the chain of command from basing its decision to commence administrative action (e.g. AGAI) upon the content of the SI but it must then gather its own evidence and follow the process set down in the administrative action regulations.

Whilst the chain of command may use the SI report as a start point for administrative action, the DSA will never hand over SI witness statements, or other evidence created for and by the SI, to be included in the administrative action report. Again, remember that the threshold for Regulation 18 is very low and is way below the standard of proof required in disciplinary (beyond reasonable doubt) or administrative (balance of probabilities) proceedings, so the mere fact that Regulation 18 is in place does not necessarily mean that disciplinary/administrative action is warranted, nor should Regulation18 be seen as an automatic pre-cursor to such action.

"So, when's the report out then?"
In a non-fatal accident, the SI will be published on the MOD internet pretty soon after completion, having been suitably redacted for the public domain. The chain of command will see it slightly in advance of that, to enable fact-checking and the immediate progression of any recommendations made. With a fatal accident, there may be a Coroner's inquest or Fatal Accident Inquiry (in Scotland). We do not wait for the inquest/FAI to finish before we publish the SI but if the Coroner asks us to delay publication for any reason, we will consider that request.

AirClues

"It's a no blame safety investigation"
One of the areas we must work very hard on is ensuring that the report does not explicitly attribute blame, as we are required to by the Regulations. Whilst we can and do ensure that there is no explicit blame attributed, it can be difficult to avoid the inference of blame especially where the SI finds that human factors played a significant part; quite often the facts will speak for themselves and an element of culpability may be inferred. In such cases, the individual would be made a PAP and given access to the report in accordance with Regulation 18. We stress again that initiating Regulation 18 in this situation does not mean that action by the chain of command is automatically justified; the fact that the panel believed the PAP could/should have done things a bit better does not necessarily amount to a professional failing warranting further action.

So, next time you hear about Regulation 18, remember:

- It is a legal requirement for the panel;
- It is a legal entitlement for the individual;
- It is not a precursor to disciplinary or administrative action.

The SI process needs EVERYONE'S help to ensure that it is kept in perspective, noting that:

- It does not mean that the individual has done something wrong;
- It does not mean that disciplinary or administrative action is needed;
- It does not mean that the individual is not fit to perform their job in any way.

If individuals who are PAPs, their peers and the chain of command at all levels understand the drivers and requirements for Regulation 18, and ensure that their response is proportionate and supportive, we may start to chip away at the perception and misconception that surrounds it.

Regulation 18 from JSP 832 Persons entitled to attend
1. Subject to paragraph (2), a potentially affected person shall be entitled to be present at the proceedings of a service inquiry panel.

2. A potentially affected person's entitlement under paragraph (1) shall be subject to such conditions and exclusions as the president, after consulting the convening authority, may reasonably impose from time to time. Such exclusions may:

a. include an exclusion from being present at such part of the proceedings of the panel as the president may specify; and

b. be imposed before or at any time during the proceedings of the panel.

3. Where under paragraph (1) a potentially affected person is entitled to be present at any part of the proceedings of the panel.

a. he may be represented at that part by a legal representative or, with the consent of the president, he may be represented by a person other than a legal representative;

b. he may give evidence, question witnesses or produce any witness to give evidence, in each case as to any other matter as to which, in the opinion of the president, the potentially affected person may be affected in relation to his character or professional reputation by the findings of the panel;

c. where he is represented, his representative may question witnesses and may, with the permission of the president, address the panel; and

d. the president shall provide him with a copy of any part of the record of the proceedings of the panel, if the president considers it appropriate to do so.

4. In this regulation "potentially affected person" means a person who in the opinion of the president may be affected in relation to his character or professional reputation by the findings of the panel.

Spry's Comment:

Reg 18 is still perceived negatively and it is easy to understand why. The problem with reading reports on things that have happened is that we all have 20:20 hindsight; and that is why Reg 18 is so important and why the bar is set so low on when it is enacted. I hope that we in the RAF all understand our Just Culture and Human Factors and understand that we never perform perfectly, but sadly that might not be the case for everyone reading the SI once published. Hence it is very important to have the protection of Reg 18 as it affords us the opportunity to see what is being said or inferred and gives us the opportunity to comment and give context to the SI Panel – without it we would only find out what is being said once it has been published and have no opportunity to put our side across. Clearly none of us ever wants to be involved with or to have to give evidence to an SI, but if we are then we need to be grateful that Reg 18 is there for us.' ☐

AirClues

Airprox Highlights

With Comments from Wg Cdr Spry

Hawk v PA28
6 May 25
Airprox No. 2025078

The Hawk Pilot reported that, post turn over a mountain peak, the TCAS warned of traffic in close proximity. Whilst the front seat trainee handling pilot stated 'looking', a glance at TCAS showed something within 400ft. Four seconds later, the front seat pilot gained tally and performed a 6g break away from the traffic. The rear seat [pilot in charge] gained tally whilst the traffic passed through the HUD co-altitude, inside 1,000ft. The pilot provided the coordinates and time of the Airprox, noting that they were on a heading of 090° at 1,000ft radar altitude, with a light-aircraft heading 330°, and perceived to be on a collision course. Their last call on the Low Level Common frequency was at 1140:48, the other side of the mountain prior to the Airprox. The pilot further commented that they cannot make calls for every hill they go over as they are flying at 500mph and going over many hills/mountains. The last call was in an open area, most likely to reach any other aircraft in the local area.

They further reported that, after rolling out over the ridge, when the TCAS alerted the RADALT reading was 840ft with traffic 400ft below, but down a large hill, their altimeter would have read 3,450ft on the RPS of 1021hPa. They noted that the avoidance manoeuvre was flown at 1,000ft AGL, with the altimeter reading 2,700ft in the turn on 1021hPa (RPS) with the traffic slightly below, and that after rolling out of the avoidance turn the RADALT read approximately 1,000ft AGL.

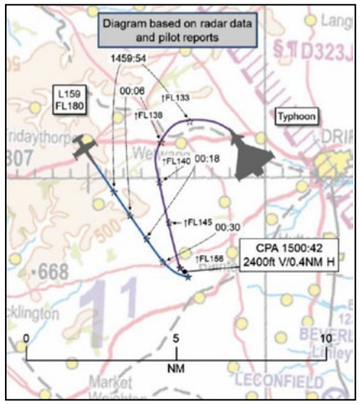
They surmised that it appeared that the traffic was flying at about 900ft AGL, which would probably read 3000ft on their [altimeter], but they were well within the Low Flying Area. They would not expect GA traffic to be less than 2000ft 'but that doesn't stop them'; there could be military traffic there, so they were always aware and looking out.

The PA 28 Pilot reported that, as they were closing in on their destination, they started a slow descent to get a better view of the hills as they were coming in to land. In the distance they saw a jet which suddenly turned in their direction and, with no avoidance attempt from the Hawk pilot [they believe], they banked steeply to get out of the way followed by a steep climb to increase separation.

To read the full report, see Airprox No. 2025078 on the Airprox Board website.

Spry's Comment:

This airprox serves as a reminder that even the best anti-collision systems have their limitations: in this case 'Terrain Masking' meant that the Hawk crew were only alerted by their TCAS to the threat at a late stage, leading to the need for a 6-G break to avoid a collision- a real 'cor-blimey' moment for the QFI and his student! The civilian pilot of the PA-28 saw the Hawk in time to take his own avoiding action which also increased the miss-distance and should be commended for his good lookout. Also, military pilots must remember that civilian GA traffic can be encountered anywhere in the UKLFS- their own rules for minimum heights simply state that they should 'not fly closer than 500ft to any person, vessel, vehicle or structure' (see SERA.5005). The UK airprox Board did note that the PA-28 pilot was not aware that he could monitor the UK Low Level Common Frequency (VHF 130.490 MHz) and if he had been listening out, he might have been forewarned that the Hawk was heading his way. My team at the RAF Safety Centre will continue to try and spread the message with our civilian counterparts at the Regional Airspace User Working Groups that they attend on my behalf. ☐



Aero L159 (Honey Badger) v Typhoon
8 May 25
Airprox Report No. 2025090

The L159 Pilot reported transiting out to EGD323 under a Traffic Service when they became aware of a Typhoon (believed to be [the Airprox Typhoon]) operating to their southeast and then east. They were initially told (at 14.54:45) that the traffic was on their nose, FL240 tracking northwest. They acquired radar contact and tracked the aircraft as it descended to FL100-120 at 14.58:27 at a range of 5.3NM. The radar dropped the track for 10sec from 14.58:52 to 14.59:03, however, on reacquisition it was 4.4NM away heading 120° at FL120, well below their level. They called visual at 14.59:19 as they saw it in a turn, low in the 10 o'clock position about 5NM away, and called to Boulmer that they thought it was in the CAS NOTAM (a warning that was active up to 16,000ft) and, at 14.59:55, they identified it to [Boulmer] as a Typhoon. They lost visual but were aware that it was sliding into the 8 o'clock. They commenced a left turn to aid visual reacquisition at 15.00:20 and became visual with a Typhoon low in the 7 o'clock heading south about 2,000ft below. They turned promptly to head east to increase separation. At that point they received a broken call from Boulmer detailing another formation 20NM away. The Typhoon had by then passed through the 6 o'clock and they saw it climbing out in the right 2 o'clock, heading about 210°, 3,000ft above. They requested the incident to be followed up as they suspected the separation (at CPA) was 1 to 2 miles.

The Typhoon Pilot reported they were number 2 of a pair of Typhoons conducting a composite sortie. There was a late addition to the sortie profile prior to walk, requiring only Typhoon 2 to conduct some test serials with the Joint Threat Emitter (JTE) at Staxton Wold. Due to the late change, CADS was not updated. After the first portion of the sortie, they completed AAR and then transited from AARA 8 to the Vale of York (VoY) with Swanwick Mil at FL240 with a request to operate FL050-FL300. At 14.54 they were cleared to operate in the block FL050-FL290, with Swanwick Mil requesting they operate no further north than RAF Leeming. Traffic was also called at this time that was correlated to a radar contact which was not assessed to be the L159. There were 2 additional contacts on radar.

One at 35,000ft, which was discounted, and another at a bearing and range of 324°/24NM, altitude 14,000ft, heading 150°, which in hindsight was assessed to be the Airprox L159. Of note, there were no correlated data-link tracks associated with any of these 3 contacts, despite other data-link tracks being transmitted. The Typhoon pilot began the serials with the JTE, which involved assessing in-cockpit indications at various altitudes and approach angles to the emitter. This was not dynamic tactical manoeuvring and was initiated at FL265. At 14.57:34 Swanwick Mil called "Traffic northwest 10 miles tracking southeast FL180", which they acknowledged, assessing it to be the radar contact previously at 14,000ft. They initiated a spiral descent and 2min later, at 14.59:30, were established at FL110 heading south with all JTE serials completed. At 14.59:44 they were in a left-hand turn through north in a gradual climb. Swanwick Mil was notified that they were complete above FL240. They were then cleared to operate FL050-FL240. At 15.00:15 the formation lead Typhoon pilot contacted them to organise a re-join over East Anglia.

At 15.00:42 they reported to Swanwick Mil they were complete in the VoY and requested a climb to FL240 and route to East Anglia. Swanwick Mil cleared them to climb to FL230 and own navigation to East Anglia. There was no information on traffic provided at that time. They were on a heading of about 140° and in a 9° nose up (NU) climb (note climb rate is not displayed as a default and Typhoon Force SOP is to climb at 8° NU in administrative phases of flight).

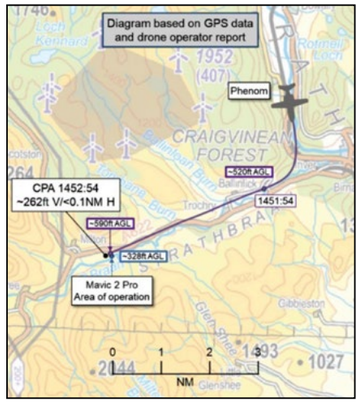
At 15.00:56 they passed through FL180 and subsequently levelled at FL230, transiting to East Anglia. They had no situational awareness as to the proximity of the L159 and were unaware of an Airprox until notified. They received one traffic call against a contact now believed to be the L159 when at 10NM separation. They had serviceable data-link and were receiving data-link tracks of other contacts in the VoY, however, there were no data-link tracks correlated to the 2 contacts within the VoY that were a potential conflict with the Typhoon, one of which was now believed to be the L159.

The Boulmer Controller reported WC4 was in control of the L159 formation (2 x L159), transiting to EGD323D/E. The Airprox L159 was at FL180, approaching EGD323K. Swanwick Mil was in control of the Airprox Typhoon. WC1 had previously called Swanwick Mil ref [the Typhoon] and was told they were cleared to operate at FL240 and would maintain until further notice. This information then changed when WC2 assistant called about the Typhoon and was told that they were cleared in a block 5000ft to FL290 in the Vale of York. WC4 and WC2 were in a landline call discussing the RTB plan for another formation, in an attempt to transit via EGD323K to also avoid the Typhoon. This was due to [the other formation] being low on fuel. At 15.02 [the L159 pilot] transmitted "I've just had a Typhoon climb through my level at my 6 o'clock within 1 mile". On looking at the radar history plots, it was evident that the Typhoon had indeed passed within close range of the L159. ADS-B replay also showed a sharp climb for the Typhoon whilst closing on the L159 from 14,000ft to 20,000ft when passing its level of FL180.

For the full report see Airprox No. 2025090 on the Airprox Board website.

Spry's Comment:

This Airprox resulted from a breakdown in standard traffic update procedures from the respective controlling agencies, and it's another instance where some onboard systems failed to detect conflicting traffic- the Typhoon pilot never knew the Honey Badger was above him as he climbed. Although the Honey Badger pilot maintained full situational awareness, and no collision risk materialised, the situation constituted a safety degradation. Both Boulmer and Swanwick accepted that they could've provided a better service to the pilots; the Boulmer Fighter controller was distracted trying to coordinate a safe routing for the Honey Badger and didn't pass updated traffic info on the Typhoon, while the Swanwick Air Traffic Controller didn't tell the Typhoon pilot that the Honey Badger they had previously warned about was now within half a mile of the Typhoon. Both agencies have investigated the incident and provided advice to their controllers on when to offer pertinent traffic information, and it's a timely reminder to all pilots that even when in receipt of an Air Traffic Service, we need to stay alert and keep looking out!!



Mavic 2 Pro v Phenom
16 Jul 2025
Airprox No. 2025160

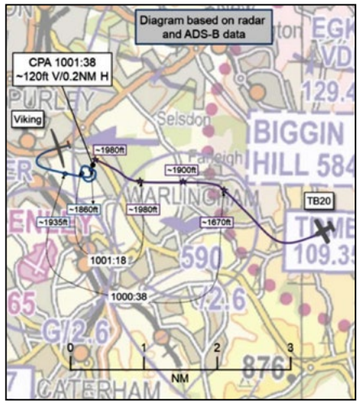
The Mavic 2 Pro Pilot reported that, after taking off at 14.40, the drone was flying a pre-made autonomous flight plan. The drone's altitude was 100m (328ft) AGL and was in sight during the whole flight. At 14.52 they had the drone flying almost directly overhead. The Phenom flew nearly directly over the drone. They noted that the Phenom was flying at 1,175ft (354m) AMSL1 according to tracking software. They were stood at 222m (728ft) AMSL (OS locater app). Their Mavic 2 Pro was flying at 322m (1,056ft) AMSL. The drone and aircraft were approximately 40-50m apart. Once double checking the airspace was clear visually, they landed the drone at 1456 and double-checked the airspace for restrictions. There were none in the area.

The Phenom Pilot reported they were on a low-level route which was completed before climbing up for a medium level transit from 5NM south of RAF Leuchars. There had been nothing significant to report on the sortie. As a crew, they had since been informed that an Airprox had been submitted in the vicinity of Perth from a drone operator. On looking back over CADS and Low Flying charts that were used on the day with NOTAMs, there appeared to be no information to notify them of UAS operations and both crew members were certain that no UAS was ever spotted during the sortie. The aircraft was flown at or above 500ft Minimum Separation Distance (MSD) throughout the sortie.

For the full report see Airprox No. 2025160 on the Airprox Board website.

Spry's Comment:

Military aircraft routinely operate in the UKLFS and 'See and Avoid' is a weak barrier in preventing a collision with a drone. It is therefore vital that we use all available sources of information, such as drone notification apps, and engage with the drone operator community to better understand where and when our activities overlap and how best to prevent accidents. In this instance a collision was avoided due to the drone remaining below 400ft AGL iaw the Drone and Model Aircraft Code and the Phenom crew remaining above 500ft MSD iaw their authorisation!



Viking vs TB20
29 Jun 2025
Airprox No. 2025127

The Viking Pilot reported that, whilst conducting thermal soaring within the local area upwind of the airfield and conducting their lookout scan, they saw a powered aircraft from their four o'clock position through to their one o'clock position. They continued their thermal turn away from the path of the aircraft. They called up Kenley Radio to report an Airprox because the other aircraft was co-level and passed close enough to startle and cause them concern. There were no indications on [their electronic conspicuity equipment].

It was their opinion that the other aircraft was unsighted of them and did not take an evasive manoeuvre away from them. Having reviewed an ADS-B data tracking source, it had shown the other aircraft involved was a TB20. The matter was reported to Biggin Hill Tower.

The TB20 Pilot reported that they took off from the departure aerodrome at 0958. They then made a standard right turn on a heading of approximately 320°, avoiding the noise sensitive areas to depart the aerodrome on the typical routeing for westbound traffic to the north of Kenley. They levelled off at around 1900ft, Biggin Hill's METAR had cloud broken at 2000ft. They then gradually turned towards the west to pass to the north of Kenley, keeping a good lookout for gliders and other traffic. They and their passenger both spotted a first glider to the south of Kenley, far from their flightpath. A second glider then appeared, which appeared to be manoeuvring to the north of Kenley and ahead of their aircraft. They made an immediate right turn to remain clear of the glider and pass it on the pilot's side of their aircraft. Once clear of the glider, they gradually turned back towards the west and resumed their flight to their destination.

The RAF Kenley Air/Ground Operator reported that they were the Duty Supervisor at the time of this event and were acting as Military Air/Ground Radio Operator (MAGRO) for Kenley Radio. They heard and saw a single-engine piston aircraft to the north of RAF Kenley and noted that it did not look like it was too close or would overfly the airfield. Shortly after, they received a radio call from the Viking aircraft pilot stating that they had experienced an Airprox. They asked whether the aircraft commander was intending on returning to base and they advised that they were content to continue with their sortie but would return within 10min. They had not sighted the proximity between the two aircraft.

The Biggin Hill Approach Controller reported that the pilot of the TB20 was on a Basic Service leaving the ATZ westbound and was asked to report abeam the gliding site at Kenley and informed that they were active, the pilot acknowledged this and subsequently reported abeam Kenley and left the frequency; no other report was made. The ATCO was later made aware that the pilot receiving a service from them had been involved in a reported Airprox with RAF Kenley site.

For the full report see Airprox No. 2025127 on the Airprox Board website.

Spry's Comment:

This Airprox occurred in Class G airspace, and both aircraft had Electronic Conspicuity (EC) equipment fitted. The Viking was using FLARM and a SkyEcho with ADBS out, and the TB20 was using SkyEcho. In this configuration the TB20 pilot should have been warned about the presence of the Viking but no alert was generated. The effectiveness of EC is dependent on several factors including aerial placement, relative bearing, and compatibility. There are various types of EC on the market and a lack of compatibility results in pilots/companies selecting the system that best meets their needs and budget. This leaves notable gaps in EC coverage which the CAA are seeking to address. Thankfully, in this Airprox both pilots saw each other in sufficient time and manoeuvred to increase the miss distance.

Safety Contacts:

Group / Station / Unit	Flight Safety Contact	Health and Safety and Environmental Protection Advisors
1 Gp	Air-1Gp-Star	
2 Gp	Air-2Gp-Air Safety	
11 Gp	Air-11Gp-Safety	
22 Gp	22Gp-DFT	
Air Support	Air-Support	
BM	Air-11Gp-BM	
JAC	JAC-Safety	
Test and Evaluation (ASWC)	ASWC-TEAirWg Air Safety	
1 ACC	1ACC-Flight Safety	
2 FTS	SYE-2FTS-DASOR	SYE-2FTS-HQ-SHSA
3 FTS	3FTS-HQ-ASM	3FTS-HQ-Platform Safety
4 FTS	4FTS-Air Safety	
6 FTS	6FTS-HQ-AST	
Air Cadets (RAFAC)	RAFAC-HQ-SafetyCtr	
Air Mobility HQ	Air-1Gp AM	
Boulmer	BOU-Stn-MySafety	
Benson	Ben-Safety	
MOD Boscombe Down	ASWC-BSD	
Brize Norton	BZN-Air Safety	
Combat Air Force HQ	CAFHQ	
Coningsby	CON-OSW-SSC	
Cosford	COS-Stn Flt Safety	
Cranwell	CRN-TotalSafety	
Defence Geographic Centre	UKStratCom-DI-NCGI-DGC	
Fylingdales	FYL-Spt	
Halton	HAL-Ops-Airfield-Ops	HAL-SSHEA
Henlow	HLW-SHE	HLW-SHE Advisor
High Wycombe	HWY-Flight Safety	HWY-SSHEA
Honington	HON-Stn SHEA	
ISTAR Air Wing	Air-1Gp-ISTAR	
Leeming	LEE-ASMT-SFSO	
Leuchars	LOS-OSW-LEU SFSO	
Lossiemouth	LOS-SafetyCentre OC	LOS-P8ASafetyTeam
Marham	MRM-SAFETYANDASSURANCE	
No 1 AIDU	UKStratCom-DI-NCGI-AIDU-OpsCntr	
Northolt	NOR-Safety	
Odiham	ODI- AST	
Swanwick	SWK-78Sqn-Dep FSO	
Shawbury	SHY-ASMT-ASM	SHY-SHSA
Spadeadam	SPD-AirBase	SPD-AirBase-SHSO and EPO
St Mawgan	SMG-ENG-	SMG-SHEF
Syerston	SYE-2FTS-DASOR	
Tactical Supply Wing	TSW-Functional-Safety	
UK AWR	Air-2Gp-SUAM	
UK JFAC	Air-11Gp-JFAC	
Valley	VAL-OpsWg SFSO	
Waddington	WAD-SafetyCentre	
Wittering	WIT-Ops Sqn-SFSO	
Woodvale	WDV-Aerodrome Manager	
Wyton	UKStratCom-DI-NCGI-Wyt-SHEA	
Overseas Flight Safety Contacts		
Al Udeid	83EAG-A3 Flight Safety	
Ascension	BFSAI-ASC Ops	
Akrotiri	BFC-AKI-Safety	
83 EAG	83EAG-FS	
Gibraltar	GIB-RAF-ASM	
MPA	BFSAI-AirOps	
Defence Safety Authority (DSA)	DSA -MAA